

IBM Netfinity Servers

S37L-2020-00

**IBM Netfinity 5500 M20 - Type 8662
Models 31Y, 3RY, 41Y, 4RY**

Hardware Maintenance Manual

February 1999

**We Want Your Comments!
(Please see page 370)**

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Note

Before using this information and the product it supports, be sure to read the general information under "Notices" on page 374.

First Edition (February 1999)

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About this supplement

This supplement contains diagnostic information, Symptom-to-FRU Indexes, service information, error codes, error messages, and configuration information for the Netfinity 5500 M20 - Type 8662.

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)

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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。

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注意及危险声明 (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。

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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 사용됩니다.

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 읽도록 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>

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General checkout

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 the 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. See "Diagnostic programs" on page 11.

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.

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 285.
4. If the computer hangs and no error is displayed, go to "Undetermined problems" on page 325.
5. Power Supply problems, see "Symptom-to-FRU index" on page 285.
6. Safety information, see "Safety information" on page 338.
7. For intermittent problems, check the error log; see, "Error logs" on page 31.

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.
- Record any POST error messages displayed on the screen. If an error is displayed, look up the first error in the "Symptom-to-FRU index" on page 285.
- Check the information LED panel System Error LED; if on, see "Information panel system error LED" on page 290.
- Check the System Error Log. If an error was recorded by the system, see "Symptom-to-FRU index" on page 285.
- Start the Diagnostic Programs. See "Running diagnostic programs" on page 14.
- Check for the following responses:
 1. One beep.

(Step 004 continues)

(CONTINUED)

004 (continued)

2. Readable instructions or the Main Menu.

DID YOU RECEIVE BOTH OF THE CORRECT RESPONSES?

Yes No

005

Find the failure symptom in "Symptom-to-FRU index" on page 285. Or, use remote video mode to monitor and access POST or to look at the System Error Log. See "Using remote video mode to monitor and access POST" on page 58.

006

- Run the Diagnostic Programs. If necessary, refer to "Running diagnostic programs" on page 14. If you receive an error, go to "Symptom-to-FRU index" on page 285. If the diagnostics completed successfully and you still suspect a problem, see "Undetermined problems" on page 325.
-

Diagnostic tools

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

- Diagnostic Programs
- Power-on self-test (POST)
- POST beep codes
- Error messages
- Troubleshooting charts
- Option diskettes

For a list of error codes and messages, see “Symptom-to-FRU index” on page 285.

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 the server, such as the 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

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.

To run the Diagnostic Programs, see “Running diagnostic programs” on page 14.

For a list of error codes and messages, see “Symptom-to-FRU index” on page 285.

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 the 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 the 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 list of error codes and messages, see “Symptom-to-FRU index” on page 285.

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.
- More than one beep indicates that POST detected a problem. For a list of error codes and messages, see “Symptom-to-FRU index” on page 285.

Error messages - descriptions

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 the 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 a list of error codes and messages, see "Symptom-to-FRU index" on page 285.

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 temporarily in the Test Log and logged in the System Error Log when diagnostics are run. For a list of error codes and messages, see "Symptom-to-FRU index" on page 285.

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 the software.

System error log

The System Error Log contains all error and warning messages issued during POST and all system status messages from the Netfinity Advanced System Management Processor. See "System error log" on page 31 for information about how to view the System Error Log.

Option diskettes

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

If the 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.

Running diagnostic programs

Note

The allowed keyboard and mouse configurations for running diagnostics are as follows:

1. PS/2 keyboard, PS/2 mouse
2. PS/2 keyboard, no mouse -- With no mouse, you will not be able to navigate between test categories directly using the [Next Cat] and [Prev Cat] buttons. All other mouse-selectable buttons are also available via function keys.
3. USB keyboard, no mouse -- With no mouse, you will not be able to navigate between test categories directly using the [Next Cat] and [Prev Cat] buttons. All other mouse-selectable buttons are also available via function keys.
4. USB keyboard, USB mouse -- The USB mouse will not be used by diagnostics; so, with no mouse, you will not be able to navigate between test categories directly using the [Next Cat] and [Prev Cat] buttons. All other mouse-selectable buttons are also available via function keys.

You can test the USB keyboard using the regular keyboard test but you will not be able to test the USB mouse. Also, you can only run the USB Hub test if there are no USB devices attached.

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.

Also, be sure to check the Test Log for further diagnostic error information.

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.
3. You might have to install a wrap connector on the active parallel, serial, or Ethernet port to obtain accurate test results for these ports. If you do not have a wrap connector, contact your IBM reseller or IBM marketing representative.
4. You might need a scratch diskette (that is, a diskette which has no contents that you want to save) to obtain accurate test results when testing the diskette drive.
5. The keyboard and mouse (pointing device) tests assume that a keyboard and mouse are attached to the server.

Tips on the diagnostic programs:

1. For system board tests, first remove all installed adapters.
2. Hard drive surface analysis can be found on the **Utility** menu.
3. Check the System Error Log for entries when memory errors occur.
4. Universal serial bus testing notes:
 - The USB interface test will fail with a normal keyboard and a USB device attached.
 - The USB interface test will abort with a USB keyboard and USB mouse in use.
 - The system will disable USB during POST with a standard keyboard attached.
5. When viewing a test, if it has dashes (-) through its box, it is unable to run because the relevant device is either not installed or is failing.

To load the diagnostic programs:

1. Turn on the server and watch the screen.
If the server is turned on already, shut down the 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 Diagnostics Programs screen appears.

To run the diagnostic programs:

1. Select either **Extended** or **Basic** from the top of the screen.
2. 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 or by pressing **F3**.

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. Press **F3** to view the error information in the Test Log.

For a list of error codes and messages, see “Symptom-to-FRU index” on page 285

Viewing the test log

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

Notes

The Test Log will not contain any information until after the diagnostic program has run.

The Test Log is maintained in memory while the server is powered on. Turning off the power clears the Test Log.

Be aware of the function keys and other instructions at the bottom of each screen as you view the Test Log.

To view the Test Log:

1. Turn on the server and watch the screen.
If the server is turned on already, shut down the 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 M20.

Microprocessor

- Intel® Pentium® III Xeon™ microprocessor with MMX™ technology
- 32 KB of level-1 cache
- 512 KB of level-2 cache (min.)
- Expandable to four microprocessors

Memory

- Eight dual inline memory-module (DIMM) sockets
- Standard: 256 MB (min.), expandable to 4 GB
- 100 MHz registered, error correcting code (ECC), synchronous dynamic random access memory (SDRAM)

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

(standard only on tower 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 models only) enables installation of options that provide extra expansion bays

Expansion Slots

Up to six adapters can be installed.

- Four 32-bit hot-plug PCI slots
- One standard (non-hot-plug) 32-bit PCI slot (for short card only)
- One 16-bit ISA slot

Upgradable Microcode

- BIOS, diagnostics, Netfinity Advanced System Management Processor, and ServeRAID upgrades (when available) can update EEPROMs on the system board

Security Features

- Door and top cover lock (tower models 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
- Voltage regulator modules (VRMs)

Integrated Functions

- Two serial ports
- Two universal serial bus (USB) ports
- One parallel port
- Mouse port
- Keyboard port
- Video port
- IBM ServeRAID controller (two channels) on system board
- 10BASE-T/100BASE-TX Ethernet port (controller on system board)
- Redundant Ethernet capability, through the use of an optional network interface card (NIC)
- Netfinity Advanced System Management Processor on system board
- Dedicated Advanced System Management I/O port
- Video controller (with 1 MB video memory) compatible with:
 - Super video graphics array (SVGA)
 - Video graphics adapter (VGA)
- RS-485 port
- External SCSI port

Power Supply

- 500 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 500 W power supply is available

Redundant Cooling

- Four hot-swap fans

Configuring the server

The following configuration information supports Netfinity 5500 M20 - Type 8662.

- “Configuration overview” on page 20
- “Configuration/Setup Utility program” on page 21
- “Configuration/Setup Utility main menu” on page 22
- “Configuring options” on page 32
- “Configuring ISA and PCI adapters” on page 33
- “Resolving configuration conflicts” on page 33
- “Configuring the ethernet controller” on page 35
- “Ethernet cable specifications” on page 36
- “Ethernet connection problems” on page 39
- “Failover for redundant Ethernet” on page 40

Configuration overview

You play a key role in how the 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 the server depend on the number and types of devices and programs that you install.

The 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 the server, the more you will have to interact with the server and the devices to correctly configure the system.

The 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 the 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. Refer to "ServeRAID system board controller" on page 66 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 the 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 176 and "System board jumpers" on page 280.
3. Set jumpers or switches on the device.
See the device installation instructions.

4. Install the device in the server.

See "Locations/Removals" on page 160.

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 31 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 33.

Configuration/Setup Utility program

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

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

After you run and exit from the Configuration/Setup Utility program, configuration information is stored in 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 this information and the information that comes with the option before making changes.

Finally, should you ever need to restore the default configuration, the default configuration can be loaded by starting the system and then pressing the reset button four times, waiting 15 seconds between each press. Once the configuration has reset to the default, it must be saved in Setup to be stored in CMOS.

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**.

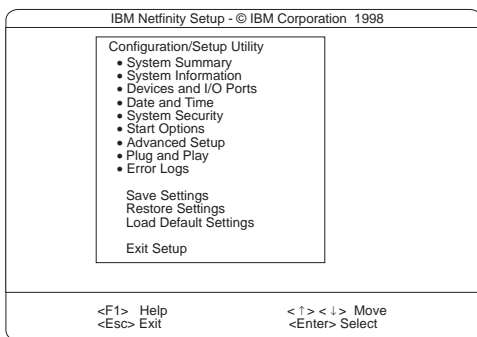
Note

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 25 for additional information.

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

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:



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 the 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 Left Arrow (←) or Right 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 the Netfinity 5500 M20, 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 Netfinity Advanced System Management Processor, diagnostics, and BIOS.

System card data: Select this choice to view information for the system board and processor board.

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 30 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 Netfinity Advanced System Management Processor and operating system. Serial port B is used by the operating system only. Management port C is controlled exclusively by the Netfinity Advanced 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 31.
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 or region. 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 the 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 the 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	<ul style="list-style-type: none"> No password required to start system. You can access all choices on the Configuration/Setup Utility main menu.
Power-on password only	<ul style="list-style-type: none"> You must enter the password to complete the system startup. You can access all the choices on the Configuration/Setup Utility main menu.
Administrator password only	<ul style="list-style-type: none"> You must enter the password to complete the system startup. Administrator password provides access to all choices on the Configuration/Setup Utility main menu.
Administrator <i>and</i> power-on password	<ul style="list-style-type: none"> You can enter either password to complete the system startup. <ul style="list-style-type: none"> Administrator password provides access to all choices on the Configuration/Setup Utility 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.

Note

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 the power-on password. Keep a record of the 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 28 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).
- If an Administrator Password has not been set, you can change the position of the Power-On Password Override jumper, as described in “Bypassing an unknown power-on password” on page 45.
- You can remove the battery as described in “Battery replacement” on page 173 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**.

Note

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

Using the Administrator Password menu: The administrator password (sometimes called a supervisor-level password) controls access to some features of the server, including the Configuration/Setup Utility program.

Attention

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

Core chip set control: Select this choice to change settings for the bridge chips in the server.

Cache control: Select this choice to enable or disable the microprocessor caches. 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 0 MLT:** This setting is for the primary bus 0 master latency timer (MLT). It can be used to help tune performance of the server.
- **PCI Primary Bus 1 MLT:** This setting is for the primary bus 1 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**. If you boot the system with the bad row empty, this choice resets the row.

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

Virtual wire mode selection: Select this choice to change the virtual wire mode in which the server will start. The default is virtual wire IOAPIC mode. Only select virtual wire mode PIC mode to run non-SMP operating systems, such as Novell NetWare 3.xx.

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 164.

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 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 Netfinity Advanced 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.

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 the server.

1. Run the Configuration/Setup Utility program and record the current configuration settings.
See "Configuration/Setup Utility program" on page 21.
2. Set jumpers or switches on the server system board.
See "Changing jumper positions" on page 176 and "System board jumpers" on page 280.
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 161.
5. Install software programs.
See the installation instructions that came with the software.
6. Resolve configuration conflicts.
See "Resolving configuration conflicts" on page 33.

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 M20 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 31 and “Plug and Play technology” on page 164 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.”

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 23). Verify that the IRQ assignments are correct.

The Netfinity 5500 M20 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.

Resolving configuration conflicts

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

Conflicts in the configuration occur if:

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

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

The Configuration/Setup Utility program configures the system hardware and PCI IRQs. The program does not consider the requirements of the operating system or the application programs. See "Resolving software configuration conflicts" on page 34 for additional information.

Resolving hardware configuration conflicts:

Use the following information to help resolve hardware configuration conflicts:

1. Run the Configuration/Setup Utility program to view and change resources used by the system board functions and the installed options. Record the current settings before making any changes. (See "Configuration/Setup Utility program" on page 21 for instructions.)
2. Determine which adapter or device is causing the conflict.
3. Change adapter jumpers or switches. Some devices use jumpers and switches to define the system resources that the devices need. If the settings are incorrect or set to use a resource that cannot be shared, a conflict occurs and the device will remain deactivated by the configuration program.
4. Remove the device or adapter. Some configurations are not supported. If you must remove an adapter, see "Adapters" on page 161.

Resolving software configuration conflicts:

The memory-address space and IRQs used by some hardware options might conflict with addresses defined for use through application programs or the expanded memory specification (EMS). (EMS is used only with DOS.)

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

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

To resolve conflicts, you can change the software or hardware configuration.

Note

Start the Configuration/Setup Utility program to view the addresses used by the system board functions. (See "Configuration/Setup Utility program" on page 21 for instructions.)

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

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

Configuring the ethernet controller

The Netfinity 5500 M20 server comes with an Ethernet controller on the system board. The Ethernet controller provides 10BASE-T and 100BASE-TX support through the RJ-45 connector on the back of the server. When you connect the server to the network, the Ethernet controller automatically detects the data-transfer rate (10 Mbps or 100 Mbps) on the network and then sets the controller to operate at the appropriate rate. That is, the Ethernet controller will adjust to the network data rate, whether the data rate is standard Ethernet (10BASE-T), Fast Ethernet (100BASE-TX), half duplex (HDX), or full duplex (FDX). This process is also known as auto-negotiation. This auto-negotiation occurs without requiring software intervention. The controller supports half-duplex (HDX) and full-duplex (FDX) modes at both speeds.

However, auto-negotiation works only if the hub or switch at the other end of the network also supports auto-negotiation. If the hub or switch does not support auto-negotiation, the speed (10 Mbps or 100 Mbps) will still be detected correctly, but half-duplex mode will always be selected. A full-duplex switch that does not support auto-negotiation will not attach to the Netfinity 5500 M20 server in full-duplex mode. In this case, if you want the network to operate in full-duplex mode, you must manually override the settings to obtain a full-duplex connection. Refer to the Ethernet documentation for additional information.

Attention

- The 10BASE-T Ethernet and the 100BASE-TX Fast Ethernet cabling in the network must be Category 5 or higher to meet various standards, including electromagnetic compatibility.
- You must install a device driver to enable the operating system to address the Ethernet controller. Use ServerGuide to install this device driver. Refer to the ServerGuide package for instructions on installing device drivers.

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 installed 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 faster response time 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 the operating system before you use the Ethernet controller.

The Ethernet controller supports the auto-detection mode only. When you install the device drivers and configure the Ethernet controller for use with the operating system, do not select the 10BASE-T mode. To ensure proper operation of the controller, always select the default parameters provided.

Notes

The Ethernet controller supports the operating systems that the server supports. To find out which operating systems the server supports, go to the following World Wide Web address:

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

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

Note

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

Ethernet cable specifications

The Ethernet controller on the system board provides 10BASE-T and 100BASE-TX support through the RJ-45 connector on the back of your server. When you connect the 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.

The Ethernet controller supports the auto-detection mode only. When you install the device drivers and configure the Ethernet controller for use with the operating system, do not select the 10BASE-T mode. To ensure proper operation of the controller, always select the default parameters provided.

The following information describes the specifications for the unshielded twisted-pair (UTP) cable that can be used to connect the server to an IEEE Standard 802.3 network.

To connect the server 10BASE-T or 100BASE-TX port to a 10BASE-T or 100BASE-TX port on a repeater, use a UTP cable with RJ-45 connectors at both ends. An EIA/TIA-568 Category 5 cable must be used for 10BASE-T and 100BASE-TX.

Attention

The 10BASE-T Ethernet and the 100BASE-TX Fast Ethernet cabling in the network must be Category 5 or higher to meet various standards, including electromagnetic compatibility.

The cables used in 10BASE-T or 100BASE-TX link segments do not require grounding. However, all devices connected to the cables must be grounded.

Connect the appropriate type of UTP cable to the repeater.

- If the port on the repeater is a crossover port (also called an MDI-X port), use a UTP cable that is wired as a straight-through cable.
- If the port on the repeater is not a crossover port (also known as an MDI port), use a UTP cable that is wired as a crossover cable.

Do not use telephone extension cables to connect the server to a repeater. The wire pairs in those cables are not twisted, and the cables do not meet other requirements for use in a 10BASE-T or 100BASE-TX network. You can identify telephone extension cables by their flat and thin appearance. UTP cables are rounder and thicker than telephone extension cables.

Table 1 on page 38 describes the specifications for UTP cables used in 10BASE-T and 100BASE-TX link segments. Cables for these link segments must be certified as EIA/TIA-568 Category 5.

Table 1. Cabling specifications for 10BASE-T and 100BASE-TX link segments

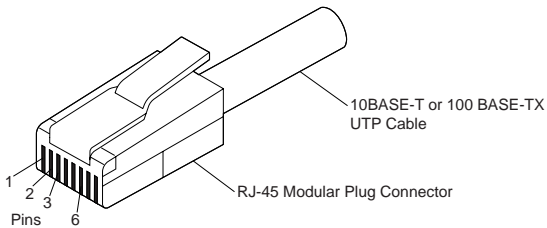
Characteristic	Specification ¹
Cable type	UTP cable with two twisted pairs of 22, 24, or 26 AWG ² wire
Nominal impedance	100 Ohms
Velocity of propagation	0.585 c ³
Maximum attenuation	<ul style="list-style-type: none"> • For 10BASE-T: 8 to 10 dB per 100 m at 10 MHz • For 100BASE-TX: 67 dB per 305 m at 100 MHz

- ¹ Cables that have been certified as EIA/TIA-568 Category 5 meet all 10BASE-T and 100BASE-TX specifications. An EIA/TIA-568 Category 5 cable must be used for 10BASE-T and 100BASE-TX.
- ² The cable can contain two to four twisted pairs, but only two of the pairs will be used by the 10BASE-T or 100BASE-TX network.
- ³ The **c** represents the velocity of light traveling in a vacuum, which is 300 000 km/sec (186 400 mi/sec).

Notes

AWG = American Wire Gauge
 EIA = Electronics Industries Association
 STP = shielded twisted pair
 TIA = Telecommunications Industries Association

The following figure illustrates the RJ-45 connector.



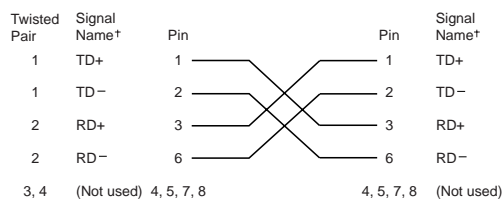
The following figure illustrates the wiring in straight-through cables.

RJ-45 Modular Connector		10BASE-T / 100 BASE-TX	RJ-45 Modular Connector	
Twisted Pair	Signal Name [†]	Pin	Pin	Signal Name [†]
1	TD+	1	1	TD+
1	TD-	2	2	TD-
2	RD+	3	3	RD+
2	RD-	6	6	RD-
3, 4	(Not used)	4, 5, 7, 8	4, 5, 7, 8	(Not used)

[†]Relative to the device connected to the adapter

The following figure illustrates the wiring in crossover cables.

RJ-45 Modular Connector 10BASE-T / 100BASE-TX RJ-45 Modular Connector



†Relative to the device connected to the adapter

Note

For additional information about Ethernet protocols, refer to your Ethernet documentation.

Ethernet connection problems

Note

1. If you use the integrated Ethernet controller, you must use Category 5 cabling. See “Ethernet cable specifications” on page 36 for additional information about Ethernet cable requirements.
2. If you directly connect two workstations (without a hub), or if you are not using a hub with X ports, use a crossover cable. To determine whether a hub has an X port, check the port label. If the label contains an X, the hub has an X port.

If the ethernet adapter cannot connect to the network, do the following.

1. Verify that the cable is installed correctly.
2. Check the Ethernet activity light on the front of the server.

Note

This light is off when you run the diagnostic programs in the Configuration/Setup Utility program.

If the Ethernet activity light is off:

- a. Make sure that the hub and network are operating, and that the correct device drivers are loaded.
 - b. There might be a defective Ethernet connector or cable, or a problem with the hub.
3. Make sure that you are using the correct device drivers that come with the server.
 4. Check for operating system-specific causes for the problem.
 5. Test the Ethernet controller or adapter.

How you test the Ethernet controller or adapter depends on which operating system is being used (see “Configuring the ethernet controller” on page 35).

Failover for redundant Ethernet

The Netfinity 5500 M20 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 the 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

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

Special considerations when combining failover and hot-plug functions:

If the 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.

OS/2

1. Add the redundant NIC adapter according to the instructions provided with the adapter and in "Adapters" on page 161.
2. Use the ServerGuide CDs to install the AMD PCNet Ethernet Family adapter device driver.
3. Using the MPTS Utility program, select the driver from the list and select the **Edit** button.

Note

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

4. Change the PermaNet Server Feature keyword to **TRUE** and specify the Primary and Standby slots that contain the redundant pair. Refer to "System board component locations" on page 279 for the locations and slot numbers of the PCI slots. The integrated controller is located in slot E (PCI primary bus 0, slot 14).
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 using the ServerGuide CDs to the 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 161.
2. Use the ServerGuide CDs to install the AMD PCNet Ethernet Family adapter device driver.
3. From the NT desktop, select **Control Panel**, then select the **Network** icon, then the **Adapters** tab.
4. Highlight one of the adapters that will be in the redundant pair and then select the **Properties...** button.
5. Check the **Grouping** box. This will show the possible combinations for redundant pairs.

6. Select the adapter pair you want and then select **OK**. Note that the integrated Ethernet controller is located at PCI primary 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 pop-up message is generated also.

IntraNetWare

1. Add the redundant NIC adapter according to the instructions provided with the adapter and in "Adapters" on page 161.
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 than 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.

Additional service information

The following additional service information supports Netfinity 5500 M20 - Type 8662.

- “Bypassing an unknown power-on password” on page 45.
- “Ethernet subsystem error messages” on page 45.
- “Light path diagnostics” on page 48.
- “Netfinity Advanced System Management Processor” on page 52.
- “Software installation” on page 60.
- “Specifications” on page 61.
- “Status LEDs” on page 63.
- “Using the ServeRAID Advanced Configuration Functions” on page 63.

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 28 for details.) Start the Configuration/Setup Utility program and change the power-on password. See “Using the power-on password menu” on page 26.
- Change the position of the jumper on J24 as described in Table 18 on page 280 to bypass the power-on password check. You can then start the Configuration/Setup Utility program and change the power-on password. See “Using the power-on password menu” on page 26.

Ethernet subsystem error messages

Notes

1. The following error messages may be displayed if "Network" is selected in the startup sequence of the configuration program.
2. The following error messages are available only with the integrated Ethernet subsystem. These error messages are not available when RPL (remote program load) or DHCP (dynamic host configuration protocol) is used through optional network adapters.

RPL-related error messages:

If a failure condition occurs after the Ethernet controller is initialized, an error message appears on the screen.

The two most common error messages are:

RPL-ROM-ERR: 105
The integrated Ethernet failed the loopback test.

RPL-ROM-ERR: 107
Media test failed; check the cable.

Error 105 indicates that a power-on diagnostic test performed by the Ethernet module did not execute correctly.

Error 107 indicates that the cable from the LAN is not securely connected to the Ethernet port on your computer. Check the cable to ensure that it is properly connected.

The following list contains other error codes that might occur, followed by a description of the error code.

Note

An *x* value that follows an error code represents any alphanumeric character.

Table 2 (Page 1 of 3). Ethernet controller messages

Error Code	Description
RPL-ROM-ERR: 100	The integrated Ethernet controller cannot be found.
RPL-ROM-ERR: 101	The integrated Ethernet controller was unable to initialize.
RPL-ROM-ERR: 102	The integrated Ethernet controller could not be reset.
RPL-ROM-ERR: 103	There are multiple Ethernet controllers or adapters in the system. Specify the correct serial number in the NET.CFG file.
RPL-ROM-ERR: 104	The integrated Ethernet controller EEPROM is faulty or not present.
RPL-ROM-ERR: 106	The integrated Ethernet controller is configured for Plug and Play in a non-Plug and Play system.
RPL-ROM-ERR: 110	The integrated Ethernet controller RAM failed the memory test.
E61	Service boot (startup) canceled; that is, the boot diskette image was not downloaded from the network.
E62	Cannot initialize controller.
E63	Cannot initialize controller.
E67	Cannot initialize controller.
E6d	Cannot find boot protocol (BOOTP) server.
E6e	Cannot start from downloaded image.
E71	Too many multicast trivial file transfer protocol (MTFTP) packages.
M10	Address resolution protocol (ARP) canceled by keystroke.
M11	ARP timeout.
M20	Cannot copy memory.
M21	Cannot write to memory.

Table 2 (Page 2 of 3). Ethernet controller messages

Error Code	Description
M22	Cannot write to memory.
M30	Cannot ARP trivial file transfer protocol (TFTP) address.
M31	TFTP canceled by keystroke.
M32	TFTP open timeout.
M33	Unknown TFTP parameter (operation code).
M34	TFTP read canceled by keystroke.
M35	TFTP timeout.
M38	Cannot open TFTP connection.
M39	Cannot read from TFTP connection.
M40	BOOTP canceled by keystroke.
M40	DHCP canceled by keystroke.
M41	BOOTP timeout.
M41	DHCP timeout.
M42	No client or server Internet protocol (IP) address.
M43	No boot (startup) file name.
M44	Cannot ARP redirected BOOTP server.
M6f	System is locked. Press Ctrl+Alt+Del to restart.
M90	Cannot initialize controller for multicast address.
M91	MTFTP canceled by keystroke.
M92	MTFTP open timeout.
M93	Unknown MTFTP parameter (operation code).
M94	MTFTP read canceled by keystroke.
M95	MTFTP timeout.

Table 2 (Page 3 of 3). Ethernet controller messages

Error Code Description
M96 Cannot ARP MTFTP address.
M98 Cannot open MTFTP connection.
M99 Cannot read from MTFTP connection.
Txx If you are running a TFTP session to another computer, an error message generated by the TFTP session will contain a message prefix of Txx.

Light path diagnostics

The light path diagnostics built into the server allow you to quickly identify the type of system error that occurred. The server is designed so that any LEDs that are illuminated remain illuminated when the server shuts down as long as the AC power source is good and the power supplies can supply +5V dc current to the server. This feature helps you isolate the problem if an error causes the server to shut down.

The light path diagnostics begin with the System Error LED on the information LED panel. (See the illustration in “Information LED panel” on page 205.) When this light is illuminated, use the following information to isolate the problem.

- If the System Error LED on the information LED panel on the front of the server is on, a system error was detected. Check to see which of the LEDs on the diagnostics panel inside the server are on.
 - Diagnostics panel LEDs off
Error log is 75% full or more.
Action: PFA alert logged.
Check System Error Log for additional information.
 - SMI LED on
A systems management event occurred.
Action: Restart the server.
If the problem persists, go to “General checkout” on page 8. Check System Error Log for additional information.
 - NMI LED on
A non-maskable interrupt occurred. The PCI 1 or PCI 2 LED will probably also be on.
Actions:

1. If the PCI 1 or PCI 2 LED is on, follow the instructions for those LEDs.
2. If the PCI 1 or PCI 2 LED is not on, restart the server.

If the problem persists, go to “General checkout” on page 8. Check System Error Log for additional information.

– PCI 1 LED on

An error occurred on PCI primary bus 0. The adapter in PCI slot 5 or the system board caused the error.

Actions:

1. Check the error log for additional information. If the error log indicates a problem with the integrated ServeRAID controller or the Ethernet controller, go to “General checkout” on page 8.
2. If you cannot determine that the adapter is failing from the information in the error log, try to determine if it is failing by removing the adapter from the PCI primary bus 0 (PCI slot 5) and restarting the server.

If the problem persists, go to “General checkout” on page 8.

– PCI 2 LED on

An error occurred on PCI primary bus 1. An adapter in PCI slot 1, 2, 3, or 4 or the system board caused the error.

Actions:

1. Check the error log for additional information.
2. If you cannot correct the problem from the information in the error log, try to determine the failing adapter by removing one adapter at a time from PCI primary bus 1 (PCI slots 1–4) and restarting the server after each adapter is removed.

If the problem persists, go to “General checkout” on page 8.

– CPU Wrong Slot LED on

The combination of microprocessors and terminator cards is not valid.

Action: Install the microprocessors in the correct order. See Table 13 on page 240.

- MEM LED on
A memory error occurred.
Actions:
 1. Check the DIMM Error LEDs on the memory board.
 2. Replace the DIMM indicated by the lit DIMM Error LED.
 3. Replace the memory board.

If the problem persists, go to “General checkout” on page 8.
- FAN 1 LED on
Fan 1 has failed or is operating too slowly.
Note: A failing fan can also cause the TEMP and DASH1 LEDs to be on.
Action: Replace fan 1.
- FAN 2 LED on
Fan 2 has failed or is operating too slowly.
Note: A failing fan can also cause the TEMP and DASH1 LEDs to be on.
Action: Replace fan 2.
- FAN 3 LED on
Fan 3 has failed or is operating too slowly.
Note: A failing fan can also cause the TEMP and DASH1 LEDs to be on.
Action: Replace fan 3.
- FAN 4 LED on
Fan 4 has failed or is operating too slowly.
Note: A failing fan can also cause the TEMP and DASH1 LEDs to be on.
Action: Replace fan 4.
- TEMP LED on
The system temperature has exceeded the maximum rating.
Actions:
 1. Check to see if a fan has failed. If it has, replace the fan.
 2. Make sure the room temperature is not too hot. (See “Specifications” on page 61)

If the problem persists, go to “General checkout” on page 8.
- VRM LED on
One of the voltage regulator modules on the processor board has failed.
Actions:

1. Check the VRM Error LEDs on the processor board.
2. Turn off the server, reseal the VRM indicated by the lit VRM Error LED, and restart the server.
3. If the problem persists, replace the VRM.
4. Replace microprocessor for that VRM and the companion VRM (see "Processor board component locations" on page 254.)
5. Replace processor board.

If the problem persists, go to "General checkout" on page 8.

– CPU LED on

One of the microprocessors has failed.

Actions:

1. Check the Microprocessor Error LEDs on the processor board. Also, if possible, check the System Error Log for additional information. If temperature problems are indicated in the log, check fans.
2. Turn off the server, reseal the microprocessor indicated by the lit Microprocessor Error LED, and restart the server.
3. If the problem persists, replace the microprocessor.
4. Replace both VRMs for that microprocessor. (see "Processor board component locations" on page 254.)
5. Replace processor board.

If the problem persists, go to "General checkout" on page 8.

– PS1 LED on

The primary power supply has failed.

Action: Replace the primary power supply.

– PS2 LED on

The secondary power supply has failed.

Action: Replace the secondary power supply.

– DASD 1 LED on

A hot-swap hard disk drive has failed on SCSI RAID channel 1.

Actions:

1. Check the error log for additional information. If the error log indicates a temperature problem and the fans are working correctly,

go to “General checkout” on page 8.

2. If the amber Hard Disk Status LED on one of the hot-swap hard disk drives is on, see “Controls and indicators” on page 181 for more information.

– DASD 2 LED on

A hot-swap hard disk drive has failed on SCSI RAID channel 2.

Actions:

1. Check the error log for additional information. If the error log indicates a temperature problem and the fans are working correctly, go to “General checkout” on page 8.
 2. If the amber Hard Disk Status LED on one of the hot-swap hard disk drives is on, see “Controls and indicators” on page 181 for more information.
- System Error LED on the information LED panel on the front of the server is off. The light path diagnostics have not detected a system error.

Netfinity Advanced System Management Processor

The following information is about the Netfinity Advanced System Management Processor that is integrated in the Netfinity 5500 M20. It also describes how to access the Netfinity Advanced System Management Processor without Netfinity Manager.

Note

To use all of the functions of the Netfinity Advanced 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 189 for information about serial port A.

The Advanced System Management service gives you the ability to configure and monitor many features of the server's Netfinity Advanced System Management Processor. You can connect to, and directly access and control, the Netfinity Advanced 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 the keyboard that will then be relayed to the remote system.

The Netfinity Manager software is included in the 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 Netfinity Advanced 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:

- Netfinity Advanced System Management Processor (built into the Netfinity 5500 M20)
- Netfinity Manager or Client Services for Netfinity Manager, version 5.10.4 or later
- 2 MB of available hard disk drive space

Accessing the Netfinity Advanced System Management Processor without Netfinity Manager:

If for some reason you are unable to use Netfinity Manager to access and manage the Netfinity Advanced System Management Processor, you can use a terminal program and a modem to connect directly to the Netfinity Advanced System Management Processor. This modem should be connected to management port C. (See "Management port C" on page 190.) 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 M20) system on or off, shutdown and restart the server, and initiate remote video mode on the Netfinity Advanced 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 Netfinity Advanced System Management Processor:

1. Use a terminal program to establish a connection with the Netfinity Advanced 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 Netfinity Advanced System Management Processor.

When you have established a connection with the Netfinity Advanced 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 Netfinity Advanced System Management Processor. You can use one of two username and password combinations:

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

Note

The default username and password is case sensitive. You must use all caps, and the "0" in PASSWORD 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 Netfinity Advanced System Management Processor microcode, the default username (USERID) and password (PASSWORD) are reset. If applicable, notify the system administrator.

When you have logged into the Netfinity Advanced 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
Service Processor Configuration	Netfinity Advanced 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 Netfinity Advanced 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. <div style="border: 1px solid black; padding: 5px; margin: 5px 0;"> <p>Note</p> <p>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 56.</p> </div>
Boot	You can use selections available from the Boot menu to shutdown and restart the system or to restart the Netfinity Advanced System Management Processor. For more information, see "Boot menu selections" on page 57.
Remote Terminal Status	Current remote terminal status

Menu Selection	Data Available for Viewing
Start Remote Video	Use Start Remote Video to enable the 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 58.

When you are finished accessing the Netfinity Advanced System Management Processor using a terminal program, select **Disconnect Current Logon** from the main menu and then use the terminal program to close the connection to the Netfinity Advanced 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 Netfinity Advanced System Management Processor modem.
2. Log in to the Netfinity Advanced System Management Processor.

When you have established a connection with the Netfinity Advanced 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 Netfinity Advanced System Management Processor. You can use one of two username and password combinations:

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

Note

The default username and password is case sensitive. You must use all caps, and the "0" in PASSWORD, 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 Netfinity Advanced System Management Processor microcode, the default username (USERID) and password (PASSWORD) are reset. If applicable, notify the system administrator.

When you have logged into the Netfinity Advanced 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 Netfinity Advanced System Management Processor

To access these functions:

1. Use a terminal program to establish a connection with the Netfinity Advanced System Management Processor modem.
2. Log in to the Netfinity Advanced System Management Processor.

When you have established a connection with the Netfinity Advanced 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 Netfinity Advanced System Management Processor. You can use one of two username and password combinations:

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

Note

The default username and password is case sensitive. You must use all caps, and the "0" in PASSWORD, 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 Netfinity Advanced System Management Processor microcode, the default username (USERID) and password (PASSWORD) are reset. If applicable, notify the system administrator.

When you have logged into the Netfinity Advanced 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 Netfinity Advanced 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 Netfinity Advanced System Management Processor modem.
2. Log in to the Netfinity Advanced System Management Processor.

When you have established a connection with the Netfinity Advanced 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 Netfinity Advanced System Management Processor. You can use one of two username and password combinations:

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

Note

The default username and password is case sensitive. You must use all caps, and the "0" in PASSWORD, 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 Netfinity Advanced System Management Processor microcode, the default username (USERID) and password (PASSWORD) are reset. If applicable, notify the system administrator.

When you have logged into the Netfinity Advanced 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 56 and "Boot menu selections" on page 57.

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 Netfinity Advanced System Management Processor, all textual output generated during POST will be sent to the terminal window. The 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.

Software installation

Use ServerGuide to verify that you have the proper working environment for the specific operating system you are installing, then follow the instructions provided in the ServerGuide package to install the operating system.

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

Specifications

The following list contains the specifications for the Netfinity 5500 M20.

Size (Tower Models)

- 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 Models)

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

Weight (Tower Models)

- Unpacked, minimum configuration (with empty NetBAY3): 39 kg (86 lb.)
- Unpacked, maximum configuration: 55 kg (121 lb.)

Weight (Rack Models)

- Unpacked, minimum configuration: 34.4 kg (76 lb.)
- Unpacked, maximum configuration: 55.4 kg (111 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)
 - 6.3 bel for typical system configuration (1 hard disk drive installed)

- Sound power, operating
 - 6.2 bel for open bay system (no hard disk drives installed)
 - 6.3 bel for typical system configuration (1 hard disk drive installed)
- Sound pressure, idling
 - 47 dBA for open bay system (no hard disk drives installed)
 - 48 dBA for typical system configuration (1 hard disk drive installed)
- Sound pressure, operating
 - 47 dBA for open bay system (no hard disk drives installed)
 - 48 dBA for typical system configuration (1 hard disk drive installed)

These levels are measured in controlled acoustical environments according to ISO 7779 (EMCA-74), and are reported in accordance with ISO 9296 (EMCA-109). 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 1-meter values stated because of room reflections and other nearby noise.

Electrical Input

- Sine-wave input (50±3 Hz or 60±3 Hz) is required
- Input voltage
 - Low range
 - Minimum: 90 V ac
 - Maximum: 137 V ac
 - Nominal: 100-127 V ac
 - High range
 - Minimum: 180 V ac
 - Maximum: 265 V ac
 - Nominal: 200-240 V ac
 - Input kilovolt-amperes (KVA) approximately
 - Minimum configuration as shipped: 0.2 KVA
 - Maximum configuration: 0.78 KVA

Electrostatic Discharge

- Tested to 8 KV

Immunity

- Verified to comply with EN 50082-1

Safety Standards

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

Status LEDs

The server has LEDs to help you identify problems with some server components (see, “Symptom-to-FRU index” on page 285).

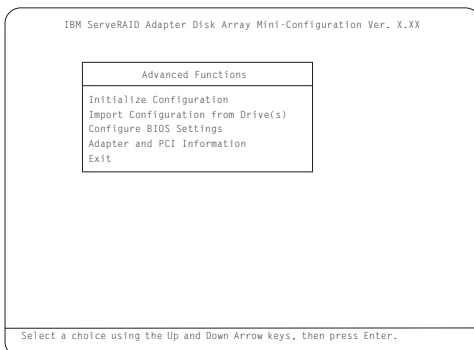
Status LEDs are located on the following components:

- Information LED panel
For more information, see “Information LED panel” on page 205.
- Hard disk drive trays
For more information, see “Controls and indicators” on page 181.
- Power supply
For more information, see “Power supply LEDs” on page 251.
- Diagnostic panel
For more information, see “Diagnostics panel LEDs” on page 187.
- Processor board
See “Processor board component locations” on page 254 for locations of the LEDs on the processor board.
- Memory board
See “Memory board component locations” on page 230 for locations of the LEDs on the memory board.

Using the ServeRAID 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.



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.

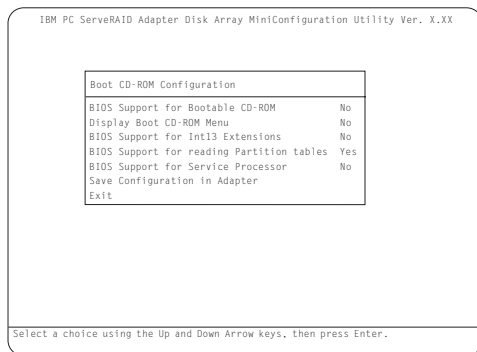
```

IBM ServeRAID Adapter Disk Array Mini-Configuration Utility Ver. X.XX
-----
Adapter Information          PCI Reg Information
Code Seg.(Cs): CB80h        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
Status0 Start: 0009E814h    Base Adr Reg4(20h): 00000000h
Status0 End: 0009E82Ch      Base Adr Reg5(24h): 00000000h
Status0 Head: 0009E818h     Reserved(28h): 00000000h
Status0 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.IntI(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.



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. Restart the server.

Note

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

ServeRAID system board controller

Note

For a complete list of ServeRAID error codes, see “ServeRAID controller error codes/messages” on page 312.

The following information is for the integrated ServeRAID controller on the system board.

- “Understanding RAID technology” on page 67.
- “ServeRAID Configuration Program” on page 70.
- “ServeRAID Mini-Configuration Program” on page 94.
- “ServeRAID Administration and Monitoring Program” on page 98.
- “ServeRAID administration functions” on page 103.
- “ServeRAID monitoring functions” on page 115.
- “ServeRAID IPSSSEND program (starting)” on page 119.
- “ServeRAID IPSSSEND program (using)” on page 119.
- “ServeRAID IPSMON program (starting)” on page 128.
- “ServeRAID IPSMON program (using)” on page 128.
- “ServeRAID device drivers and utility programs (installation)” on page 130.
- “Administration and Monitoring Program” on page 130.
- “ServeRAID programs for Windows NT and Windows 95” on page 131.
- “ServeRAID background-server components” on page 131.
- “ServeRAID programs for OS/2 and NetWare” on page 132.
- “ServeRAID programs for OpenServer and UnixWare” on page 132.
- “Installing the ServeRAID WIN32-based program” on page 133.
- “Installing ServeRAID device drivers” on page 134.
- “Starting the ServeRAID background-server components” on page 151.
- “ServeRAID background-server components” on page 152.
- “IPSSSEND and IPSMON programs” on page 154.
- “Rebuilding a defunct drive” on page 157.

Understanding RAID technology

RAID is the technology of grouping several hard disk drives in a computer into an *array* that can be defined as one or more logical drives. Each *logical drive* appears to the operating system as a single drive. This grouping technique greatly enhances logical-drive capacity and performance beyond the physical limitations of a single hard disk drive.

When multiple physical hard disk drives are grouped into a logical drive, the ServeRAID controller can transfer data in parallel from the multiple drives in the array. This parallel transfer yields data-transfer rates that are many times higher than with nonarrayed drives. This increased speed makes the system better able to meet the *throughput* (the amount of work in a given amount of time) or productivity needs of the multiple-user network environment.

The ability to respond to multiple data requests provides not only an impressive increase in throughput, but also a decrease in response time. The combination of parallel transfers and simultaneous responses to multiple requests allows disk arrays to provide a high level of performance in network environments.

Interleave depth and stripe-unit size:

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

The granularity at which data from one file is stored on one drive of the array before subsequent data is stored on the next drive of the array is called the *interleave depth*.

You can control the interleave depth and maximize the performance of a ServeRAID controller by setting a stripe-unit size that is close to the size of the system I/O requests. You can set the stripe-unit size to 8 KB, 16 KB, 32 KB, or 64 KB. For example, performance in transaction-based environments, which typically involve large blocks of data, might be optimal when the stripe-unit size is set to 32 KB or 64 KB; however, performance in file and print environments, which typically involve multiple small blocks of data, might be optimal when the stripe-unit size is set to 8 KB or 16 KB.

The collection, in logical order of these stripe units, from the first drive of the array to the last drive of the array, is called a *stripe*. (See page 90 for more information.)

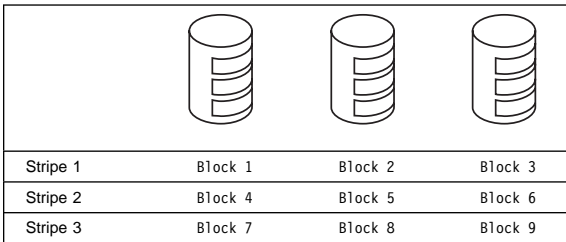
Supported RAID levels:

Disk arrays are used to improve performance and reliability. The amount of improvement depends on the application programs that are run on the server and the RAID levels that are assigned to the logical drives.

The ServeRAID adapters and controllers support RAID level-0, RAID level-1, Enhanced RAID level-1, and RAID level-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. RAID level-0 provides the largest capacity of the RAID levels offered, because no room is taken up for redundant data or data-parity storage.

The following illustration shows data arranged in an array of three hard disk drives defined as one RAID level-0 logical drive. Notice that the data is striped across all the drives in the array, but no copies of the data or parity information is stored.



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

Note

The ServeRAID controller automatically assigns RAID level-0 to all logical drives in an array containing only one hard disk drive.

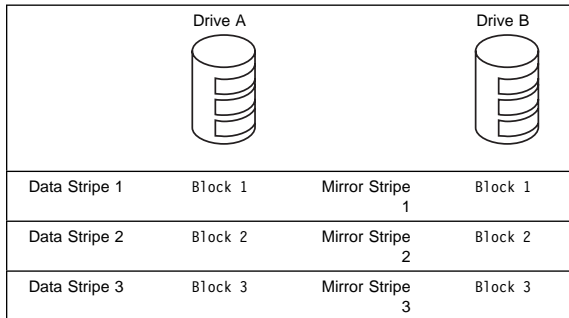
When you replace a failed drive, the ServeRAID controller can rebuild all the RAID level-1 and RAID level-5 logical drives automatically onto the replacement hard disk drive. However, any data stored in a failed RAID level-0 logical drive is lost.

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 is backed up each day and for which safety is not of primary importance, that is, data that can be easily re-created. You also might want to use a RAID level-0 logical drive when the work being done requires maximum capacity.

RAID level-1: RAID level-1 provides 100% data redundancy and requires two hard disk drives. With RAID level-1, the first half of a stripe is the original data; the second half of a stripe is a *mirror* (copy) of the data, but written to another drive.

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

The following illustration shows data arranged in an array of two hard disk drives defined as one RAID level-1 logical drive. Notice that the data on Drive B is a mirror copy of the data on Drive A.



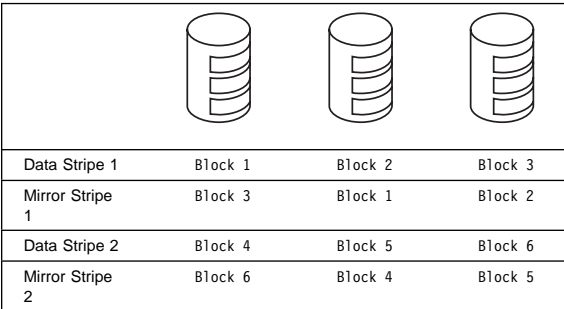
If one of the hard disk drives fails, the ServeRAID controller switches read and write requests to the remaining functional drive in the array.

Enhanced RAID level-1: When you group more than two physical drives into an array and select RAID level-1, the ServeRAID controller automatically assigns the IBM Enhanced RAID level-1 to the array.

The Enhanced RAID level-1 combines mirroring with data striping. This RAID level 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 Enhanced RAID level-1 requires a minimum of three drives and, depending upon the stripe-unit size, supports a maximum of eight or 16 drives.

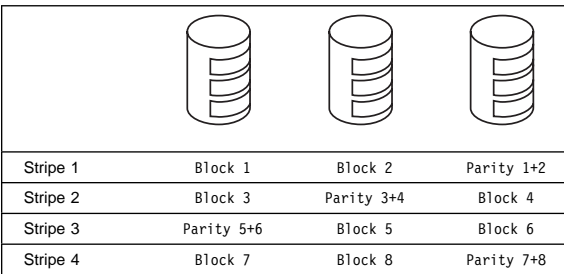
The following illustration shows data arranged in an array with three hard disk drives. The logical drive is assigned the Enhanced RAID level-1. Notice that the first stripe is the data stripe and the second stripe is the mirror (copy) of the first data stripe, but shifted one drive.



RAID level-5: RAID level-5 requires a minimum of three hard disk drives. This RAID level stripes data and parity across all drives in the array. When an array is assigned RAID level-5, the capacity of the logical drive is reduced by one drive (for data-parity storage).

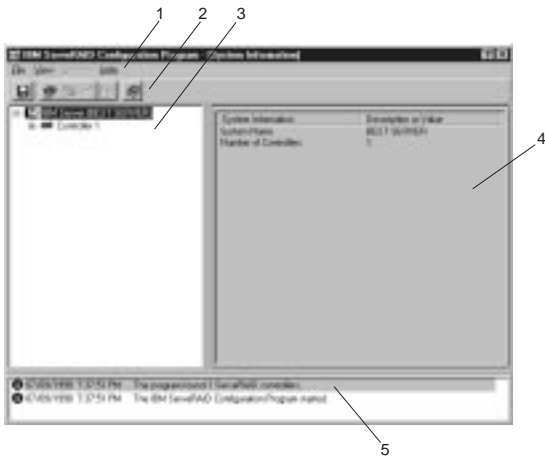
RAID level-5 is generally the most desirable choice, because it offers both data protection and increased throughput. RAID level-5 gives higher capacity than RAID level-1, but RAID level-1 offers better performance.

The following illustration shows data arranged in an array with three hard disk drives. The logical drive is assigned RAID level-5. Notice that the storage of the data parity also is striped, and it shifts from drive to drive.



ServeRAID Configuration Program

The graphical interface in the ServeRAID Configuration Program makes it easy to create, delete, change, or view the ServeRAID configuration. Before beginning, review the following illustration to become familiar with the layout of the configuration program screens.



Descriptions of the numbered areas are as follows:

1. **Menu Bar** Provides standard File, View, Actions, and Help pull-down menus. See "Menu bar" on page 86 for more information.
2. **Tool Bar** Provides quick-path icons for common tasks. The icons from left to right are Save the Configuration Event Log, Configure the ServeRAID Controller, Configure for Clustering, Scan for New or Removed Ready Drives, Create an Array, and Help. See "Tool bar" on page 85 for more information.
3. **Tree View** Provides an expandable tree view of the ServeRAID subsystem. You will perform most ServeRAID configuration and maintenance tasks by first selecting the ServeRAID controller, array, logical drive, hot-spare drive, or physical drive objects from this Main Tree.
4. **Main Panel** Provides specific device information or configuration instructions. When the configuration program is in the Information mode and an object is selected from the Main Tree, detailed information about the object appears in this panel. When the configuration program is in the Configuration mode, the instructions needed to configure the ServeRAID subsystem appear in this panel.
5. **Event Viewer** Provides advisory and progressive-status information and messages during the ServeRAID configuration process. Each message appears with a time stamp, a date stamp, and an icon that classifies the severity of the event. Attention messages identify potential data-loss situations, and Fatal

messages inform you when a failure has occurred.

Starting the configuration program:

The ServeRAID Configuration Program runs in two modes: the *Configuration* mode and the *Information* mode.

In the Configuration mode, you can create or delete disk arrays, create or delete logical drives, and define hot-spare drives. When this mode is active, only a limited set of functions is available from the Menu and Tool Bars. See "Configuration mode" on page 73 for more information.

In the Information mode, you can view the existing device and configuration information for the ServeRAID subsystem. When this mode is active, you can use the functions available from the Menu and Tool Bars to customize settings for the ServeRAID controllers. See "Information mode" on page 78 for more information.

The ServeRAID Configuration Program is provided on the *IBM ServeRAID Configuration CD* packaged with the ServeRAID adapter, and it also is provided on the ServerGuide CD (*CD 1*) that comes with some IBM server models.

Notes

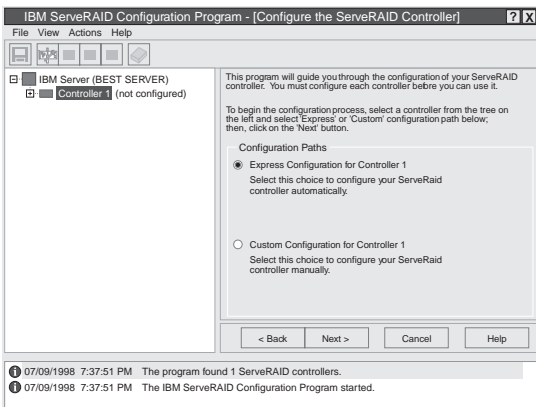
1. If you are configuring a ServeRAID controller on a system board, see the installation instructions and CDs provided with the server for information about starting the configuration programs for the server.
2. To gain access to the ServeRAID Configuration or Mini-Configuration programs, you must restart the server.

To start the configuration program:

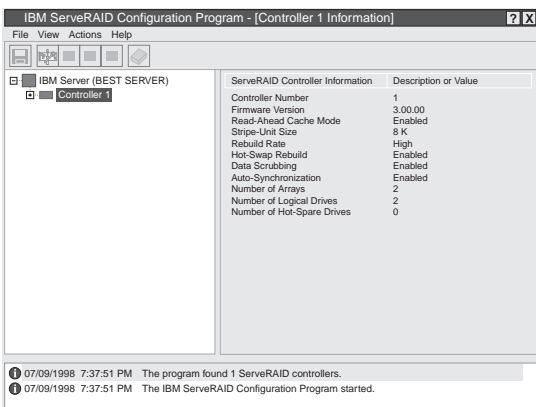
1. Insert the *IBM ServeRAID Configuration CD* (or the ServerGuide *CD 1*) into the CD-ROM drive; then, turn on the server.

One of the following screens will appear:

- If the configuration program detects unconfigured ServeRAID controllers, the program starts in the Configuration mode and a screen similar to the following appears.



Select the **Cancel** button to switch from the Configuration mode to the Information mode. All ServeRAID controllers in the server are configured, the program starts in the Information mode and a screen similar to the following appears.



Select the icon on the Tool Bar to switch from the Information mode to the Configuration mode.

2. Continue with one of the following:
 - "Configuration mode"
 - "Information mode" on page 78

Configuration mode:

You can use the Configuration mode to create up to eight independent disk arrays for each ServeRAID controller. The Configuration mode provides two configuration paths: *Express Configuration* and *Custom Configuration*.

Express Configuration provides a quick and easy path for you to automatically configure the ServeRAID controller. This choice creates the most efficient ServeRAID configuration based on the number and capacity of the Ready drives available in the system. If four or more Ready drives of the same capacity are available, this choice also will define a *hot-spare drive* for the ServeRAID adapter or controller. A hot-spare drive is a physical drive that is defined for automatic use when a similar drive fails.

The Express Configuration choice groups up to 16 Ready drives of the same capacity into one disk array and defines one logical drive for each array. This choice defines the size of the logical drive, based on the amount of free space available, and it assigns the highest RAID level possible, based on the number of physical drives available.

For example, if the server contains one 1024 MB Ready drive, two 2150 MB Ready drives, and four 4300 MB Ready drives, Express Configuration will create three arrays and one hot-spare drive as follows:

- Array A:** The total capacity of this array is 1024 MB (1 x 1024 MB) and it contains one 1024 MB RAID level-0 logical drive.
- Array B:** The total capacity of this array is 4300 MB (2 x 2150 MB) and it contains one 2150 MB RAID level-1 logical drive.
- Array C:** The total capacity of this array is 12900 MB (3 x 4300 MB) and it contains one 8600 MB RAID level-5 logical drive.
- Hot Spare:** Express Configuration defines one of the four 4300 MB drives as a hot-spare drive, as follows:
- When there are four or more Ready drives of the same capacity, Express Configuration groups three of the drives into one array (as in Array C) and defines one of the drives as a hot spare.
 - A hot-spare drive must be of equal or greater capacity than the drive that it is intended to replace. In this configuration, the 4300 MB drive can replace any failed drives in Array B or Array C.

Using Express Configuration

To use the Express Configuration path:

1. Select the ServeRAID controller that you want to configure in the Main Tree.
2. Select the **Express Configuration** radio button.
3. Select the **Next** button.
4. Review the information that appears on the Configuration Summary screen.

Notes

1. Some operating systems have size limitations for logical drives. Before you save the configuration, you might want to verify that the size of the logical drive is appropriate for the operating system. See the operating system documentation for more detailed information.
2. To change the configuration, select a **Modify** icon button.

5. Select the **Apply** button to accept and save the configuration.
6. If you have not already done so, install the operating system. See the server documentation or the documentation provided with the operating system for more information.

After you install the operating system, see “ServeRAID device drivers and utility programs (installation)” on page 130 (or see the installation instructions provided with the server) for information about installing the ServeRAID device drivers and utility programs.

Learning about custom configuration:

The Custom Configuration path allows you to manually configure the ServeRAID subsystem. Using this path, you can select the drives that you want to include in each array, define the number and size of the logical drives for each array, and select the drives that you want to use as hot spares.

Before you select the Custom Configuration path, consider the following:

- If you are not familiar with the IBM implementation of RAID technology, you might want to review the information provided in “Understanding RAID technology” on page 67 before you begin.
- Each ServeRAID controller supports a maximum of eight arrays.
- Each ServeRAID controller supports a maximum of eight 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.

If you have only one array, you can define it as a single logical drive, or you can divide it into several logical drives. Typically, the first logical drive defined on the first ServeRAID adapter or controller found by

the basic input/output system (BIOS) during startup will be the 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.

Note

Independent of the RAID logical drives, most operating systems allow you to partition the logical drives further.

- The optimal way to create arrays is to use hard disk drives that have the same capacity.

Hard disk drive capacities influence the way you create arrays. Drives in an array can be of different capacities (1 GB¹, or 2 GB, for example), but RAID controllers treat 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. Similarly, if you group three 2 GB drives and one 1 GB drive into an array, the total capacity of that array is 4 GB, not the 7 GB physically available.

- A hot-spare drive is a disk drive that is defined for automatic use in the event of a drive failure. The hot-spare drive must be of equal or greater capacity than the drive that it is intended to replace. If a physical drive fails and it is part of a RAID level-1 or RAID level-5 logical drive, the ServeRAID controller automatically starts to rebuild the data on the hot-spare drive.
- You can include a maximum of 16 physical drives in an array when the stripe-unit size is set to 8KB (the default setting) or 16KB, and you can include a maximum of 8 physical drives in an array when the stripe-unit size is set to 32KB or 64KB. (See “Interleave depth and stripe-unit size” on page 67 and page 90 for more information.)

Using custom configuration:

To use the Custom Configuration path:

1. Select the ServeRAID controller that you want to configure in the Main Tree.

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

2. Select the **Custom Configuration** radio button.
3. Select the **Next** button.
4. Using the right mouse button, select the drive or SCSI Channel icons in the Main Tree to select the drives that you want to add to the arrays, delete from the arrays, or define as hot-spare drives; then, select a choice from the pop-up list.

OR

Drag the drive or SCSI Channel icon from the Main Tree and drop it on the Array or Hot-Spare Drive icon in the Main Panel on the right. If you change your mind, you can drag the icons back to the Main Tree to remove them from the configuration.

5. After you select the data drives for the arrays and define the hot-spare drives, select the **Next** button.

If you change your mind, you can:

- Remove a specific drive from a newly defined array or delete an entire newly defined array. To do this, select the **Back** button, use the right mouse button to select the specific drive or Array icon in the Main Panel on the right, and then select **Remove from New Array** or **Delete New Array**.
 - Remove a specific hot-spare drive or all newly defined hot-spare drives. To do this, select the **Back** button, use the right mouse button to select the Hot-Spare Drive icon in the Main Panel on the right, and then select **Remove New Hot-Spare Drive** or **Remove All New Hot-Spare Drives**.
6. Select a RAID level for the logical drive from the RAID pull-down menu in the Main Panel. (See "Supported RAID levels" on page 67 for descriptions of the supported levels.)
 7. Move the sliding bar in the Main Panel from right to left to allot data and parity space for the logical drive.

Notes

1. You can define from one to eight logical drives.
2. Some operating systems have size limitations for logical drives. Before you save the configuration, you might want to verify that the size of the logical drive is appropriate for the operating system. See the operating system documentation for more detailed information.
3. Typically, the first logical drive defined on the first ServeRAID adapter or controller found by system BIOS during startup will be the startup (boot) drive.

8. If free space is available and you want to define another logical drive, click on the **Add Logical Drive** button in the Main Panel.
9. Repeat steps 6, 7, and 8 for each logical drive that you want to define; then, continue with step 10.
10. Select the **Next** button.
11. Review the information that appears on the Configuration Summary screen.

Note

To change the configuration, select a **Modify** icon button.

12. Select the **Apply** button to accept and save the configuration.
13. If you have not already done so, install the operating system. See the server documentation or the documentation provided with the operating system for more information.

After you install the operating system, see "ServeRAID device drivers and utility programs (installation)" on page 130 (or the installation instructions provided with the server) for information about installing the ServeRAID device drivers and utility programs.

Information mode:

You can use the Information mode to view the configuration information for the server, ServeRAID controllers, arrays, logical drives, hot-spare drives, and physical drives that make up the ServeRAID subsystem. You also can use this mode to change some of the ServeRAID controller settings.

Viewing the Device and Configuration Information

To view the current settings:

1. Select the plus (+) box next to the object in the Main Tree to expand that portion of the tree.
2. Select the icon for the server, ServeRAID controller, array, logical drive, hot-spare drive, or physical drive to view its current settings.

Detailed information about the selected device will appear in the Main Panel on the right. The following pages provide descriptions of the device information that might appear.

System Information Panel

When you select the server from the Main Tree, the following information appears in the Main Panel on the right:

- **System Name** shows the name you assigned to the server.

- **Number of Controllers** shows the total number of ServeRAID adapters and controllers found in the server.

ServeRAID Controller Information Panel

When you select a ServeRAID controller from the Main Tree, the following information appears in the Main Panel on the right:

- **Controller Type** shows the type of ServeRAID controller, such as ServeRAID II, ServeRAID-3H, or ServeRAID-3L.
- **BIOS Version** shows the level of basic input/output system code currently installed for the ServeRAID controller.
- **Firmware Version** shows the level of microcode currently installed for the ServeRAID controller.
- **Physical Slot** shows the actual physical slot location for the ServeRAID controller; for example, PCI slot 4.
- **Battery Backup Write Cache** provides information about the optional battery-backup cache device. Statements such as Installed, Not Installed, Defective, or Replace Battery might appear for this feature.
- **Read-Ahead Cache Mode** shows the current setting, Enabled or Disabled, for the read-ahead cache mode. (See page 88 for more information.)
- **Stripe-Unit Size** shows the current setting of 8 KB, 16 KB, 32 KB, or 64 KB for the stripe-unit size. (See “Interleave depth and stripe-unit size” on page 67 and page 90 for more information.)
- **Rebuild Rate** shows the current setting (High, Medium, or Low) for the rebuild rate. (See page 89 for more information.)
- **Hot-Swap Rebuild** shows the current setting, Enabled or Disabled, for the hot-swap rebuild feature. This feature is set to Enabled when the level of ServeRAID firmware in use supports this feature.
- **Data Scrubbing** shows the current setting, Enabled or Disabled, for the data-scrubbing feature. This feature is set to Enabled when the level of ServeRAID firmware in use supports this feature. The data-scrubbing feature continuously reads all sectors of RAID level-1 and RAID level-5 logical drives “in the background” while the system is running. If a defective sector is found, it is automatically repaired. With this feature Enabled, you no longer need to synchronize RAID level-1 and RAID level-5 logical drives on a weekly basis.
- **Auto-Synchronization** shows the setting for this feature. The auto-synchronization feature always appears as Enabled when the level of ServeRAID firmware in use supports this feature. (See page 91 for more information.)

- **Clustering** shows the current setting, Enabled or Disabled, for this feature.
- **ServeRAID Controller Host ID** appears only when the controller is part of a shared-disk cluster.
- **Cluster Partner Host ID** appears only when the ServeRAID controller is configured for use in a shared-disk cluster.
- **Number of Arrays** shows the total number of arrays (1 to 8) defined for this ServeRAID controller.
- **Number of Logical Drives** shows the total number of logical drives (1 to 8) defined for this ServeRAID controller.
- **Number of Hot-Spare Drives** shows the total number of hot-spare drives defined for this ServeRAID controller.

Array Information Panel

When you select the Arrays icon from the Main Tree, general information about all configured arrays (such as size, free space, and number of logical drives in each array) appears in the Main Panel on the right.

When you select a specific array from the Main Tree, the following information appears in the Main Panel on the right:

- **Array Letter** shows the letter (A through H) assigned to the array.
- **Array Size in MB** shows the total size, in MB, of the array.
- **Free Space in MB** shows the amount of free space available in the array.
- **Number of Logical Drives** shows the number of logical drives (1 to 8) defined for the array.
- **Number of Physical Drives** shows the number of physical drives grouped in the array.

Logical Drive Information Panel

When you select a logical drive from the Main Tree, the following information appears in the Main Panel on the right:

- **Logical Drive Number** shows the number (1 to 8) assigned to the logical drive.
- **Array Letter** shows the letter (A through H) assigned to the array in which the logical drive resides.
- **Drive State** shows the current state of the logical drive. See “Logical drive state descriptions” on page 82 for descriptions of the states that might appear in this field.
- **RAID Level** shows the RAID level (0, 1, or 5) assigned to the logical drive.
- **Data Space in MB** shows the amount of space in the logical drive defined for data storage.

- **Parity Space in MB** shows the amount of space in the logical drive allocated for parity storage.
- **Date Created** shows the date that you created the logical drive.
- **Write-Cache Mode** shows the current setting, write through or write back, for the logical drive.
- **Battery Backup Write Cache** shows the current setting, Enabled or Disabled, for the battery backup cache device. When the battery backup cache device is installed, write cache is set to the write-back mode.
- **Merge-Group Number** appears if the ServeRAID controller is part of a cluster. The valid settings in the Shared state are 1 through 8. Valid settings in the Non-Shared state are 201 through 215.
- **Merge-Group State** shows the current setting, Shared or Non-Shared, for this parameter.

Hot-Spare Drive Information Panel

When you select the Hot-Spare Drives icon from the Main Tree, information about the total number of functional hot-spare and standby hot-spare drives defined for the ServeRAID controller appears in the Main Panel on the right.

When you select a specific hot-spare drive from the Main Tree, the following information appears in the Main Panel on the right:

- **SCSI ID** shows the SCSI ID assigned to the drive.
- **Channel** shows the SCSI channel to which the hot-spare drive is attached.
- **Drive Type** shows the type of physical drive. For a hot spare, this will always appear as Hard Disk Drive.
- **Size in MB** shows the total capacity of the hard disk drive in MB.
- **Drive State** shows the drive state. For a hot spare, this will always appear as Hot Spare.
- **Vendor** shows characters that represent the drive manufacturer.
- **Product or Model Number** shows characters that represent the product or model number for the drive.
- **Serial Number** shows the serial number for the drive.
- **Drive Firmware Level** shows the current level of microcode in use for the drive.
- **PFA Error** indicates the status, Yes or No, for predictive-failure alerts. Yes indicates that PFA errors were detected and that you should plan to replace the device. No indicates that PFA errors were not found.

Physical Drive Information Panel

When you select the Physical Drives icon from the Main Tree, information about the total number of drives connected to each channel of the ServeRAID adapter or controller appears in the Main Panel on the right.

When you select a specific physical drive from the Main Tree, the following information appears in the Main Panel on the right:

- **SCSI ID** shows the SCSI ID assigned to the drive.
- **Channel** shows the SCSI channel to which the physical drive is attached.
- **Drive Type** shows the type of physical drive (Hard Disk, CD-ROM, Tape, Enclosure, Removable-Media, or Unknown) selected.
- **Size in MB** shows the total capacity of the drive, in MB, if the drive is a hard disk. No value will appear if the physical drive is a CD-ROM or Tape drive.
- **Drive State** shows the current state of the physical drive. See “Physical drive state descriptions” on page 83 for descriptions of the states that might appear in this field.
- **Array Letter** shows the letter (A through H) assigned to the array in which the physical drive resides, if the physical drive is part of an array.
- **Vendor** shows characters that represent the drive manufacturer.
- **Product or Model Number** shows characters that represent the product or model number for the drive.
- **Serial Number** shows the serial number for the drive.
- **Drive Firmware Level** shows the current level of microcode in use for the drive.
- **PFA Error** indicates the status, Yes or No, for predictive-failure alerts. Yes indicates that PFA errors were detected and that you should plan to replace the device. No indicates that PFA errors were not found.

Channel Information Panel

When you select a SCSI Channel icon from the Main Tree, the following information appears in the Main Panel on the right:

- **Number of Drives** shows the number of physical drives currently attached to the SCSI channel.
- **SCSI Initiator ID** shows the initiator ID for the SCSI channel.
- **SCSI Transfer Speed** shows the current SCSI transfer setting (Optimal, Ultra2 SCSI, UltraSCSI, Fast SCSI 2, or SCSI 2) for the entire channel. See page 93 for more information.

Logical drive state descriptions:

The following table provides descriptions of the valid logical drive states.

Drive State	Meaning
Blocked	<p>During a rebuild operation, the ServeRAID controller sets the state of any RAID level-0 logical drives associated with a failed array to the Blocked state; then, it reconstructs the data that was stored in RAID level-1 and RAID level-5 logical drives.</p> <p>After the Rebuild operation completes, you can unblock the RAID level-0 logical drives, and access them once again. However, the logical drive might contain damaged data. You must either re-create, install, or restore the data from the most recent backup disk or tape to the RAID level-0 logical drive.</p>
Critical Migrating	A logical drive in the critical state that is undergoing a logical drive migration (LDM).
Critical System	The ServeRAID controller uses this reserved state during a logical drive migration (LDM).
Critical	<p>A RAID level-1 or level-5 logical drive that contains a defunct physical drive is in the critical state. A critical logical drive is accessible, despite a physical drive failure.</p> <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <p style="text-align: center;">Attention</p> <p>If the state of the logical drive is critical, replace and rebuild the defunct drive as soon as possible to prevent the loss of data. If a second drive fails before the first rebuild completes, you might lose valuable data. See "Rebuilding a defunct drive" on page 157 for more information.</p> </div>
Migrating	The logical drive is undergoing a logical drive migration; that is, a change in RAID levels, a change in logical drive size, or an increase in free space.
Offline	The logical drive is offline and not accessible. This state occurs if one or more physical drives in a RAID level-0 logical drive is defunct. This state also occurs when two or more physical drives in a RAID level-1 or level-5 logical drive are defunct.
Okay	The logical drive is okay. It is in a good, functional state.
System	The ServeRAID controller uses this reserved state during logical drive migration (LDM).

If the state of the logical drive is critical you must replace and rebuild the defunct drive. See "Rebuilding a defunct drive" on page 157 for more information.

Physical drive state descriptions:

The following table provides descriptions of the valid physical drive states.

Drive State	Meaning
Defunct	<p>A physical hard disk drive in the Online, Hot-Spare, or Rebuild state has become defunct. It does not respond to commands, which means that the ServeRAID controller cannot communicate properly with the drive.</p> <p>A hard disk drive in the Defunct state does not necessarily mean that you need to replace the drive. Before you replace the drive, ensure that:</p> <ol style="list-style-type: none"> 1. All cables are connected properly to the server backplane and to the hard disk drive. Also, check to ensure that all cables inside the server are connected properly. 2. The hot-swap drive trays are seated properly in the drive bay. 3. The termination for each device on the SCSI channel is set properly. 4. Each device on the SCSI channel has its own, unique SCSI ID. <p>If the hard disk drive still does not function after you perform these steps, replace the drive.</p>
Empty	No device is present in the bay.
Hot Spare	A Hot-Spare drive is a hard disk drive that is defined for automatic use when a similar drive fails.
Online	The drive is Online. It is functioning properly and is part of an array.
Rebuilding	<p>The drive is being rebuilt.</p> <p>For more information on rebuilding a drive, refer to "Rebuilding a defunct drive" on page 157.</p>
Ready	The ServeRAID controller recognizes a Ready drive as being available for definition.
Standby	A Standby drive is a hard disk drive that the ServeRAID controller has spun down.
Standby Hot Spare	A Standby Hot Spare is a Hot-Spare drive that the ServeRAID controller has spun down. If an Online drive becomes Defunct and no suitable Hot-Spare drive is available, a Standby Hot-Spare drive of the appropriate size automatically spins up, and enters the Rebuild state.

Changing the ServeRAID configuration settings:

To change the settings:

1. Select the plus (+) box next to the object in the Main Tree to expand the tree.

2. Select the icon in the Main Tree for the ServeRAID controller, array, logical drive, hot-spare drive, or physical drive that you want to change.
3. Select **Actions** in the File Menu; then, make a selection from the pull-down menu.

or

Using the right mouse button, select the object in the Main Tree; then, make a selection from the pop-up list.

See “Menu bar” on page 86 for descriptions of the choices available from the Actions pull-down menu.

Tool bar:

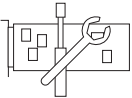
Descriptions of the quick-path icons provided on the Tool Bar are as follows:



Save the Configuration Event Log: This icon appears in the Information mode. When you select this icon, a pop-up window appears and lets you specify a file name and path for the ServeRAID Configuration Event Log.

Note

This feature currently is not supported on IBM Netfinity 3000, 3500, 5000, and 5500 servers; however, IBM intends to support this feature on these server models in the near future. The updated BIOS code needed to support this feature will be made available on the World Wide Web. (See page 130 for the instructions needed to access the IBM support page.)

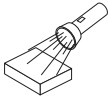


Configure the ServeRAID Controller: This icon appears in the Information mode. When you select this icon, the configuration program switches from the Information mode to the Configuration mode. A message will appear at the bottom of the Main Panel if no Ready drives are available for the selected ServeRAID controller. If this occurs, you can select the Cancel button to return to the Information mode or select another ServeRAID controller.



Configure for Clustering: This icon appears in the Information mode. You can select this icon to define the ServeRAID controller for use in a dual-node, high-availability, shared-disk cluster environment. Detailed instructions for using the clustering features are provided in the *IBM Netfinity High-Availability Cluster Solution Installation and User's Guide*. You can obtain a copy of this manual at the following address on the World Wide Web:

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



Scan for New or Removed Ready Drives:
This icon appears in the Information mode. When you select a ServeRAID controller from the Main Tree and select this icon, the configuration program will scan the individual channel, or all channels, on the controller for new or removed Ready drives. Use this feature whenever you physically change the configuration of the ServeRAID subsystem, for example, when you physically install or remove one or more SCSI drives.



Create an Array: This icon appears in the Information mode if you select a controller from the Main Tree and that controller has Ready drives available.



Help: This icon appears in both the Information and Configuration modes. Select this icon to access the online ServeRAID Help facility. Task-oriented Help is available from many of the pop-up windows that appear during the configuration process; and, you also can obtain context-sensitive Help by selecting an item and then pressing the **F1** key.

Menu bar:

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

- File** The File pull-down menu contains the following choices in the Information mode:
- **Save Configuration Event Log:** Select this choice to save configuration event information (such as the start time and completion time for a rebuild operation) to a file.
 - **Clear Configuration Event Log:** Select this choice to erase the event information stored in the Configuration Event Log.
 - **Exit:** Select this choice to exit from the ServeRAID Configuration Program.
- View** The View pull-down menu contains the following choices in both the Information and Configuration modes:
- **Small Icons:** This is the default setting. When you select this choice, small icons appear in the Main Tree on the left and the Main Panel on the right.
 - **Large Icons:** Select this choice to display large icons in the Main Tree on the left and the Main Panel on the right.
 - **Options:** Select this choice to change the Initialization and Synchronization mode, as follows:

- **Basic:** This is the default setting. When this mode is Enabled, the configuration program automatically initializes each new logical drive and prevents access to the manual initialization and synchronization functions. This choice also forces the synchronization of all new RAID level-5 logical drives attached to older ServeRAID adapter or controller models that do not support the auto-synchronization feature.
- **Advanced:** When Enabled, this choice lets you select to automatically initialize new logical drives and force the synchronization of all new RAID level-5 logical drives before exiting the ServeRAID Configuration Program.

Attention

If you disable Automatic Initialization, the ServeRAID Configuration Program will not initialize each logical drive (by writing zeros to the first 1024 sectors of the logical drive) when it is created. You still must initialize all newly defined logical drives before storing data. If you disable the synchronization feature and the level of firmware being used by the ServeRAID adapter or controller does not support the auto-synchronization feature, you still must synchronize all RAID level-5 logical drives before storing data.

Actions

All choices available from the Actions pull-down menu also are available from the pop-up lists that appear when you use the right mouse button and select the object in the Main Tree.

The following choices appear on the Actions pull-down menu when you select a ServeRAID controller from the Main Tree:

- **Configure the ServeRAID Controller:**
This choice is available in the Information mode only. It appears on the pull-down menu when there are

Ready drives and logical-drive slots still available for the ServeRAID controller.

- **Configure for Clustering:** This choice is available in the Information mode only. You can select this choice to define the ServeRAID controller for use in a high-availability, shared-disk cluster environment. Detailed instructions for using the clustering features are provided in the *IBM Netfinity High-Availability Cluster Solution Installation and User's Guide*. You can obtain a copy of this manual at the following address on the World Wide Web:

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

- **Initialize the Controller Configuration:** This choice is available in both the Configuration and Information modes. Select this choice to delete the ServeRAID controller configuration.

Attention

After you initialize the controller configuration, you will not have access to any data stored on the logical drives attached to the selected ServeRAID adapter or controller.

This choice deletes the existing configuration information, sets all functional hard disk drives attached to the controller to the Ready state, and deletes all logical drives defined for the controller.

This choice *does not* change any of the ServeRAID adapter or controller settings (such as the stripe-unit size, rebuild rate, and so on) from their current or customized values.

- **Copy the Configuration from the Drives to the Controller:** This choice is available in the Information mode only; it copies the configuration information stored on the hard disk drives to the ServeRAID controller. This function is useful when you import previously configured drives from another system, or when you replace the ServeRAID adapter or controller.
- **Disable or Enable Read-Ahead Cache Mode:** These choices are available in

the Information mode only. When read-ahead cache is set to Enabled (default setting), the ServeRAID controller transfers data from a 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 cache is set to Disabled, the ServeRAID controller transfers data from a disk to local cache in increments equal to the system I/O request size, without reading ahead to the end of the stripe.

- **Change the Rebuild Rate:** This choice is available in the Information mode only. You can select this choice to set the priority for Rebuild operations to High (default), Medium, or Low.
 - When the rebuild rate is set to High, the rebuild I/O request gets high priority in the execution order.
 - When the rebuild request is set from High to Medium in a heavily loaded system, it can increase the 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.
- **Change the Stripe-Unit Size:** This choice is available in the Information mode only.

Attention

After you configure an array and store data on the logical drives, you cannot change the stripe-unit size without destroying data in the logical drives.

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

size to 8 KB, 16 KB, 32 KB, or 64 KB. When the stripe-unit size is 8 KB (the default setting) or 16 KB, the maximum number of physical drives supported in an array is 16. When the stripe-unit size is 32 KB or 64 KB, the maximum number of physical drives supported in an array is eight. (See "Interleave depth and stripe-unit size" on page 67 for more information.)

- **Scan for New or Removed Ready Drives:** This choice is available in the Information mode only. When you select this choice, the configuration program scans all channels on the ServeRAID controller for new or removed Ready drives.

The following choices appear on the Actions pull-down menu when you select the Arrays icon or a specific array icon from the Main Tree:

- **Create an Array:** This choice appears in the Information mode if you select the Arrays icon and Ready drives are available. When you select this choice, the configuration program switches from the Information mode to the Configuration mode.
- **Delete All Arrays:** This choice is available in the Information mode only. It appears on the Actions pull-down menu if you select the Arrays icon from the Main Tree and arrays are defined for the controller.
- **Delete Array:** This choice is available in the Information mode only. It appears on the Actions pull-down menu when you select a specific array icon from the Main Tree.

The following choices appear on the Actions pull-down menu when you select the Logical Drives icon or a specific logical drive icon from the Main Tree:

- **Create a Logical Drive in Array:** This choice appears on the Actions pull-down menu in the Information mode if you select the Logical Drives icon and free space is available in one or more arrays.
- **Change Write-Cache Mode to Write Through or Write Back:** These choices are available in the Information mode when you select a specific logical drive icon from the Main Tree.

When this feature is set to the write-through mode, 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 this setting to the write-back mode, where the completion status of a write command is sent *after* the data is copied to cache memory, but *before* the data is actually written to the storage device.

Attention

1. You might lose data if a power outage occurs while using the write-back mode without a battery-backup cache device.
2. If you do not have a battery-backup cache installed and Enabled and you set this feature to the write-back mode, wait at least 10 seconds after the last operation before you turn off the system. Failure to follow this practice can result in lost data.

- **Synchronize:** This choice is available in the Information mode when you select a logical drive from the Main Tree and the following conditions are both true:
 - The ServeRAID adapter or controller does not support the auto-synchronization feature.
 - You previously selected Options from the View pull-down menu and disabled the “Synchronize all new RAID level-5 logical drives” setting.Synchronizing a logical drive verifies that the data redundancy for the logical drive is correct. You must synchronize all RAID level-5 logical drives before storing data. (See page 79 for more information.)
- **Initialize:** This choice is available in the Information mode when you select a logical drive from the Main Tree and you previously selected Options from the View pull-down menu and disabled the “Automatically initialize new logical drives” setting.
- **Unblock the Logical Drive:** This choice appears in the Information mode when you select a specific logical drive

that is in the Blocked state. You can select this choice to change the Drive Access setting for the RAID level-0 logical drive from Blocked to Unblocked. During a rebuild operation, the ServeRAID controller sets the state of any RAID level-0 logical drives associated with a failed array to the Blocked state.

After the Rebuild operation completes, you can unblock the RAID level-0 logical drives, and access them once again. However, the logical drive might contain damaged data. You must either re-create, install, or restore the data from the most recent backup disk or tape to the RAID level-0 logical drive.

The following choice appears on the Actions pull-down menu when you select a hot-spare drive from the Main Tree:

- **Remove from Hot-Spare State:** This choice is available in the Information mode only. Select this choice to remove a hot-spare drive from the configuration and set the drive state back to Ready.

The following choices appear on the Actions pull-down menu when you select a physical drive, a physical drive icon, or a SCSI channel icon from the Main Tree:

- **Set Drive State to Hot Spare:** This choice is available in the Information mode only. It appears when the physical drive that you select from the Main Tree is in the Ready state. You can select this choice to add the drive to the configuration and to change its state from Ready to Hot Spare.
- **Set Drive State to Online:** This choice appears in the Information mode, and you can use it to change the state of a drive from Defunct to Online.

Attention

You might lose data by setting a Defunct physical drive that is part of an array to Online.

- **Replace Drive and Rebuild:** This choice is available in the Information mode only. Select this choice when you want to physically remove a defunct drive from the system and install a good drive in its place.

- **Change the SCSI Transfer Speed:**
This choice is available in the Information mode only. It appears when you select a SCSI Channel icon. You can select this choice to change the transfer speed from its default value of Optimal. When the transfer speed is set to Optimal, the ServeRAID adapter or controller determines the best transfer speed, based on the types of SCSI drives and storage enclosures in use. Choices available are Ultra2 SCSI, UltraSCSI, Fast SCSI 2, and SCSI 2.
- **Remove Defunct Drive:** This choice appears in the Information mode only. After you physically remove a drive, select this choice to delete the drive information from the configuration.
- **Replace Defunct Drive:** This choice appears in the Information mode only. Select this choice to physically replace a defunct disk drive.

Note

Always replace a defunct drive with a drive of equal or greater capacity.

- **Scan for New or Removed Ready Drives:** This choice is available in the Information mode only. When you select this choice, the configuration program scans the individual channel or all channels on the ServeRAID controller for new or removed Ready drives.

Help

The following choices are available from the Help pull-down menu:

- **Contents:** Select this choice to access the online Help facility. This choice is available in both the Information and Configuration modes. Task-oriented Help is available from many of the pop-up windows that appear during the configuration process; and, you also can obtain context-sensitive Help by selecting an item and then pressing the **F1** key.
- **About:** Select this choice to view the version number and copyright information for the ServeRAID Configuration Program. This choice is available in both the Information and Configuration modes.

ServeRAID Mini-Configuration Program

The ServeRAID Mini-Configuration Program is a quick way to display the current settings for the ServeRAID adapter or controller. You also can use this program to perform a limited set of the configuration functions without using the *ServeRAID Configuration CD*.

To access the Mini-Configuration program:

1. Turn on the server. If the server already is turned on, restart it.
2. When the ServeRAID Mini-Configuration prompt appears, press **Ctrl+i**.
3. If the system contains more than one ServeRAID adapter or controller, a selection screen will appear. To continue:
 - a. Use the Up Arrow (↑) or Down Arrow (↓) key to select an adapter or controller.
 - b. Press **Enter**.

If the system contains only one ServeRAID adapter or controller, or after you select a ServeRAID adapter or controller, the Main Menu appears.

Descriptions of the choices available from the Main Menu of the Mini-Configuration program are as follows:

- **View Controller Status** shows the current status of the ServeRAID adapter or controller. (See “Viewing the controller status” for more information.)
 - **View Configuration** shows the current configuration information for the ServeRAID adapter or controller. (See “Viewing the configuration” on page 95 for more information.)
 - **Advanced Functions** lets you initialize the configuration, import configuration from drives, configure BIOS settings, and view the controller and PCI information. (See “Advanced Configuration Functions” on page 96 for more information.)
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 controller status:

When you select View Controller Status from the Main Menu, the following information appears on the screen:

- **Unattended** shows the current On/Off state of the Unattended mode.
 - When set to Off, you can choose the recovery method when there is a ServeRAID adapter or controller startup error.

- When set to On, the ServeRAID adapter or controller chooses the recovery method when a startup error occurs.
- **Read Ahead** shows the current On/Off state of the Read Ahead Cache mode.
- **BootCD** shows the current On/Off state of the Bootable CD-ROM function. (Refer to “Setting the bootable CD-ROM feature” on page 97.)
- **CompMode** shows the current BIOS compatibility mode. **On** indicates 8 GB Extended; **Off** indicates 2 GB Limited.
- **Clustered** shows the current On/Off state for clustering.
- **NVRBB** shows the current state of the battery-backup cache option. The default value is Enabled.
- **Boot Bk** shows the version number of the bootable microcode loaded for the ServeRAID adapter or controller.
- **Code Bk** shows the current version number of the firmware loaded for the ServeRAID adapter or controller.
- **Rebuild Rate** shows the current speed setting for rebuilds: High, Medium, or Low.
- **Number of Defunct Drives** shows the current number of Defunct physical drives.
- **Number of Offline Drives** shows the current number of Offline logical drives.
- **Number of Critical Drives** shows the current number of Critical logical drives.
- **Config. Updates** shows the number of times that the configuration has been changed since it has been initialized. When you initialize the configuration, the Config. Update resets to zero.
- **Flash Prgms** shows the current number of times that the Flash EEPROM has been written.
- **Locked, Bad Stripe, or Blocked Drive** identifies the logical drives that are affected.
 - **Bad Stripe Drives** indicates the area of a logical drive that is inaccessible.
 - **Locked Stripe Drives** is a reserved field.
 - **Blocked Drives** indicates the logical drives that are blocked. You must unblock a blocked drive before you can use it. See “Logical drive state descriptions” on page 82 for more information.

Viewing the configuration:

You can select View Configuration from the Main Menu to view the number of each logical drive, and to view the size, RAID level, state, stripe-unit size, write policy, read-ahead status, and creation date for each logical drive.

Advanced Configuration Functions:

You can select the **Advanced Functions** choice to reset the ServeRAID adapter or controller, initialize the configuration, import the configuration information from the drives, configure BIOS settings, and view the adapter, controller, or PCI information.

When you select the **Advanced Functions** choice from the Main Menu, the following choices appear on the screen.

Attention

Be careful when making selections from this menu. If you change the configuration, you might lose data.

- **Initialize Configuration** lets you reset the configuration. You will not have access to any data stored on the logical drives attached to the selected ServeRAID adapter or controller.
This choice deletes the existing configuration information, sets all functional hard disk drives attached to the controller to the Ready state, and deletes all logical drives defined for the controller.
This choice *does not* change any of the ServeRAID adapter or controller settings (such as the stripe-unit size, rebuild rate, and so on) from their current or customized values.
- **Import Configuration from Drive** reads the most common configuration from the drives in the system and copies it to the ServeRAID adapter or controller NVRAM and EEPROM module.
- **Configure BIOS Settings** lets you modify the BIOS settings, such as the Bootable CD-ROM and INT13 Extensions settings, for the ServeRAID adapter or controller. (See “Setting the bootable CD-ROM feature” on page 97 for more information.)

Notes

1. The Multiple Controller mode has two settings: Erase and Shrink. When this parameter is set to Erase, redundant copies of the ServeRAID BIOS are erased. When this parameter is set to Shrink, the extra copies of the ServeRAID BIOS are removed from memory, but stored for future use. When you have multiple ServeRAID adapters and controllers installed, you need only one active copy of ServeRAID BIOS. However, to ensure that you will have a copy of the ServeRAID BIOS available if the active copy becomes defective or unavailable, leave the Multiple Controller parameter set to Shrink.
2. Only one adapter or controller in the system can support the INT13 extensions.

- **View Controller and PCI Information** shows the ServeRAID adapter or controller hardware and PCI register information.
- **Exit** lets you exit the Mini-Configuration program.

Setting the bootable CD-ROM feature:

When you attach a CD-ROM drive to the ServeRAID adapter or controller and set the Bootable CD-ROM feature to Yes, the ServeRAID adapter or controller will attempt to start a CD that has a bootable startup partition, if no other adapter or controller in the system is currently using INT13 extensions. Only one adapter or controller in the system can support the INT13 extensions.

To enable the Bootable CD-ROM feature:

1. Select **Advanced Functions** from the Main Menu of the Mini-Configuration program.
2. Select **Configure BIOS Settings** from the Advanced Functions menu.
3. Use the Up Arrow (↑) and Down Arrow (↓) keys to highlight **BIOS Support for Bootable CD-ROM**; then, press **Enter** to change No to Yes.

Note

This also changes No to Yes next to **Display Boot CD-ROM Menu** and **BIOS Support for INT13 Extensions**.

4. Ensure that the screen has Yes next to **BIOS Support for Reading Partition Tables**. If not, use the Up Arrow (↑) and Down Arrow (↓) keys to highlight **BIOS Support for Reading Partition Tables**; then, press **Enter** to change No to Yes.

Note

You must perform this next step to save the new settings.

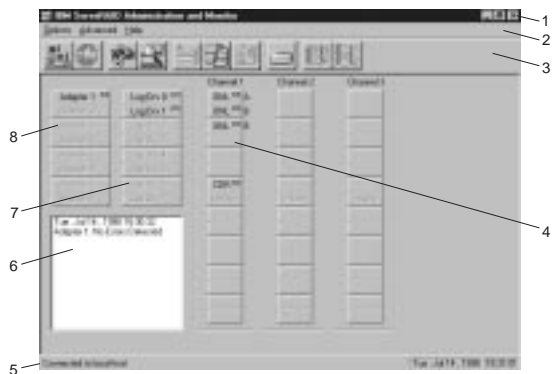
5. Highlight **Save Configuration to the ServeRAID Controller**; then, press **Enter**. The program displays a Configuration Saved message, and then returns you to the Main Menu of the Mini-Configuration program.
6. Press **Ctrl+Alt+Del** to restart the system.

ServeRAID Administration and Monitoring Program

You can use the Administration and Monitoring Program to monitor the ServeRAID adapters and controllers, view the ServeRAID configuration and associated devices, rebuild an array, create a logical drive, create an array, delete an array, dynamically increase the logical-drive size, change RAID levels, and much more.

Starting the ServeRAID Administration and Monitoring Program:

Before you start the ServeRAID WIN32-Based Administration and Monitoring Program, review the following illustration to become familiar with the layout of its Main screen.



Descriptions of the numbered 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 the state of each device connected to the physical channels of the ServeRAID adapter or controller, and if applicable, its array identifier.
- 5. **Status Bar** Displays help for the area where the cursor is currently pointing. Also displays the date and time.
- 6. **Status Window** Displays messages regarding the operational status of each adapter or controller.
- 7. **Logical Drive Area** Displays the number of logical drives created and the status of the logical drive.
- 8. **Adapter Area** Displays the number and status of the installed ServeRAID adapters and controllers

To start the WIN32-Based Administration and Monitoring Program:

1. Do one of the following:
 - Select the IBM ServeRAID Administration icon
or
 - Select **IBM ServeRAID Administration** from the Start menu.
2. The Administration and Monitoring Program starts in stand-alone mode. After this program loads, you can access the ServeRAID adapters and controllers.

When the Main window appears:

- If you are running the program in the stand-alone mode and you have ServeRAID adapters or controllers installed in the system, the current settings of the installed adapters or controllers will appear on the screen.
 - If you are running the program from a client with no ServeRAID adapters or controllers, a message will appear stating that no ServeRAID adapters or controllers are installed in the system.
3. To access the server that contains the ServeRAID adapters or controllers, select **Network Settings** from the Options menu.
 4. When the window appears prompting for Stand-alone or Client/Server, select the **Client/Server** button.
 5. In the edit box, type in the host name of the server that you want to access.

or

Select the host name from the pull-down list; then, select **Connect**.

Note

If security is enabled on the server, you must enter a valid user name and password.

Options pull-down menu:

The following choices are available from the Options pull-down menu on the Main Screen of the Administration and Monitoring Program:

- Network Settings
- General Options
- Alert Options

Network settings:


If you want to monitor the ServeRAID adapters and controllers across a network, you must switch to client/server mode.



You can use the Network Settings dialog box to select and connect to servers in the network that contain IBM ServeRAID adapters or controllers.

To select and connect to a server:



1. Select the  icon on the Tool Bar or select **Network Settings** from the **Options** pull-down menu. A screen similar to the following appears.

Network Settings

Stand-alone Client/Server

Connect Cancel

Client/Server Settings

User Name: Password:

ibm xxxxxxx

TCP/IP Add Delete

Host Name:Port Number (Optional)

ServeRAID:1087

2. Select the **Client/Server** radio button.
3. If security is enabled on the server to which you are connecting, type in the **User Name** and **Password** as defined by the security file on the server to which you are connecting. (Refer to "Background-server component security" on page 153 for information on the security file).

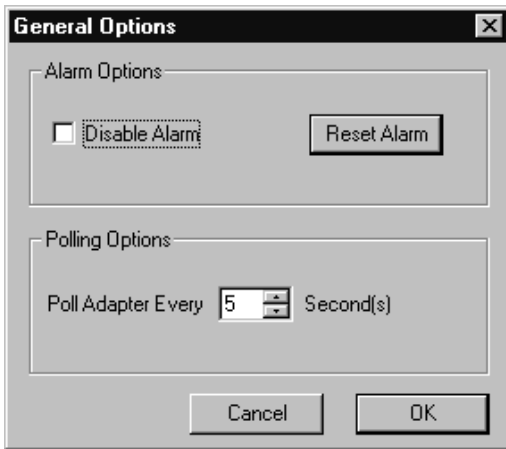
4. Type in either the **Host Name** or the **TCP/IP Address** of the system, or select it from the pull-down list.

Note

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

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

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



You can use this screen to:

- Enable or Disable the alarm
- Reset the alarm
- Set the polling options

Enabling or disabling the alarm: The alarm alerts you to a failure in the system. It sounds if any of the following conditions occur:


- A DDD hard disk drive is found.
- A Predictive Failure Analysis (PFA) error occurs.
- A ServeRAID adapter or controller is not responding.

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

Resetting the alarm:



Resetting the alarm turns off the alarm for the current failure without disabling the feature.

To reset the alarm, you can either select the  icon or select **Reset Alarm** on the General Options screen.

Polling options: The ServeRAID adapter or controller will *poll*, or check, the server at a specified time interval for any changes that may have occurred in the server.

You can choose how often the adapter or controller polls the server by specifying a time interval on the options menu, from five to 60 seconds. The default time interval setting is five seconds.

The program will poll for the following events:

- Rebuild started
- Rebuild completed
- Synchronization started
- Synchronization completed
- Migration started
- Migration completed
- PFA error detected
- Dead drive detected
- Adapter or controller is not responding to commands

Alert options:

The Netfinity Manage alerts allow system administrators who are using the IBM Netfinity Manager Program to configure the ServeRAID Administration and Monitoring Program to notify the Netfinity Alert Manager of various activities occurring on the server.

To configure the settings for the Netfinity Manager alerts:

1. Open the Options pull-down menu.
2. Select **Alert Options**.
3. Select **Netfinity Alerts**. A screen similar to the following appears.



Note

The default setting for the Netfinity Manager alerts is disabled.

4. To enable all Netfinity Manager alerts, select the check box next to Enable Netfinity Alerts.
5. To disable any of the Netfinity Manager alerts:
 - a. Ensure there is a check in the check box next to Enable Netfinity Alerts.
 - b. Select the check box next to the specific alert or alerts you want disabled.
6. To test the Netfinity Manager integration, select the **Send Test Alert** button. This will send a Netfinity Manager alert to the Alert Manager with a test message.

When you enable Netfinity Manager Alerts, the ServeRAID adapter or controller will relay the following three types of messages to the Netfinity Alert Manager:

- a. Information
 - Rebuild started
 - Rebuild completed
 - Synchronization started
 - Synchronization completed
 - Migration started
 - Migration completed
- b. Warning
 - PFA error detected
- c. Fatal
 - Dead drive detected
 - Adapter or controller is not responding to commands

By knowing what these types of messages are, you can configure the Netfinity Manager program with instructions for monitoring the server configuration and the appropriate action to take if an alert is given. For example, you could set the Netfinity Manager program to dial a specified phone number, should a defunct drive be detected on any server across the network. See the documentation provided with Netfinity Manager for more information.

ServeRAID administration functions

The following information is about using the following ServeRAID administration functions:

- Array administration
- Logical drive administration
- Logical drive migration administration
- Physical drive administration
- Adapter administration

Array administration:


Use the following information for creating and deleting disk arrays.

Creating disk arrays:



You can use disk arrays to improve security, performance, and reliability.

To create a disk array:

1. Select 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.



2. Select one or more Ready (RDY) drives for the new disk array from the Main screen of the Administration and Monitoring Program.

To select a RDY drive, click 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. Select **OK** to define a logical drive for the new array. A screen similar to the following appears.



4. Select the appropriate RAID level from the pull-down list.

Note

The number of hard disk drives in the array determines the RAID levels available for the array.

- If the array contains one hard disk drive, you can select only RAID level-0 for the logical drive.
- If the array contains two hard disk drives, you can select RAID level-0 or RAID level-1 for the logical drive.
- If the array contains three or more hard disk drives, you can select RAID level-0, RAID level-1, or RAID level-5 for the logical drive.

5. Enter the **Requested Space** in the entry field.

The ServeRAID program uses the maximum available space for the selected RAID level to calculate the default value that it assigns.

Note

The actual logical drive size might be slightly different from what you type in the **Requested Space** field. The RAID level and the number of hard disk drives determine the size of the logical drive. 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. Select **OK** to create the disk array.


Deleting disk arrays:

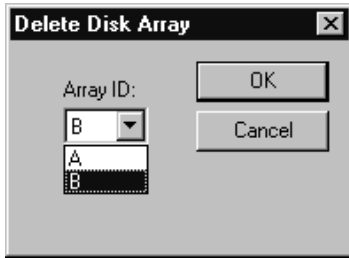


Deleting a disk array deletes all logical drives that are defined in that disk array. All data and programs on the logical drives in the disk array will be lost during this procedure.

To delete a disk array:



1. Select the  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.



2. Select the desired disk array ID from the pull-down list.

Attention

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

3. Select **OK** to delete the disk array.

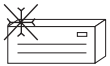
Note

For some operating systems, deleting a disk array and its associated logical drives might change the drive-letter assignments of the remaining drives when you restart the system.

Logical drive administration:


Use the following information to create logical drives, initialize and synchronizing logical drives, or access blocked logical drives.

Creating logical drives:



Each ServeRAID adapter or controller supports a maximum of 8 logical drives. Depending upon the stripe-unit size being used, you can combine a maximum of 8 or 16 physical drives into each logical drive.

To create a logical drive:

1. Select the  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.



2. Select the desired disk array ID from the pull-down list.

3. Select the appropriate RAID level from the pull-down list.

Note

The number of hard disk drives in the array determines the RAID levels available for the array.

- If the array contains one hard disk drive, you can select only RAID level-0 for the logical drive.
- If the array contains two hard disk drives, you can select RAID level-0 or RAID level-1 for the logical drive.
- If the array contains three or more hard disk drives, you can select RAID level-0, RAID level-1, or RAID level-5 for the logical drive.

4. Enter the **Requested Space** in the entry field.

The ServeRAID program uses the maximum available space for the selected RAID level to calculate the default value that it assigns.

Note

The actual logical drive size may be slightly different from what you type in the **Requested Space** field. The RAID level and the number of hard disk drives determine the size of the logical drive. 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.

5. Select **OK** to create the logical drive.

Notes

1. If you plan to use the Logical Drive Migration (LDM) feature, *do not* define more than seven logical drives. The LDM feature requires one free logical drive to perform the migration. Refer to "Logical drive migration administration" on page 109 for more information.
2. If you plan to use the Change RAID Level function of the LDM feature, you must assign the same RAID level to all logical drives within a single disk array. Refer to "Change RAID levels" on page 109 for more information.

Initializing logical drives: Initializing a logical drive erases the first 1024 sectors on the drive and prevents access to any data previously stored on the drive.

To initialize a logical drive:

1. Select the desired logical drive from the Main screen of the Administration and Monitoring Program.
2. Select **Initialize** to initialize the drive.
3. If you have initialized a RAID level-5 drive, you must synchronize to ensure data integrity. Go to "Synchronizing logical drives."

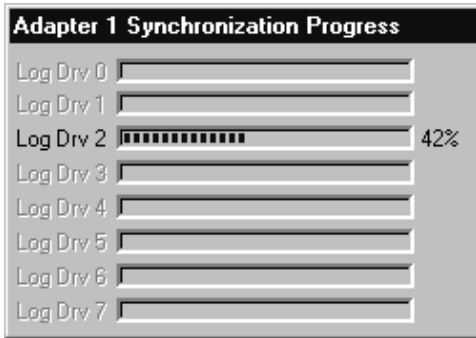
Synchronizing logical drives: The purpose of synchronizing logical drives is to compute and write the parity data on the selected drives.

If the type of ServeRAID adapter or controller you are using does not support the auto-synchronization and data-scrubbing features, manually synchronize the RAID level-1 and RAID level-5 logical drives weekly. This does not alter data on the drive.

Synchronizing a logical drive verifies that the data redundancy for the logical drive is correct.

To synchronize a logical drive:

1. Select the desired logical drive from the Main screen of the Administration and Monitoring Program.
2. Select **Synchronize** to synchronize the drive.
3. The synchronization begins automatically and reports progress information on the screen.



Note

Only one synchronization command can be active at a time.

Unblocking logical drives: When the ServeRAID adapter or controller performs a Rebuild operation on an array, it reconstructs the data that was stored in RAID level-1 and RAID level-5 logical drives. However, the ServeRAID adapter or controller cannot reconstruct the data that was stored in any RAID level-0 logical drives in that array. The data in the RAID level-0 logical drives is blocked when the ServeRAID adapter or controller detects that the array is valid, but the data might be damaged.

After the Rebuild operation completes, you can unblock the RAID level-0 logical drives and access them once again. But remember, the logical drive might contain damaged data. You must either re-create, install, or restore the data from the most recent backup disk or tape.

To unblock a blocked drive:

1. Select the blocked logical drive from the Main screen of the Administration and Monitoring Program.
2. Select **Unblock** to unblock the drive.
3. Initialize all unblocked logical drives before using them. See "Initializing logical drives" on page 107.
4. Restore the data to the drive from the 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 procedure 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 at least 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 adapter or 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 adapter or controller changes the state of the SYS drive back to FRE.

Change RAID levels:



You can change (migrate) the RAID levels of currently defined logical drives. To use the Change RAID Level feature, all of the logical drives within the array must be the same RAID level.


The ServeRAID adapters and controllers support changing RAID levels as follows:

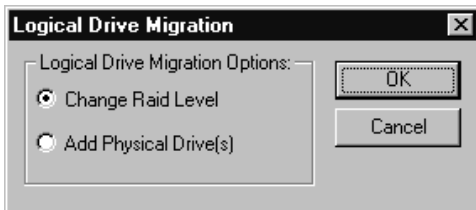
- Change two-drive RAID level-0 to RAID level-5 by adding one hard disk drive
- Change two-drive RAID level-1 to RAID level-5 by adding one hard disk drive
- Change from RAID level-5 to RAID level-0 by removing one hard disk drive

To change the RAID level of an existing disk array:

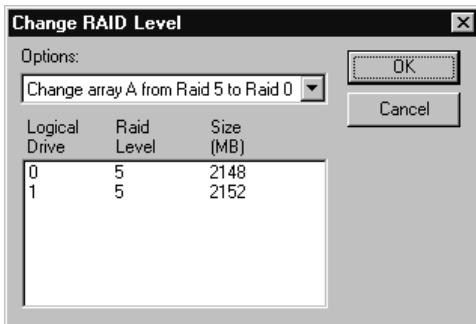
Note

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

1. Select 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 **Change RAID Level**.
3. Select **OK**.



4. Select a migrating option from the pull-down list.

Note

The affected logical drives appear, based on the migrating option you select.

5. Select **OK** to proceed.
6. Select **OK** to verify the operation.
7. Select a Ready (RDY) drive to add to the array, if you are migrating to RAID level-5.

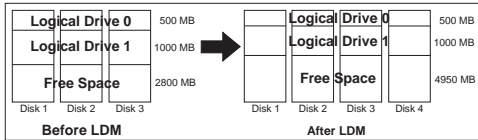
Adding a physical drive:



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

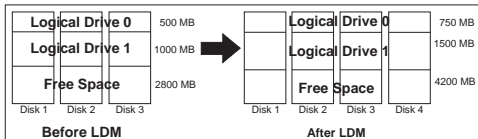
The ServerRAID adapters and controllers support adding new space to a disk array in the following scenarios:

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



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 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 with 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.

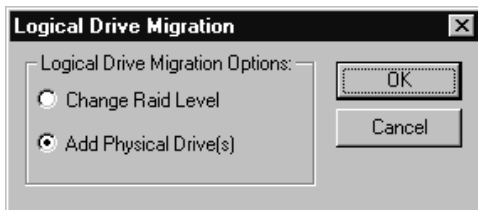


For example, an array uses three 2150 MB hard disk drives that are configured as two RAID level-5 logical drives (one 500 MB and 1000 MB) and 2800 MB of free space. If you use the logical drive migration procedure and add a 2150 MB hard disk drive to proportionally increase the size of the disk array, the end result will be two RAID level-5 logical drives (one 750 MB and 1500 MB) and 4200 MB of free space.

To add a physical device:



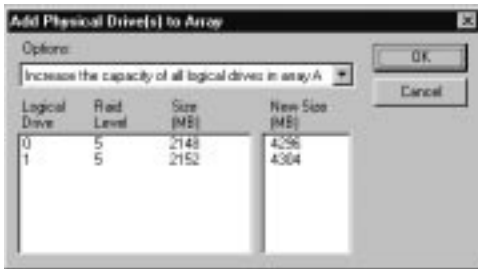
- Select the  icon on the Tool Bar or select **Manage Disk Arrays** from the Advanced pull-down menu; then, select **Logical Drive Migration**. A screen similar to the following appears.



- Select **Add Physical Drive(s)**.

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

3. Select the appropriate RDY drives on the Main screen. An **X** appears beside the selected drives.
4. When you are finished selecting drives, select **OK**.



5. Select one of the available expansion options from the pull-down list.
The screen will show a list of the affected logical drives with their new sizes.
6. Select **OK**.

Physical device administration:

Use the following information to set device states and rebuild devices.

Setting physical device states: The following table shows the valid device states and valid alternative states.

Device State	Alternative 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 set or change the physical device state:

1. Select the device from the Main screen of the Administration and Monitoring Program.
2. Select 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, the system might lose data.

3. Select **Set Device State**.

Rebuilding a device: When a hard disk drive goes defunct (DDD), a Rebuild operation is required to reconstruct the data for the device in its respective disk

array. The ServeRAID adapters and controllers can reconstruct RAID level-1 and RAID level-5 logical drives, but they cannot reconstruct data stored in RAID level-0 logical drives. To prevent data integrity problems, the ServeRAID adapters and controllers set the RAID level-0 logical drives to *Blocked* during a Rebuild operation. After the Rebuild operation completes, you can unblock the RAID level-0 logical drives, and access them once again. But remember, the logical drive might contain damaged data. (Refer to “Unblocking logical drives” on page 108 for more information.)

To perform a Rebuild operation:

1. Select the DDD device on the Main screen of the Administration and Monitoring Program.
2. Select **Rebuild Device**.
3. Select a RDY drive to use to reconstruct the data, or click on **OK** to use the same drive slot and SCSI ID if you have physically replaced the defunct drive.
4. The reconstruction begins automatically and reports progress information on the screen.

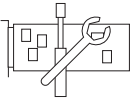
Notes

1. The ServeRAID adapter or controller can perform only one Rebuild operation at a time.
2. If the array contains a critical (CRT) logical drive, the Rebuild operation changes the hard disk drive state from DDD to RBL. After the Rebuild operation completes, the hard disk drive state changes from RBL to ONL. (If you rebuild to a RDY drive, the DDD drive is removed from the disk array and becomes a defunct hot-spare (DHS).)
3. The hard disk drive being rebuilt must be the same size or larger than the failed drive.
4. If a hot-spare (HSP) drive is available, a Rebuild operation will start automatically.
5. If multiple hot-spare (HSP) drives are available, the ServeRAID adapter or controller searches all the drives on each channel for a hot-spare drive of the appropriate size. The first appropriate hot-spare drive found enters the Rebuild (RBL) state.

Adapter administration:

This section provides instructions for copying the drive configuration to the ServeRAID adapter or controller, copying the ServeRAID adapter or controller configuration to the drives, initializing the adapter or controller configuration, and scanning for new drives.


Copying the drive configuration to the adapter:

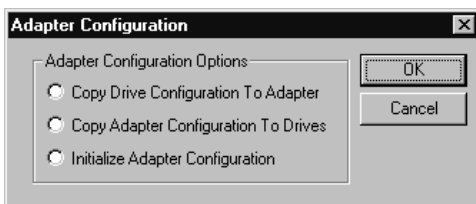


You can copy the configuration stored on the hard disk drives to the ServeRAID adapter or controller.

This operation is useful when drives are imported from other systems.

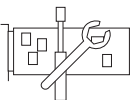
To copy the configuration:

1. Select the  icon on the Tool Bar or select **Adapter Configuration** from the Advanced pull-down menu. A screen similar to the following appears.




2. Select **Copy Drive Configuration to Adapter**.
3. Select **OK**.

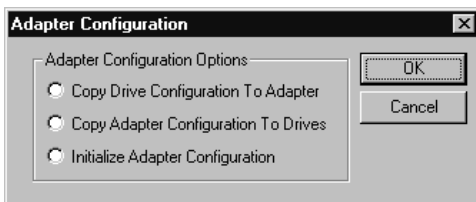
Copying the adapter configuration to the drives:



You can copy the configuration stored for the ServeRAID adapter or controller to all configured hard disk drives.

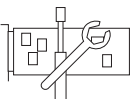
To copy the configuration:

1. Select the  icon on the Tool Bar or select **Adapter Configuration** from the Advanced pull-down menu. A screen similar to the following appears.



2. Select **Copy Adapter Configuration to Drives**.
3. Select **OK**.


Initializing the adapter:

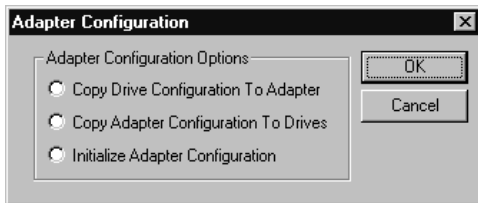


Initializing the adapter or controller configuration clears all the logical drives and resets all the functional hard disk drives to the Ready (RDY) state.

This operation is useful when you want to start over and create a new configuration.

To initialize the adapter or controller:

1. Select the  icon on the Tool Bar or select **Adapter Configuration** from the Advanced pull-down menu. A screen similar to the following appears.



2. Select **Initialize Adapter Configuration**.

Attention


After you initialize the configuration, you will not have access to any data stored on the logical drives attached to the selected ServeRAID adapter or controller.

This choice deletes the existing configuration information, sets all functional hard disk drives attached to the controller to the Ready state, and deletes all logical drives defined for the controller.

This choice *does not* change any of the ServeRAID adapter or controller settings (such as the stripe-unit size, rebuild rate, and so on) from their current or customized values.

3. Select **OK**.

Scanning for new drives: You can scan for new devices attached to the ServeRAID adapter or controller.

To scan for new drives, select the  icon on the Tool Bar or select **Scan For New Drives** from the Advanced pull-down menu.

ServeRAID monitoring functions

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

Monitoring adapter status information:

A green or red light on the screen indicates the currently active adapter button. (Green indicates that the ServeRAID adapter or controller is responding and red

indicates that it is not responding.) If there is more than one ServeRAID adapter or controller in the system, select on the appropriate adapter or controller to make it active.

You can then monitor the status by clicking on the active adapter button on the Main screen of the Administration and Monitoring Program.

Note

You might need to use the scroll bar and scroll down to see all of the items that appear on this screen.

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

Adapter Number	The active adapter or 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 startup error. On - The adapter or controller chooses the recovery method when there is a ServeRAID startup error.
Code Block Version	The current version number of the firmware loaded on the adapter or controller.
Boot Block Version	The current version number of the bootable microcode loaded on the adapter or controller.
Concurrent Commands	The maximum number of concurrent commands supported.
Maximum Devices Supported	The maximum number of devices supported.
Flash Program Count	The current number of times the flash EEPROM has been written.
Defunct Disk Count	The current number of defunct hard disk drives.
Rebuild Rate	The current setting (Low, Medium, or High) of the rebuild rate.
Hot-Swap Rebuild	The current state (Enabled or Disabled) of the hot-swap rebuild feature.
Offline Logical Drive Count	The current number of offline logical drives.
Configuration Update Count	The number of times that the ServeRAID configuration has been updated.
NVRAM Battery Backup Device	The current state of the battery-backup cache (installed, not installed, or defective).

Monitoring the device event logs:

The ServeRAID adapters and controllers store information concerning various events in the event logs. There are four types of event logs: a device event log, a hard event log, a soft event log, and a configuration event log. (See “ServeRAID Configuration Program” on page 70 and “ServeRAID Mini-Configuration Program” on page 94 for information about the configuration event log.)

To view the hard, soft, or device event logs:

1. Select the **adapter** on the Main screen of the Administration and Monitoring Program.
2. Select an event log button from the bottom of the screen.

The Device Event Log contains event counters for each attached physical device, as follows:

- Parity Event - The ServeRAID adapter or controller detected a parity event while transferring data on the SCSI bus. A large number of parity events might indicate a problem with the SCSI cable, connectors, or terminators on the SCSI channel.
- Soft Event - These events are detected by the SCSI device and reported to the ServeRAID adapter or controller through the SCSI Check Condition status.
- Predictive Failure Analysis (PFA) - The device has signaled the adapter or controller that it might fail in the near future.
- Hard Event - These events are detected by the ServeRAID adapter or controller. The most likely cause of a hard event is a problem with the SCSI cabling, termination, or adapter seating. If one of these is not the problem, replace the controller.
- Misc Event - These miscellaneous events are detected by the ServeRAID adapter or controller. These events do not include parity, soft, PFA, or hard events. The most likely cause of a miscellaneous event is a cable, termination, or connector problem.

Note

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

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 Program.

Descriptions of the information that appears on the Logical Drive Information screen 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 disk array (A, B, C, D, E, F, G, H).
Part of Merge Group	The identifier of the logical drive merge group (1 through 254).
Date Created	The date the logical drive was created.
State	The current state (see "Logical drive state descriptions" on page 82 for more information).
Size	The size in megabytes.
RAID Level	RAID level (0, 1, or 5).
Write Policy	WT - Write-through. WB - Write-back.
NVRAM Battery Backup Enable	Enable - The battery-backup cache is On. Disable - The battery-backup cache is Off.
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 SCSI ID 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 Program.

Descriptions of the fields that might appear on the Device Management screen are as follows.

Note

The number of fields that appear on the Device Management screen depend on the physical device selected.

Channel	The channel to which the device is connected (1, 2, or 3).
SCSI ID	The SCSI ID (0 to 15).
Vendor	The manufacturer of the physical device.
Serial Number	The manufacturer identifier.
Size	The size in megabytes.

State	The current state (see "Physical drive state descriptions" on page 83 and "Logical drive state descriptions" on page 82 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 Event	Yes - device indicates predictive failure analysis event. No - device does not indicate predictive failure analysis error.

ServeRAID IPSSSEND program (starting)

You can run the IPSSSEND program from the operating system command line.

To start the IPSSSEND program:

- If you are using OS/2 or Windows NT:

1. Type:
`c:\ipsadm\ipssend`
2. Press **Enter**.

Note

The *c* represents the drive where OS/2 or Windows NT is installed.

- If you are using NetWare:
 1. From the console, type:
`load ipssend`
 2. Press **Enter**.
- If you are using DOS:
 1. Insert the bootable IPSSSEND diskette that you created into diskette drive A; then, type:
`a:\ipssend`
 2. Press **Enter**.
- If you are using OpenServer or UnixWare:
 1. Type:
`/usr/bin/ipssend`
 2. Press **Enter**.

ServeRAID IPSSSEND program (using)

When you run the IPSSSEND program with no command-line parameters, a list of available functions and their specific parameters appears. All functions require a minimum set of parameters to run the command. If you run the IPSSSEND program with a specific function but

without its required parameters, specific help for that function will appear on the monitor.

There are four basic types of IPSSSEND commands:

- Server roll-out commands
- Error-recovery commands
- Problem-isolation and debug commands
- RAID configuration commands

ServeRAID server roll-out commands:

The IPSSSEND server roll-out commands include the following:

BACKUP Use the BACKUP command to save a ServeRAID adapter or controller configuration to a diskette or to a hard disk drive. The ServeRAID adapter or controller configuration must be valid.

Supported operating systems: Windows NT, OS/2, NetWare, DOS, OpenServer, and UnixWare.

Command:

IPSSSEND BACKUP *Controller Filename Oparm*

Replace:

- *Controller* with the ServeRAID controller number (1 to 8)
- *Filename* with the path and file name where the configuration is to be written
- *Oparm* with the optional parameter, NOPROMPT, to override the user prompt

COPYLD Use the COPYLD command to copy a source logical drive to a target logical drive. The size of the target logical drive must be greater than or equal to the size of the source logical drive.

Supported operating system: DOS

Command:

IPSSSEND COPYLD *Controller Source Target Oparm*

Replace:

- *Controller* with the ServeRAID controller number (1 to 8)
- *Source* with the source logical drive number
- *Target* with the target logical drive number
- *Oparm* with the optional parameter, NOPROMPT, to override the user prompt

RESTORE Use the RESTORE command to load a configuration from a file stored on a diskette or a hard disk drive. The configuration must be a valid configuration file from the BACKUP option on the *IBM ServeRAID DOS Configuration Utility Program Diskette* or IPSEND. This operation overwrites the existing configuration information stored for the ServeRAID adapter or controller.

Supported operating systems: Windows NT, OS/2, NetWare, OpenServer, UnixWare, and DOS

Command:

IPSEND RESTORE *Controller Filename Oparm*

Replace:

- *Controller* with the ServeRAID controller number (1 to 8)
- *Filename* with the path and file name where the configuration is to be written
- *Oparm* with the optional parameter, NOPROMPT, to override the user prompt

INIT Use the INIT command to initialize the first 0.5 MB of a logical drive. This process will erase the partition tables on the drive, and all data on the logical drive will be lost.

Supported operating systems: Windows NT, OS/2, NetWare, OpenServer, UnixWare, and DOS

Command:

IPSEND INIT *Controller DriveNum Oparm*

Replace:

- *Controller* with the ServeRAID controller number (1 to 8)
- *DriveNum* with the logical drive number (0 to 7)
- *Oparm* with the optional parameter, NOPROMPT, to override the user prompt

INITSYNC Use the INITSYNC command to initialize and synchronize a logical drive at the same time. This command works only on RAID level-1 and level-5 logical drives. The command will erase the entire logical drive, and all data on the logical drive will be lost.

Supported operating systems: Windows NT, OS/2, NetWare, OpenServer, UnixWare, and DOS

Command:

IPSEND INITSYNC *Controller DriveNum Oparm*

Replace:

- *Controller* with the ServeRAID controller number (1 to 8)
- *DriveNum* with the logical drive number (0 to 7)
- *Oparm* with the optional parameter, NOPROMPT, to override the user prompt

SYNCH Use the SYNCH command to synchronize the parity information on redundant logical drives. If the parity information is inconsistent, the IPSEND program will repair it automatically.

Supported operating systems: Windows NT, OS/2, NetWare, OpenServer, UnixWare, and DOS

Command:

IPSEND SYNCH *Controller Scope DriveNum*

Replace:

- *Controller* with the ServeRAID controller number (1 to 8)
- *Scope* with Drive for a single logical drive
- *DriveNum* with the logical drive number (0 to 7)

ServeRAID error-recovery commands:

The IPSEND error-recovery commands include the following:

GETSTATUS Use the GETSTATUS command to display the current logical-drive status for the most recent rebuild, synchronization, or logical-drive migration. The status includes such information as the remaining size of the logical drive, the percentage completed for the function in process, or information about the most recently completed logical-drive function.

Supported operating systems: Windows NT, OS/2, NetWare, OpenServer, UnixWare, and DOS

Command:

IPSEND GETSTATUS *Controller*

Replace:

Controller with the ServeRAID controller number (1 to 8)

REBUILD Use the REBUILD command to rebuild a designated disk drive. This command is valid for disk arrays that contain one or more logical drives that are in the critical (CRT) state. Progress is indicated during the rebuild operation, but you can also use the

GETSTATUS command to obtain progress information about the rebuild.

Supported operating systems: Windows NT, OS/2, NetWare, OpenServer, UnixWare, and DOS

Command:

IPSSEND REBUILD *Controller DCh DSID NCh NSID*

Replace:

- *Controller* with the ServeRAID controller number (1 to 8)
- *DCh* with the channel number for the Defunct drive (1 to 3)
- *DSID* with the SCSI ID for the Defunct Drive (0 to 15)
- *NCh* with the channel number for the New Drive (1 to 3)
- *NSID* with the SCSI ID for the New Drive (0 to 15)

SETSTATE Use the SETSTATE command to change the state of a physical device from its current state to a new state.

Attention

You must be very careful when you use this command. For example, you might lose data if you reset a Defunct (DDD) device to Online (ONL) without first performing a Rebuild operation.

Supported operating systems: Windows NT, OS/2, NetWare, OpenServer, UnixWare, and DOS

Command:

IPSSEND SETSTATE *Controller Channel SID NState*

Replace:

- *Controller* with the ServeRAID controller number (1 to 8)
- *Channel* with the channel number for the drive (1 to 3)
- *SID* with the SCSI ID for the drive (0 to 15)
- *NState* with the new state for the drive. Valid states are: EMP for Empty, RDY for Ready, HSP for Hot Spare, SHS for Standby Hot Spare, DDD for Defunct Disk Drive, DHS for Defunct Hot Spare, RBL for Rebuild, SBY for Standby, and ONL for Online. (See "Setting physical

device states" on page 112 for more information.)

UNBLOCK Use the UNBLOCK command to gain access to a blocked logical drive. RAID level-0 logical drives become blocked if they are in an array that contains RAID level-1 or level-5 logical drives and the array is being rebuilt. Because the RAID level-0 logical drives cannot be rebuilt, the data stored on the RAID level-0 logical drives is damaged and should not be accessed. After you issue the UNBLOCK command, you must re-create or restore the data previously stored on the RAID level-0 logical drives.

Supported operating systems: Windows NT, OS/2, NetWare, OpenServer, UnixWare, and DOS

Command:

IPSEND UNBLOCK *Controller DriveNum*

Replace:

- *Controller* with the ServeRAID controller number (1 to 8)
- *DriveNum* with the logical drive number (0 to 7)

ServeRAID problem-isolation and debug commands:

The IPSEND problem-isolation and debug commands include the following:

CERTIFY Use the CERTIFY command to verify the media of a hard disk drive. If the program finds a media error, it reassigns the sectors. A summary of reassignments and PFA errors appears upon completion of the verification.

Supported operating system: DOS

Command:

IPSEND CERTIFY *Controller Channel SID*

Replace:

- *Controller* with the ServeRAID controller number (1 to 8)
- *Channel* with the channel number for the device (1, 2, or 3)
- *SID* with the SCSI ID for the device (0 to 15)

ERASEEVENT Use the ERASEEVENT command to clear all logged entries in the designated event log. See GETEVENT help for information about the contents of the Device Event Log and the Adapter Soft and Hard Event Logs.

Supported operating systems: Windows NT, O/S2, Netware, OpenServer, UnixWare, and DOS

Command:

IPSSEND ERASEEVENT *Controller Options*

Replace:

- *Controller* with the ServeRAID controller number (1 to 8)
- *Options* with one of the following:
 - DEVICE for the Device Event Log
 - SOFT for the ServeRAID adapter or controller Soft Event Log
 - HARD for the ServeRAID adapter or controller Hard Event Log

FMSTATUS Use the FMSTATUS command to display the progress of a format operation currently processing.

Supported operating system: DOS

Command:

IPSSEND FMSTATUS *Controller Channel SID*

Replace:

- *Controller* with the ServeRAID controller number (1 to 8)
- *Channel* with the channel number for the device (1, 2, or 3)
- *SID* with the SCSI ID for the device (0 to 15)

FORMAT Use the FORMAT command to perform a low-level format of a hard disk drive.

Attention

When you issue this command, all data on the drive will be lost.

Supported operating system: DOS

Command:

IPSSEND FORMAT *Controller Channel SID*

Replace:

- *Controller* with the ServeRAID controller number (1 to 8)
- *Channel* with the channel number for the device (1, 2, or 3)
- *SID* with the SCSI ID for the device (0 to 15)

GETEVENT Use the GETEVENT command to display information about various unexpected events. IBM uses the Soft and Hard Event Logs for development and debugging purposes only. The Device Event Log contains event counters for each attached physical device. These counters include:

- Parity: An unexpected event while transferring data on the SCSI bus. This usually indicates a problem with the SCSI cable, connectors, or terminators.
- Soft: A SCSI device detected a *check condition* event.
- Hard: The SCSI controller detected an unexpected event. The controller is the most likely cause.
- Misc: The ServeRAID adapter or controller detected an event that was most likely caused by the device.

The Device Event Log also provides predictive failure analysis (PFA) alerts, which indicate that the device has signaled the ServeRAID adapter or controller that it might fail in the near future.

Supported Operating Systems: Windows NT, OS/2, NetWare, OpenServer, UnixWare, and DOS

Command:

IPSEND GETEVENT *Controller Options*

Replace:

- *Controller* with the ServeRAID controller number (1 to 8)
- *Options* with one of the following: DEVICE for Device Event Log, SOFT for the ServeRAID adapter or controller Soft Event Log, or HARD for the ServeRAID adapter or controller Hard Event Log.

SELFTEST The SELFTEST command is used to direct an adapter or a device to perform its self-test.

Supported operating systems: DOS

Command:

IPSEND SELFTEST *Controller Options*

Replace:

- *Controller* with the ServeRAID controller number (1 to 8)
- *Options* with AD for the ServeRAID adapter or controller self-test or PD Channel SID for the Device self-test.

Note

Channel represents the drive channel and *SID* represents the SCSI ID for the device.

STARTDELY Use the STARTDELY command to set the number of drives in a group to start up simultaneously and to set the delay in seconds between the startup of these groups of drives.

Supported operating systems: DOS

Command:

IPSSEND STARTDELY *Controller Options*

Replace:

- *Controller* with the ServeRAID controller number (1 to 8)
- *Options* with a question mark (?) to display concurrent drive startup count: Drive Count (1 to 16) and Delay Time (3 to 15 seconds).

RAID configuration commands:

The IPSSEND RAID configuration commands include the following:

DRIVEVER Use the DRIVEVER command to display the vendor ID, microcode version, and serial number of a SCSI device. The IPSSEND program retrieves this information directly from the device.

Supported operating systems: Windows NT, OS/2, NetWare, OpenServer, UnixWare, and DOS

Command:

IPSSEND DRIVEVER *Controller Channel SID*

Replace:

- *Controller* with the ServeRAID controller number (1 to 8)
- *Channel* with the channel number for the device (1, 2, or 3)
- *SID* with the SCSI ID for the device (0 to 15)

GETCONFIG Use the GETCONFIG command to display the ServeRAID adapter or controller configuration information. This includes information about the firmware version; initiator ID and rebuild rate; logical drive status, RAID level, and size; and physical device type, SCSI ID, and PFA error.

Supported operating systems: Windows NT, OS/2, NetWare, OpenServer, UnixWare, and DOS

Command:

IPSSEND GETCONFIG *Controller Options*

Replace:

- *Controller* with the ServeRAID controller number (1 to 8)
- *Options* with one of the following: AD for adapter or controller information, LD for logical drive information, PD for physical device information, AL (default) for all information.

HSREBUILD Use the HSREBUILD command to set the ServeRAID adapter or controller hot-swap rebuild feature on. Use a question mark (?) to display the current status of the hot-swap rebuild feature.

Supported operating systems: Windows NT, OS/2, NetWare, OpenServer, UnixWare, and DOS

Command:

IPSEND HSREBUILD *Controller Options*

Replace:

- *Controller* with the ServeRAID controller number (1 to 8)
- *Options* with ON to enable the hot-swap rebuild feature, or ? to display the status of the hot-swap rebuild feature.

ServeRAID IPSMON program (starting)

You can run the IPSMON program from the operating system command line.

To start the IPSMON program:

- If you are using OS/2 or Windows NT:

1. Type:
`c:\ipsadm\ipsmon`
2. Press **Enter**.

Note

The *c* represents the drive where OS/2 or Windows NT is installed.

- If you are using Novell NetWare:

1. From the console, type:
`load ipsmon`
2. Press **Enter**.

- If you are using SCO OpenServer or UnixWare:

1. Type:
`/usr/bin/ipsmon`
2. Press **Enter**.

ServeRAID IPSMON program (using)

When you start this monitoring program, it immediately begins polling all ServeRAID adapters and controllers for specific conditions. If a condition being monitored is found, this program logs a message to the monitor, to a file, or to both the monitor and a file.

The IPSMON program uses command-line parameters to determine where to log the messages. If you need help, you can type the `IPSMON -?` command for a list of valid parameters.

If you start this program without any command-line parameters, the IPSPMON program will log the messages to the IPSPMON.LOG file, and the messages will not appear on the monitor.

The valid parameters for IPSPMON are:

- **-f:filename**
Use the -f parameter to specify the name of the file in which to record messages. The default file name is IPSPMON.LOG.
- **-s**
Use the -s parameter to display messages on the standard output (usually the monitor).
- **-?**
Use the -? parameter to obtain a current list of valid parameters.

After you start the IPSPMON program, the program will continuously poll the ServeRAID adapters and controllers until you take one of the following actions:

- If you are using Windows NT or OS/2, press **Ctrl+C**.
- If you are using NetWare, type: `unload ipsmon` at the system console.
- If you are using OpenServer or UnixWare, press the **Del** key to cancel the program.

During operation, the program will log various messages. Each message will contain an alert code and a location specifier.

- The alert code begins with the message type and number. For example, INF, WRN, or CRT, followed by the message number.
- After the alert code comes the location specifier:
 - A** specifies the adapter or controller number
 - SID** specifies the SCSI ID (if required)
 - C** specifies the channel number (if required)

For example, a message of CRTxxx:A2C3SID04 signifies that a Critical condition (CRTxxx) was found on Adapter 2 (A2), Channel 3 (C3), SCSI ID 4 (SID04).

The IPSPMON program can log the following messages, based on the required condition.

Information Messages:

```
<Date and Time> INF000:A1C-SID
-- no errors detected
<Date and Time> INF001:A1C-SID
-- rebuild started
<Date and Time> INF002:A1C-SID
-- rebuild completed
<Date and Time> INF003:A1C-SID
-- synchronization started
<Date and Time> INF004:A1C-SID
```

-- synchronization completed
<Date and Time> INF005:A1C-SID
-- migration started
<Date and Time> INF006:A1C-SID
-- migration completed

Warning Messages:

<Date and Time> WRN001:A2C3SID12
-- PFA Error detected

Critical Messages:

<Date and Time> CRT001:A3C2SID04
-- dead drive detected
<Date and Time> CRT002:A1C-SID
-- not responding to commands

ServeRAID device drivers and utility programs (installation)

This chapter provides information about the device drivers and utility programs available for the IBM ServeRAID adapters and controllers.

IBM ServeRAID utility programs:

This section contains information about the device drivers and utility programs available for the ServeRAID adapters and controllers.

Obtaining ServeRAID updates: IBM periodically makes updated versions of the ServeRAID device drivers and utility programs available from the IBM Support page on the World Wide Web. In addition to the updated device drivers and utility programs, there are also two ServeRAID command-line programs, IPSEND and IPSMON, available from the World Wide Web. These programs are both on the *IBM ServeRAID Command Line Programs Diskette*.

You can download the most current versions of the ServeRAID device drivers and utility programs or a copy of the *IBM ServeRAID Command Line Programs Diskette* from the following address on the World Wide Web:

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

From the IBM Support page:

1. Select **IBM Server Support**; then, select **Server Options** from the Family menu.
2. Select **Downloadable Files**; then, select **ServeRAID**.

Administration and Monitoring Program

The IBM ServeRAID Administration and Monitoring Program monitors the ServeRAID adapters and controllers while the network operating system is up and running.

This section provides information about the IBM ServeRAID Administration and Monitoring Program files for the ServeRAID adapters and controllers. You can use these files with the Windows NT, Windows 95, OS/2, Novell NetWare, SCO OpenServer, and SCO UnixWare operating systems.

ServeRAID programs for Windows NT and Windows 95

The ServeRAID program files available for Windows NT consist of the ServeRAID Administration and Monitoring Program, device drivers, background-server components, and the IPSEND and IPSMON command-line programs. (See "IPSEND and IPSMON programs" on page 154 for more information.)

The IBM ServeRAID Administration and Monitoring Program for Microsoft Windows NT or Windows 95 is called the WIN32-Based program. This program provides a graphical interface that enables you to monitor ServeRAID configuration changes being performed on the server while the server is fully operational. You can create an array, delete an array, create a logical drive, change the RAID level, dynamically increase the logical drive size, rebuild an array, and perform other basic ServeRAID configuration functions.

You can run the WIN32-Based program in the stand-alone mode *only* on a Windows NT server. Or, you can run the WIN32-Based program remotely on a Windows NT or Windows 95 client and access the client from a server that has TCP/IP, a background-server component (see "ServeRAID background-server components"), and one of the following operating systems installed:

- Microsoft Windows NT
- IBM OS/2 Warp Server and OS/2 LAN Server
- Novell NetWare 3.12 and 4.1X
- SCO UnixWare 7.0
- SCO OpenServer 5.0.X

ServeRAID background-server components

The background-server components are operating-system-specific program files that enable servers running Windows NT, OS/2, NetWare, OpenServer, or UnixWare to act as the TCP/IP interface for a remote client that has the WIN32-Based program installed. These files install automatically when you use the instructions in this chapter to install the ServeRAID operating-system-specific device drivers.

Notes

1. Only one remote session at a time can access ServeRAID adapters and controllers using the background-server component.
2. It is possible to run multiple background-server components with each component using a different TCP/IP port; however, to avoid damage to data, you must restrict administration activities to one remote client and use the other remote clients for monitoring purposes only.

ServeRAID programs for OS/2 and NetWare

The ServeRAID program files available for the OS/2 and NetWare operating systems consist of the Administration and Monitoring program, device drivers, background-server components, and the IPSEND and IPSPMON command-line programs. (See "IPSEND and IPSPMON programs" on page 154 for more information.)

The Administration and Monitoring Program files for OS/2 and NetWare run only on the system containing a ServeRAID adapter or controller (stand-alone mode). These ServeRAID programs provide a limited subset of the functions provided in the WIN32-Based program, and they install automatically when you use the instructions in this chapter to install the ServeRAID device driver for OS/2 or NetWare.

A good way to use these operating-system-specific programs is to run the OS/2 or NetWare versions of the Administration and Monitoring Program files locally on the server, while using the WIN32-Based program on a remote Windows NT or Windows 95 client. This method enables you to take advantage of the more advanced administration and monitoring functions provided in the WIN32-Based program.

ServerRAID programs for OpenServer and UnixWare

The ServeRAID program files available for OpenServer and UnixWare consist of device drivers, background-server components, and the IPSEND and IPSPMON command-line programs. (See "IPSEND and IPSPMON programs" on page 154 for more information.)

The background-server components for SCO operating systems install automatically when you use the instructions in this chapter to install the ServeRAID OpenServer or UnixWare device drivers.

To use the ServeRAID Administration and Monitoring Program with a SCO operating system, you must first install the WIN32-Based program on a Windows NT or

Windows 95 client. Then, attach the Windows NT or Windows 95 client to the same network as the OpenServer or UnixWare system that contains the ServeRAID adapter or controller. You must perform all administration functions from the remote WIN32-Based client.

Installing the ServeRAID WIN32-based program

This section provides instructions for installing the ServeRAID WIN32-Based program.

Before you begin the installation.

- Be sure that the ServeRAID adapter or controller is physically installed, properly cabled, and configured.
- Be sure that the network operating system is installed and functional.
- If the network operating system is Windows NT, you can use the ServeRAID WIN32-Based program remotely in the client/server mode or locally in stand-alone mode.
- The ServeRAID adapters and controllers do not support Windows 95. However, you can run the WIN32-Based program remotely on a Windows 95 client attached to a remote server running the OS/2, NetWare, Windows NT, UnixWare, or OpenServer operating system. Use the instructions in this section to install the WIN32-Based program on the Windows 95 client.
- If the network operating system is OS/2, NetWare, OpenServer, or UnixWare, you must run the ServeRAID WIN32-Based program remotely, in the client/server mode.

Other requirements for this environment include:

- A Windows NT or Windows 95 client running the IBM ServeRAID WIN32-Based program
Use the instructions in this section to install the WIN32-Based program.
- A network adapter with proper cabling for access to the remote systems
- The TCP/IP networking protocol installed on both the local and remote systems
- The ServeRAID device driver and background-server component installed on the remote system

Refer to "Installing ServeRAID device drivers" on page 134 for more information.

If you are using Windows NT, use the installation instructions and ServerGuide CDs provided with the server to install the Administration and Monitoring program. If you want to install the program on a remote Windows 95 client, use the ServerGuide Diskette Factory to create an *IBM ServeRAID Administration and Monitoring Diskette*; then,

use the instructions in this section to install the Administration and Monitoring program.

To install the ServeRAID WIN32-Based program:

1. Turn on the system and allow Windows NT or Windows 95 to start.
2. Insert the *IBM ServeRAID Administration and Monitoring Diskette* into the diskette drive.
3. Select **Start**, select **Run**; then, type the following:

```
a:\setup
```

Note

The *a* represents the letter assignment for the diskette drive.

4. Press **Enter**; then, follow the instructions that appear on the screen to complete the installation.

Refer to "Starting the ServeRAID Administration and Monitoring Program" on page 98 for more information about the WIN32-Based program.

Installing ServeRAID device drivers

This section provides the instructions for installing the device drivers for Windows NT, NetWare, OS/2, OpenServer, and UnixWare. The OS/2 and NetWare Administration and Monitoring Program files and background-server components install automatically when you use the instructions in this section to install the ServeRAID device drivers for OS/2 and NetWare. The Windows NT, UnixWare, and OpenServer background-server components install automatically when you use the instructions in this chapter to install the ServeRAID device drivers for Windows NT, UnixWare, and OpenServer.

When using:	Go to:
Windows NT	"Installing ServerRAID device drivers for Windows NT"
NetWare	"Installing ServeRAID device drivers for NetWare" on page 136
OS/2	"Installing ServerRAID device drivers for OS/2" on page 140
OpenServer	"Installing ServerRAID device drivers for OpenServer" on page 143
UnixWare	"Installing ServeRAID device drivers for UnixWare" on page 146

Installing ServerRAID device drivers for Windows NT:

This section provides two sets of instructions for installing the ServeRAID device driver: one that you can use during the initial Windows NT installation and one that you can use if Windows NT already is installed.

The background-server components for Windows NT 3.5X and Windows NT 4.0 install automatically when you use the instructions in this chapter to install the ServeRAID device drivers.

Installing the files while installing Windows NT:

To install the ServeRAID files while installing Windows NT:

1. Use the ServerGuide Diskette Factory to create an *IBM ServeRAID Device Driver Diskette*.
2. Insert the Windows NT boot diskette into the diskette drive or insert the bootable Windows NT CD into the CD-ROM drive; then, restart the server.
3. When the message Setup is inspecting the computer's hardware configuration... appears, press the **F6** key.
4. After loading some files, Windows NT displays a screen that allows you to manually specify an adapter. When this screen appears, press **S** to specify additional devices.
5. When prompted in the next window, select **Other** from the list.
6. When prompted to insert the Manufacturer-supplied-hardware support disk, insert the *IBM ServeRAID Device Driver Diskette* into the diskette drive; then, press **Enter**.
7. Select **IBM ServeRAID Adapter**; then, press **Enter**. A message similar to the following will appear. Setup is loading files (IBM ServeRAID Adapter)...
8. When prompted, press **Enter** to continue.
9. Use the instructions provided in the Windows NT manual to complete the normal installation process.
10. After you complete the installation, be sure to apply the latest Service Pack.

Installing the files after installing Windows NT:

To install the ServeRAID files after Installing Windows NT:

1. Use the ServerGuide Diskette Factory to create an *IBM ServeRAID Device Driver Diskette*.
2. Insert the *IBM ServeRAID Device Driver Diskette* into the diskette drive.
3. From the Windows NT Start Menu, select **Settings**; then, select **Control Panel**.
4. Select **SCSI Adapter**; then, select the **Drivers** tab.
5. Select **Add**; then, select **Have Disk**.
6. In the **Copy manufacturer's files from** field, type:
a:\nt
7. Select **OK**; then in the next dialog box, select **OK** again.
8. When a message appears asking if you want to use the currently installed device driver or if you want to install a new one, select **New**.
9. When prompted to enter the full path to the IBM ServeRAID files, type:

a:\nt

10. Select **Continue**; then after the device driver installs, restart the system.

Installing ServeRAID device drivers for NetWare:

This section provides instructions for installing the ServeRAID device drivers while installing NetWare 3.12 or 4.1X, and instructions for installing the ServeRAID device drivers if NetWare 3.12 or 4.1X already is installed.

The Administration and Monitoring Program files and the background-server components for NetWare install automatically when you use the instructions in this chapter to install the ServeRAID device drivers for NetWare.

Installing the files while installing NetWare 3.12:

The ServeRAID device driver for NetWare, IPSRAID.HAM, is in the NetWare directory on the *IBM ServeRAID Device Driver Diskette*. You can use the INSTALL.BAT file, which is also in the NetWare directory on the diskette, to copy all required files to the server directory. The INSTALL.BAT file will modify the STARTUP.NCF file so that it will load the required NetWare modules.

Use the instructions provided in the NetWare 3.12 manual along with the following instructions to install the ServeRAID device driver, background-server component, and Administration and Monitoring Program files while installing NetWare, Version 3.12.

1. Use the ServerGuide Diskette Factory to create an *IBM ServeRAID Device Driver Diskette*.
2. After you create the diskette, type the following at the command prompt to manually create the directory for NetWare:

```
md server.312
```

Note

The *SERVER.312* is the default NetWare 3.12 directory. If you are using a different path, be sure to specify the same path throughout the entire NetWare installation process.

3. Press **Enter**.
4. Change to the SERVER.312 directory on the hard disk; then, insert the *IBM ServeRAID Device Driver Diskette* into the diskette drive.
5. At the operating system prompt, type:

```
a:
```

Note

The *a* represents the drive assignment for the diskette drive that contains the ServeRAID diskette.

6. Press **Enter**. Then, type:
cd netware
7. Press **Enter**. Then, type:
install
8. Press **Enter**. Then, follow the instructions that appear on the screen to complete the ServeRAID device driver and program installation.

Installing the files after installing NetWare 3.12:

The ServeRAID device driver for NetWare, IPSRAID.HAM, is in the NetWare directory on the *IBM ServeRAID Device Driver Diskette*. You can use the INSTALL.BAT file, which is also in the NetWare directory on the diskette, to copy all of the required files to the server directory. The INSTALL.BAT file will modify the STARTUP.NCF file so that it will load the required NetWare modules.

Use the instructions provided in the NetWare 3.12 manual along with the following instructions to install the ServeRAID device driver, background-server component, and Administration and Monitoring Program files after installing NetWare, Version 3.12.

1. Use the ServerGuide Diskette Factory to create an *IBM ServeRAID Device Driver Diskette*.
2. Insert the *IBM ServeRAID Device Driver Diskette* into the diskette drive.
3. Go to the default NetWare 3.12 directory. To do this, type:
cd\server.312

Note

The *SERVER.312* is the default NetWare 3.12 directory. If you are using a different path, be sure to specify the same path throughout the installation process.

4. Press **Enter**; then, from the operating system prompt in the SERVER.312 directory, type:
a:

Note

The *a* represents the drive assignment for the diskette drive that contains the ServeRAID diskette.

5. Press **Enter**. Then, type:
cd netware

6. Press **Enter**. Then, type:
install
7. Press **Enter**. Then, follow the instructions that appear on the screen to complete the ServeRAID device driver and program installation.

Installing the files while installing NetWare

4.1X: Use the instructions provided in the NetWare 4.1X manual along with the following instructions to install the ServeRAID device driver, background-server component, and Administration and Monitoring Program files while installing NetWare, Version 4.1X.

1. Use the ServerGuide Diskette Factory to create an *IBM ServeRAID Device Driver Diskette*.
2. Use the instructions provided in the NetWare manual to begin the installation.
3. When the Choose the Server Drivers - Disk Driver prompt appears during the install process, insert the *IBM ServeRAID Device Driver Diskette* into the diskette drive.
4. Select **Select additional or modify selected Disk/LAN drivers**.
5. If IPSRAID appears, select **Deselect a selected driver**.
6. Select **Select an additional driver**; then, press the **Ins** (Insert) key to add an unlisted new device driver.
7. Press **F3** to specify a path; then, type:
a:\netware

Note

The *a* represents the drive assignment for the diskette drive that contains the ServeRAID diskette.

8. Select **IPSRAID.HAM** from the list of device drivers that appears in the window; then, press **Enter**.

Note

The IPSRAID.HAM and support files will be copied to the system volume.

9. Select **OK** to overwrite the existing files.
10. Follow the instructions in the NetWare manual to complete the installation.

Installing the files after installing NetWare 4.1X

1. Use the ServerGuide Diskette Factory to create an *IBM ServeRAID Device Driver Diskette*.
2. From the system console, start the NetWare installation utility program by typing:
load install
3. Press **Enter**.

4. Insert the *IBM ServeRAID Device Driver Diskette* into the diskette drive.
5. Select **Driver options** from the Installation Options list.
6. Select **Configure disk and storage** from the Driver Options pop-up window.
7. Select **Select an additional driver** from the Additional Drivers Actions pop-up window.
8. When the next screen appears, press the **Ins** key to install an unlisted driver.
9. When the next screen appears, press the **F3** key to specify a different path.
10. In the **Specify a directory path** field, type:
a:\netware
11. When prompted to select a driver to install, select **IPSRAID.HAM**.
12. Select **Yes** when prompted to copy the IPSRAID.HAM driver.
13. When the prompt appears to specify the server boot path, type:
c:\nwserver

Notes

1. This instruction assumes that you installed NetWare in its default directory. If you did not install NetWare in the NWSERVER directory on drive C, modify step 13 accordingly.
2. If any of the files you are installing already exist on the server, NetWare will prompt you to save the older files. Although it is not necessary to save the older files, it usually is a good idea.

14. After the installation program copies all files, you can edit parameters (such as the ServeRAID slot number) from the Driver IPSRAID Parameter Actions screen.
15. After you edit the parameters, select **Save Parameters and load driver** to load the ServeRAID device driver.
16. Press **Esc** to exit the installation screens.

Note

If you want NetWare to load the ServeRAID device driver automatically during startup, you must add the appropriate LOAD command (for example, `load ipsraid.ham slot=1`) to the NetWare startup command file (usually `C:\NWSERVER\STARTUP.NCF`).

Installing ServerRAID device drivers for OS/2:

This section provides two sets of instructions for installing the ServeRAID device driver: one that you can use during the initial OS/2 installation and one that you can use if OS/2 already is installed.

The ServeRAID Administration and Monitoring Program files and background-server component for OS/2 install automatically when you use the instructions in this chapter to install the ServeRAID device driver for OS/2.

Installing the files while installing OS/2: You can use the following instructions to install the ServeRAID device driver and Administration and Monitoring Program files while installing OS/2 Warp Server.

Note

If you install these files on a logical drive that has its write policy set to the write-back mode, wait at least 10 seconds after being prompted to press **Ctrl+Alt+Del** before you actually press the keys. Waiting 10 seconds or longer gives the ServeRAID adapter or controller the time needed to flush all dirty-cache pages out to the hard disk.

To install the ServeRAID files while installing OS/2:

1. Use the ServerGuide Diskette Factory to create an *IBM ServeRAID Device Driver Diskette*.
2. Make a copy of the *OS/2 Warp Diskette 1* and label it *Copy of OS/2 Diskette 1*.
3. Copy the IPSRAID.ADD file from the OS2 directory on the *IBM ServeRAID Device Driver Diskette* to the *Copy of OS/2 Diskette 1*.

If there is not enough space, delete files not needed in the installation (such as proprietary CD-ROM or SCSI device drivers). Make sure you remove all entries referring to any device drivers you delete from the CONFIG.SYS file.

4. Edit the CONFIG.SYS file on the *Copy of OS/2 Diskette 1* to add the following lines:
BASEDEV=IPSRAID.ADD
SET COPYFROMFLOPPY=1
5. Install OS/2, but when prompted to insert diskette 1, use the updated *Copy of OS/2 Diskette 1*.
6. After you complete the OS/2 installation, insert the *IBM ServeRAID Device Driver Diskette*.
7. From an OS/2 window, type:
a:

Note

The *a* represents the drive assignment for the diskette drive that contains the ServeRAID diskette.

8. Press **Enter**. Then, type:

```
ddinstal
```

9. Press **Enter**.

The OS/2 Device Driver Installation window will appear and prompt you for the source and destination drives. The source directory shows where to insert the *IBM ServeRAID Device Driver Diskette*. The destination directory shows where the program will copy the device driver files.

10. Select **Install**.

- The program copies the following ServeRAID device driver and program files to the OS/2 subdirectory on the hard disk: IPSRAID.ADD, IPSADM.EXE, and IPSRADM.EXE.
- The program copies the ServeRAID IPSRADM.HLP Help file to the \OS2\HELP directory.

11. Edit the CONFIG.SYS file and verify that there is only one copy of the line BASEDEV=IPSRAID.ADD.

Notes

1. If you have more than one ServeRAID or SCSI adapter in the system, make sure that the BASEDEV statement for the adapter controlling the startup (boot) device appears before the BASEDEV statements for other ServeRAID or SCSI adapters in the CONFIG.SYS file.
2. After you install any service packs, check the path for the IPSRAID.ADD device driver and verify that the correct device driver is installed.

12. Restart the server.

Installing the files after installing OS/2: You can use the following instructions to install the ServeRAID device driver and Administration and Monitoring Program files after installing OS/2 Warp Server.

To install the ServeRAID files after installing OS/2:

1. Use the ServerGuide Diskette Factory to create an *IBM ServeRAID Device Driver Diskette*.
2. After you complete the OS/2 installation, insert the *IBM ServeRAID Device Driver Diskette*.
3. From an OS/2 window, type:
a:

Notes

1. The *a* represents the drive assignment for the diskette drive that contains the ServeRAID diskette.
2. If you install these files on a logical drive that has its write policy set to the write-back mode, wait at least 10 seconds after being prompted to press **Ctrl+Alt+Del** before you actually press the keys. Waiting 10 seconds or longer gives the ServeRAID adapter or controller the time needed to flush all dirty-cache pages out to the hard disk.

4. Press **Enter**. Then, type:

```
ddinstal
```

5. Press **Enter**.

The OS/2 Device Driver Installation window will appear and prompt you for the source and destination drives. The source directory shows where to insert the *IBM ServeRAID Device Driver Diskette*. The destination directory shows where the program will copy the device driver files.

6. Select **Install**.

- The program copies the following ServeRAID device driver statement to the CONFIG.SYS file: BASEDEV=IPSRAID.ADD
- The program copies the following ServeRAID device driver and program files to the OS/2 subdirectory on the hard disk: IPSRAID.ADD, IPSADM.EXE, and IPSRADM.EXE
- The program copies the following ServeRAID Help file to the \OS2\HELP directory: IPSRADM.HLP

7. Edit the CONFIG.SYS file and verify that there is only one copy of the line BASEDEV=IPSRAID.ADD.

Notes

1. If you have more than one ServeRAID or SCSI adapter in the system, make sure that the BASEDEV statement for the adapter controlling the startup (boot) device appears before the BASEDEV statements for other ServeRAID or SCSI adapters in the CONFIG.SYS file.
2. After you install any service packs, check the path for the IPSRAID.ADD device driver and verify that the correct device driver is installed.

8. Restart the server.

Starting the Administration and Monitoring

Program: To start the ServeRAID Administration and Monitoring Program for OS/2:

1. Go to the OS/2 subdirectory on the hard disk drive; then, type:

```
ipsradm /lf=d:\path\logfile
```

Notes

1. Make sure that the path you type exists. The program will not create a path.
2. *Logfile* is where the program will log messages.
3. If you omit the */lf* parameter, the program will create the *IPSRADM.LOG* default file in the OS2 subdirectory to log the program messages.

2. Press **Enter**.
3. Use the following steps if you want to define IPSRADM to OS/2:
 - a. Open the Templates Folder on the OS/2 Desktop.
 - b. Drag a program template onto the Desktop. A Program Settings window will appear.
 - c. At the Program page in the **Path and File Name** field, type:

```
c:\os2\ipsradm.exe
```
 - d. In the **Parameters** field, type:

```
/lf=d:\path\logfile
```
 - e. At the General Tab in the **Title** field, type:

```
ServeRAID
```

Installing ServerRAID device drivers for OpenServer:

To use the ServeRAID Administration and Monitoring Program with SCO, you must first install the WIN32-Based version of the Administration and Monitoring Program on a Windows NT or Windows 95 client. Then, attach the Windows NT or Windows 95 client to the same network as the OpenServer systems that contain the ServeRAID adapters or controllers. Finally, you must install the ServeRAID device driver and background-server component for OpenServer.

The background-server component for OpenServer installs automatically when you use the instructions in this chapter to install the ServeRAID OpenServer device driver. This component enables the OpenServer system to act as the TCP/IP interface for the remote WIN32-Based Program. (See "ServeRAID programs for Windows NT and Windows 95" on page 131 for more information.)

Installing the files for OpenServer: Before you begin the installation, review the following information:

- You must install logical drives as Bus Number 0 when using the MKDEV program, regardless of the channel that the physical drives are on.
- You must install nondisk devices, such as CD-ROM and tape drives, as Bus Numbers 1, 2, or 3 relative to the channel to which they are attached. External Channel 1 connector is Bus Number 1, external Channel 2 connector is Bus Number 2, and internal Channel 3 connector is Bus Number 3.

To configure the default nondisk devices during the initial installation:

1. Redefine the default tape drive in the initial bootstring. For example, to install the IPSRAID BTLD and redefine the tape drive, go to the B00T prompt and type:

```
link Stp=ips(0, 1, 2, 0)
```

The numbers in parentheses represent the Host Adapter Number, the Bus Number, the SCSI ID, and the LUN respectively.
2. When prompted for the location of the installation CD, change the Bus Number and SCSI ID, as required.

Adding BTLD at boot time: To install the ServeRAID device driver for OpenServer, Version 5.0.X:

1. Use the ServerGuide Diskette Factory to create an *IBM ServeRAID Device Drivers for SCO Operating Systems Diskette*.
2. At the B00T prompt, type:

```
link
```
3. Press **Enter**; then, when asked for the name of the package to load, type:

```
ipsraid
```
4. Press **Enter**.
5. After the kernel loads but before it runs, link prompts you to insert the *IBM ServeRAID Device Drivers for SCO Operating Systems Diskette*.

While the installation program copies the files, one or both of the following messages might appear:

Messages

1. Extracting BTLD distribution for ipsraid... /etc/uadmin getdev b ips: No such device (error 19)
2. dynamic linker: dlvr_audit: Cannot open /dev/zero for file /lib/libprot.so.1

You can ignore Message A, no action is required. But if Message B appears, you must press **Enter** when prompted to continue the installation.

6. Keep the *IBM ServeRAID Device Drivers for SCO Operating Systems Diskette* readily available. You will need it to configure the device driver into the link kit.

For additional information about adding a BTLD at boot time, refer to "Using Boot-Time Loadable Drivers" in the *SCO OpenServer Handbook*.

Adding BTLD after the initial installation

1. Use the ServerGuide Diskette Factory to create an *IBM ServeRAID Device Drivers for SCO Operating Systems Diskette*.
2. Start the server in system maintenance mode, and log in as *root*.
3. Type:
`installpkg`
4. Press **Enter**; then, select the diskette drive in which you will insert the installation diskette.
5. Insert the *IBM ServeRAID Device Drivers for SCO Operating Systems Diskette*, when prompted.
6. When prompted for the name of the package, type:
`ipsraid`
7. Press **Enter**; then, relink the kernel (as described in "Relinking the kernel" in the *SCO OpenServer Handbook*) by entering the following commands:
`cd /etc/conf/cf.d`
`./link_unix`
8. After the kernel rebuilds, the following message appears:
The UNIX® kernel has been rebuilt. Do you want this kernel to boot by default?
To continue, enter: `y`
The system backs up the old kernel by moving */UNIX* to */UNIX.OLD*.
9. When the system asks for the kernel environment to be rebuilt, enter: `y`
The system will respond with a successful message.
10. Use *shutdown* to bring down the system; then, restart the system.

Using an IDE CD-ROM drive to install

OpenServer files: This section contains instructions for installing files for OpenServer 5.0.0, OpenServer 5.0.2, and OpenServer 5.0.4 when using an IDE CD-ROM Drive.

Installing the files for OpenServer 5.0.0:

To install files for OpenServer 5.0.0 using an IDE CD-ROM drive:

1. Type the following at the B00T prompt:
`restart ahslink="ATAPI ipsraid" Srom=wd(0,0,0,0)`

2. Insert the ATAPI BTLD diskette when prompted; then, press **r** to replace the *wd* driver.

The fields for the ATAPI CD-ROM are:

Srom=*wd(c,d,l,b)* where:

c = primary (0) or secondary (1) IDE/EIDE controller

d = master (0) or slave (1) device

l = LUN of device (always 0 with ATAPI or *wd* driver)

b = BUS of device (always 0 with ATAPI or *wd* driver)

Installing the files for OpenServer 5.0.2 and

5.0.4: To install files for OpenServer Versions 5.0.2 or 5.0.4 using an IDE CD-ROM drive:

1. Type the following at the B00T prompt:
restart link=ipsraid Srom=*wd(0,0,0,0)*

Note

The ATAPI BTLD (which includes the *wd* driver) is included in OpenServer 5.0.2 and 5.0.4.

The fields for the ATAPI CD-ROM are:

Srom=*wd(c,d,l,b)* where:

c = primary (0) or secondary (1) IDE/EIDE controller

d = master (0) or slave (1) device

l = LUN of device (always 0 with ATAPI or "*wd*" driver)

b = BUS of device (always 0 with ATAPI or "*wd*" driver)

2. Let the system start normally until it comes to the select Media options.
 - If you are using OpenServer 5.0.2, go to step 3.
 - If you are using OpenServer 5.0.4, go to step 4.
3. To install with OpenServer 5.0.2:
 - a. Select Adapter type as **WD**.
 - b. Select Media Type as **SCSI CD-ROM**.
 - c. Select ID, BUS and LUN as **0**.
 - d. Go to step 5.
4. To install with OpenServer 5.0.4:
 - a. Select Media Type as **IDE CD-ROM Drive**.
 - b. Select **Primary Adapter** and **Master Device**.
 - c. Go to step 5.
5. You have completed the installation.

Installing ServerRAID device drivers for UnixWare:

The instructions for installing the ServerRAID files when using UnixWare depend on the number of IDE and SCSI disk-storage adapters and controllers installed in the system. If all of the direct-access-storage devices (DASD)

in the system are attached to a single disk-storage adapter or controller (such as the ServeRAID adapter or controller), you can skip the instructions in this section and go directly to “Installing the files while installing UnixWare” on page 150 or “Installing the files after installing UnixWare” on page 151.

If you are attaching devices to multiple disk-storage adapters or controllers (including IDE and SCSI controllers integrated on the system board), use the following instructions.

- If you are installing UnixWare on a drive attached to a ServeRAID adapter or controller, follow the instructions in “Installing UnixWare on a ServeRAID drive.”
- If you are installing UnixWare on a drive attached to a non-ServeRAID adapter or controller and you intend to store only data on the drives attached to the ServeRAID adapters and controllers, follow the instructions in “Installing UnixWare on a non-ServeRAID drive” on page 149.

Installing UnixWare on a ServeRAID drive: Use the following instructions if you are using multiple disk-storage adapters or controllers and you are installing UnixWare on a drive attached to a ServeRAID adapter or controller.

Note

If you are not using multiple disk-storage adapters and controllers, go to “Installing the files while installing UnixWare” on page 150.

1. Install all ServeRAID adapters that you intend to use in the system.
2. Using the ServeRAID Configuration Program, create all of the arrays and define all of the logical drives.
3. Make a list of all of the ServeRAID adapters and controllers, including the order and slot number, installed in the system. To do this:
 - a. Turn on the server.
 - b. When the ServeRAID Mini-Configuration prompt appears, press **Ctrl+i**. When a system contains more than one ServeRAID adapter or controller, a selection screen appears.
 - c. The menu lists the ServeRAID adapters and controllers in order. Select the first ServeRAID adapter or controller from the menu.
 - d. Select **Advanced Functions** from the Main Menu.
 - e. Select **View Controller and PCI Information** from the Advanced Functions menu.

- f. Record the slot number for the ServeRAID adapter or controller; then, press **Esc** three times to return to the controller selection screen.
 - g. Repeat step 3c on page 147 through step 3f until you record the slot number for each ServeRAID adapter or controller that appears on the selection screen.
4. Turn off the system; then, remove all ServeRAID adapters and controllers except the first one on the list.

Note

If one of the ServeRAID controllers that you need to remove is on the system board, you must do one of the following:

- If the CD-ROM drive that you are using to install the operating system is attached to the integrated ServeRAID controller, disconnect or remove all disk drives attached to the integrated controller.
- If only disk drives are attached to the integrated controller, disconnect the SCSI cable from the ServeRAID connector on the system board. See the label inside the server cover for the location of the ServeRAID connector.

5. Remove all other non-ServeRAID IDE and SCSI disk-storage adapters and controllers.

Note

If one of the disk-storage controllers that you need to remove is on the system board, you must do one of the following:

- If the CD-ROM drive that you are using to install the operating system is attached to the integrated disk-storage controller, disconnect or remove all disk drives attached to the integrated controller.
- If only disk drives are attached to the integrated controller, disconnect the cable for the integrated controller from the IDE or SCSI connector on the system board. See the label inside the server cover for the location of the IDE or SCSI controller connector.

6. Follow the instructions in "Installing the files while installing UnixWare" on page 150; then, return here and continue with step 7.
7. Power down the system.

8. Install any non-ServeRAID disk-storage adapters or controllers in the server; then, attach the drives to the disk-storage adapters and controllers.
9. Install the second ServeRAID adapter or controller from the list you created in step 3f on page 148; then, attach the drives to the ServeRAID adapter or controller.
10. Turn on the system and allow UnixWare to discover the new disk-storage adapters and controllers.
11. Power down the system.
12. Repeat steps 9, 10, and 11 until all ServeRAID adapters, ServeRAID controllers, and drives are installed.
13. You can now partition and format the logical drives attached to the additional ServeRAID adapters and controllers. See the information provided with UnixWare for more instructions.

Installing UnixWare on a non-ServeRAID drive:

Use the instructions in this section if you are using multiple disk-storage adapters or controllers, you are installing UnixWare on a drive attached to a non-ServeRAID adapter or controller, and you intend to store only data on the drives attached to the ServeRAID adapters and controllers.

1. Install all ServeRAID adapters that you intend to use in the system.
2. Using the ServeRAID Configuration Program, create all of the arrays and define all of the logical drives.
3. Make a list of all of the ServeRAID adapters and controllers, including the order and slot number, installed in the system. To do this:
 - a. Turn on the server.
 - b. When the ServeRAID Mini-Configuration prompt appears, press **Ctrl+i**. When a system contains more than one ServeRAID adapter or controller, a selection screen appears.
 - c. The menu lists the ServeRAID adapters and controllers in order. Select the first ServeRAID adapter or controller from the menu.
 - d. Select **Advanced Functions** from the Main Menu.
 - e. Select **View Controller and PCI Information** from the Advanced Functions menu.
 - f. Record the slot number for the ServeRAID adapter or controller; then, press **Esc** three times to return to the controller selection screen.
 - g. Repeat step 3c through step 3f until you record the slot number for each ServeRAID adapter or controller that appears on the selection screen.
4. Turn off the system; then, remove all ServeRAID, IDE, and SCSI disk-storage adapters and controllers except the one attached to the drive where you intend to install UnixWare.

Note

If one of the disk-storage or ServeRAID controllers that you need to remove is on the system board, do one of the following:

- If the CD-ROM drive that you are using to install the operating system is attached to the integrated controller, disconnect or remove all disk drives attached to the integrated controller.
- If only disk drives are attached to the integrated controller, disconnect the SCSI or IDE cable for the integrated controller from the connector on the system board. See the label inside the server cover for the location of the SCSI and IDE cable connectors.

5. Follow the instructions in "Installing the files while installing UnixWare"; then, return here and continue with step 6.
6. Power down the system.
7. Install any non-ServeRAID disk-storage adapters or controllers in the server; then, attach the drives to the disk-storage adapters and controllers.
8. Install the first ServeRAID adapter or controller from the list you created in step 3f on page 149; then, attach the drives to the ServeRAID adapter or controller.
9. Turn on the system and allow UnixWare to discover the new disk-storage adapters and controllers.
10. Power down the system.
11. Repeat steps 8, 9, and 10 until all ServeRAID adapters, ServeRAID controllers, and drives are installed.
12. You can now partition and format the logical drives attached to the ServeRAID adapters and controllers. See the information provided with UnixWare for more instructions.

Installing the files while installing UnixWare: To install the ServeRAID files while installing UnixWare 7.0:

1. Use the ServerGuide Diskette Factory to create an *IBM ServeRAID Device Drivers for SCO Operating Systems Diskette*.
2. Use the instructions provided with UnixWare to begin the installation.
3. When a message appears asking if you want to install any HBA diskettes, insert the *IBM ServeRAID Device Drivers for SCO Operating Systems Diskette*; then, select **Install HBA diskette**.
4. Use the instructions provided in the UnixWare manual to complete the normal installation process.

Installing the files after installing UnixWare: Use the following instructions to install the ServeRAID files after you install UnixWare, or use these instructions to update a previously installed ServeRAID file with a newer version. You can use the UnixWare Pkgadd or the UnixWare SCOAdmin utility program to install the files.

Installing an HBA diskette file using Pkgadd

1. Use the ServerGuide Diskette Factory to create an *IBM ServeRAID Device Drivers for SCO Operating Systems Diskette*.
2. Insert the *IBM ServeRAID Device Drivers for SCO Operating Systems Diskette* into the diskette drive.
3. Type:

```
pkgadd -d/ dev/dsk/f0t
```
4. Press **Enter**
5. When the message Insert diskette into Floppy Drive 1 appears, press **Enter**.
6. When the message Installation of IBM ServeRAID SCSI IHV HBA (ips) was successful appears, type:

```
q
```
7. Press **Enter**; then after the device driver installs, restart the system.

Installing an HBA diskette file using SCOAdmin

1. Use the ServerGuide Diskette Factory to create an *IBM ServeRAID Device Drivers for SCO Operating Systems Diskette*.
2. Insert the *IBM ServeRAID Device Drivers for SCO Operating Systems Diskette* into the diskette drive.
3. Start the SCOAdmin utility program.
4. Select **Software_Management**.
5. Select **Application Installer**.
6. Select **Disk_A** from the Install From tab.
7. Select the **Update View** button.
8. When the icon labeled **ips** appears in the window, select **Install**.
9. After the device driver installs, restart the system.

Starting the ServeRAID background-server components

To start the background-server components:

- If you are using OS/2 or Windows, select the IPSRAID ADMIN-MONITOR icon on the desktop.
- If you are using OpenServer or UnixWare:
 1. Make sure you are logged on as root.
 - a. If you are not, type:

```
su
```
 - b. When prompted, enter the root password.
 2. Start the background-server component (daemon) running in the background. To do this, type:

```
ipsadm &
```

3. Press **Enter**.

- If you are using Novell NetWare:

1. Load the remote component. To do this, type:

```
load ipsadm.nlm
```

2. Press **Enter**

Notes

1. To load the NetWare Administration program with NetWare SFT III installed, load IPSADM.NLM in the mirrored server engine. The ServeRAID adapters and controllers in the primary and backup servers will appear to the Administration and Monitoring Program as if they were in one server.
2. When a rebuild, synchronization, or logical-drive migration is in process, you cannot stop the IPSADM.NLM module by pressing the **Esc** key. To stop the module during one of these operations, you must unload the IPSADM.NLM module.

ServerRAID background-server components

This section provides information about background-server component command-line parameters and logging messages.

Command-line parameters:

To use the command-line parameters provided in the background-server components, issue the IPSADM command in the following format:

```
IPSADM parameter1 parameter2 parameter3 etc...
```

Valid command-line parameters for the background-server components are as follows:

-? The **-?** command displays the help for the valid parameters.

-p:number The **-p:number** command specifies the port number that the server will check for client connections.

The port number is a parameter used in TCP/IP to distinguish among different services on a single server. The default for the server utility programs is port number 1087. You can use this parameter to change the port number if another service on the system is using 1087.

- s:filename** The `-s:filename` command specifies the name of the file that contains security information. For more about security information, see “Background-server component security” on page 153.
- f** The `-f` command specifies to log messages to the default file, IPSADM.LOG.
- f:filename** The `-f:filename` command lets you specify the name of a file in which to log messages.
- d** The `-d` command disables the logging of messages to the standard output, which is usually the screen.

Logging messages:

Messages generated by the ServeRAID adapter or controller consist of startup information, connecting and disconnecting clients, and error messages.

When using the `-f`, `-f:filename` and `-d` parameters, you can specify how you want the ServeRAID messages handled. The default is to log messages to the standard output, which is usually the screen. However, you can have these messages logged to other output devices, such as a printer or a text file.

The following information provides examples of different formats for using the IPSADM command and the results.

Command	Results
IPSADM	Logs messages to the standard output and not to a file.
IPSADM -f	Logs messages to the standard output and to the IPSADM.LOG file.
IPSADM -f:NEWFILE.LOG	Logs messages to the standard output and to the file that you defined: NEWFILE.LOG.
IPSADM -d	Disables the logging of messages.
IPSADM -f -d	Logs messages to the IPSADM.LOG file; however, messages are not logged to the standard output.

Background-server component security:

Security information is maintained in an optional text file on the server. 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 into the Administration and Monitoring Program (the client), they are encrypted for delivery to the server. The server

decrypts the user names and passwords to verify proper access to the ServeRAID adapter or controller. If the verification is successful, the adapter or controller accepts commands from the client. If no security file is present in the default directory, or the directory specified by the `-s` parameter, security is disabled. The server component then accepts commands from any client connection.

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

Background-server component name resolution:

The server component 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 client connecting. 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 persist, check the network configuration.

IPSEND and IPSMON programs

IPSEND and IPSMON are advanced command-line programs that you can use to manage the ServeRAID adapters and controllers. These utility programs are provided on the *IBM ServeRAID Command Line Programs Diskette*. This ServeRAID diskette is available from the ServerGuide Diskette Factory or from the following address on the World Wide Web:

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

See page 130 for the instructions needed to access the IBM support page.

You can use the IPSEND program to view the configuration of a ServeRAID adapter or controller, rebuild a defunct drive, initialize logical drives, synchronize logical drives, and perform other functions.

You can use the IPSMON program to monitor a ServeRAID adapter or controller for defunct drives, predictive failure analysis (PFA) warnings, rebuild operations, synchronizations, and logical-drive migrations. This program can log a message to the monitor, to a file, or to both the monitor and a file whenever activities occur.

You can use the IPSEND and IPSMON programs with the following operating systems:

- IBM OS/2 Warp Server and OS/2 LAN Server
- Novell NetWare 3.12 and 4.1X

- Microsoft Windows NT
- SCO OpenServer 5.0.X
- SCO UnixWare 7.0

You also can use the IPSEND program with DOS, but DOS requires the ASPI Manager.

Installing IPSEND and IPSMON for OS/2, Windows NT, or NetWare:

To install these programs for OS/2, Windows NT, or NetWare:

1. After you create an *IBM ServeRAID Command Line Programs Diskette* using Diskette Factory or by downloading the image from the IBM Support Page on the World Wide Web, start the server.
2. After the operating system loads, insert the *IBM ServeRAID Command Line Programs Diskette* into the diskette drive.
3. If you are using NetWare, go to step 5. If you are using Windows NT or OS/2, create an IPSADM directory on the hard disk drive. To do this, go to the operating system command prompt and type:

```
md c:\ipsadm
```

Notes

1. The *c* represents the drive where OS/2 or Windows NT is installed.
2. If you installed the Administration and Monitoring Program files, you already created this directory.

4. Press **Enter**.
5. Copy the IPSEND.EXE file to the hard disk drive by typing one of the following at the command prompt:
 - For OS/2, type:
copy a:\os2\ipssend.exe c:\ipsadm
 - For Windows NT, type:
copy a:\nt\ipssend.exe c:\ipsadm
 - For NetWare, type:
copy a:\netware\ipssend.nlm c:\nwserver

Notes

1. The *a* represents the drive assignment for the diskette drive that contains the ServeRAID diskette.
2. The *c* represents the drive where OS/2, Windows NT, or NetWare is installed.
3. These instructions assume that you installed NetWare in the NWSERVER directory.

6. Press **Enter**; then, copy the IPSMON.EXE file to the hard disk drive by typing one of the following at the command prompt:

- For OS/2, type:

```
copy a:\os2\ipsmon.exe c:\ipsadm
```

- For Windows NT, type:

```
copy a:\nt\ipsmon.exe c:\ipsadm
```

- For NetWare, type:

```
copy a:\netware\ipsmon.nlm c:\nwserver
```

Notes

1. The *a* represents the drive assignment for the diskette drive that contains the ServeRAID diskette.
2. The *c* represents the drive where OS/2, Windows NT, or NetWare is installed.
3. These instructions assume that you installed NetWare in the NWSERVER directory.

7. Press **Enter**; then, refer to “Starting the ServeRAID Administration and Monitoring Program” on page 98 for information to start and use the IPSSSEND and IPSMON programs.

Installing IPSSSEND and IPSMON for OpenServer:

To install these programs for OpenServer 5.0.X:

1. Insert the *IBM ServeRAID Command Line Programs Diskette* into the diskette drive.

2. Copy the program files from the *IBM ServeRAID Command Line Programs Diskette* by typing the following:

```
doscp -r a:/openserv/ipssend /usr/bin/ipssend
```

3. Press **Enter**; then, type:

```
doscp -r a:/openserv/ipsmon /usr/bin/ipsmon
```

4. Press **Enter**; then, change the access permissions by typing the following:

```
chmod 700 /usr/bin/ipssend
```

5. Press **Enter**; then, type:

```
chmod 700 /usr/bin/ipsmon
```

6. Press **Enter**; then, refer to “Starting the ServeRAID Administration and Monitoring Program” on page 98 for information to start and use the IPSSSEND and IPSMON programs.

Installing IPSSSEND and IPSMON for UnixWare:

To install these programs for UnixWare 7.0:

1. Insert the *IBM ServeRAID Command Line Programs Diskette* into the diskette drive.
2. Copy the program files from the *IBM ServeRAID Command Line Programs Diskette* by typing the following:

```
doscp -r a:/unixware/ipssend /usr/bin/ipssend
```

3. Press **Enter**; then, type:

```
doscp -r a:/unixware/ipsmon /usr/bin/ipsmon
```

4. Press **Enter**; then, change the access permissions by typing the following:

```
chmod 700 /usr/bin/ipssend
```

5. Press **Enter**; then, type:

```
chmod 700 /usr/bin/ipsmon
```

6. Press **Enter**; then, refer to "Starting the ServeRAID Administration and Monitoring Program" on page 98 for information to start and use the IPSSSEND and IPSMON programs.

Installing IPSSSEND for DOS:

To install IPSSSEND for DOS:

1. Create a startable diskette. To do this, insert a blank diskette in diskette drive A; then, type:

```
format a: /s
```

2. Press **Enter**.

3. Copy the ASPI device driver from the DOS directory on the *IBM ServeRAID Device Driver Diskette* to the startable diskette.

4. Copy the IPSSSEND.EXE file from the DOS directory on the *IBM ServeRAID Command Line Programs Diskette* to the startable diskette.

5. Leaving the startable diskette in the diskette drive, restart the system; then, refer to "Starting the ServeRAID Administration and Monitoring Program" on page 98 for information to start and use the IPSSSEND and IPSMON programs.

Rebuilding a defunct drive

When a hard disk drive goes defunct (DDD), a Rebuild operation is required to reconstruct the data for the device in its respective disk array. The ServeRAID adapters and controllers can reconstruct RAID level-1 and RAID level-5 logical drives, but they cannot reconstruct data stored in RAID level-0 logical drives.

To prevent data integrity problems, the ServeRAID adapters and controllers set the RAID level-0 logical drives

to *Blocked* during a Rebuild operation. After the Rebuild operation completes, you can unblock the RAID level-0 logical drives, and access them once again. But remember, the logical drive might contain damaged data. (Refer to “Unblocking logical drives” on page 108 for more information.)

Before you rebuild a drive, review the following guidelines and general information.

Guidelines for the rebuild operation:

- The replacement hard disk drive must have a capacity equal to or greater 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.
 - You must unblock any RAID level-0 logical drives at the end of the rebuild operation.
 - If you use the Administration and Monitoring program to initiate the rebuild operation, you can unblock the blocked RAID level-0 drive when the rebuild operation completes. (See “Unblocking logical drives” on page 108 for more information.)
- Data in a logical drive with RAID level-0 is lost during the rebuild operation. If you backed up the data before the drive failed, you can restore the data to the new drive.

General information about the rebuild operation:

A physical hard disk drive can enter the rebuild state if:

- You physically replace a defunct drive that is part of the critical logical drive.

When you physically replace a defunct drive in a critical logical drive, the ServeRAID adapter or controller rebuilds the data on the new physical drive *before* it changes the logical drive state back to Okay.
- The ServeRAID adapter or controller adds a hot-spare or a standby hot-spare drive to the array and changes its state from Hot-Spare or Standby Hot-Spare to Rebuilding.

Automatically rebuilding the defunct drive:

The ServeRAID adapter or 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 RAID level-5 logical drive.
- A hot-spare or standby hot-spare drive with a capacity equal to or greater than the capacity of the defunct drive is available the moment the drive fails.

- When multiple hot-spare drives are available, the ServeRAID adapter or controller searches for a hot-spare drive of the appropriate size. The smallest drive that meets this requirement enters the Rebuild state.
- If no hot-spare or standby hot-spare drives are available, the rebuild operation will start the moment you replace the defective drive.

Note

If you physically replace the drive and the new drive does not appear in the Physical Drives branch of the Main Tree, you must scan for new or removed Ready drives.

- No rebuild, synchronization, or logical-drive migration operation is in process.

Locations/Removals

The following information supports the Netfinity 5500 M20 - Type 8662 server.

- “Adapters” on page 161.
- “Battery replacement” on page 173.
- “Changing jumper positions” on page 176.
- “Completing the installation” on page 178
- “Controls and indicators” on page 181.
- “CD-ROM drive” on page 184.
- “DASD backplane removal” on page 186.
- “Diagnostics panel LEDs” on page 187.
- “External options” on page 188.
- “Front bezel removal” on page 195.
- “Hot-swap power supply installation” on page 196.
- “Hot-swap power supply removal” on page 200.
- “Hot-swap fan assembly replacement” on page 202.
- “Information LED panel” on page 205.
- “Information LED panel cover removal” on page 207.
- “Information LED panel assembly removal” on page 208.
- “Input/output connectors and expansion slots” on page 209.
- “Interior LED and speaker assembly” on page 212.
- “Internal drives installation” on page 213.
- “Installing devices in the NetBAY3” on page 225.
- “Memory board component locations” on page 230.
- “Memory board jumpers” on page 231.
- “Memory board removal” on page 232.
- “Memory modules” on page 234.
- “Microprocessor installation” on page 238.
- “Preparing to install options” on page 246.
- “Power backplane removal” on page 249.
- “Power supplies” on page 250.
- “Power supply LEDs” on page 251.
- “Power supply filler panel” on page 252.
- “NetBAY3 bezel installation” on page 253.
- “Processor board component locations” on page 254.
- “Processor board jumpers” on page 255.
- “Processor board removal” on page 257.
- “Processor support tray removal” on page 259.
- “Processor support tray installation” on page 261.
- “Rack installation” on page 262.
- “SCSI backplane component locations” on page 273.
- “SCSI backplane option jumpers” on page 274.
- “Server cabling” on page 275.
- “Server door and trim bezels removal” on page 276
- “Shuttle removal” on page 277
- “Side cover(s) removal” on page 278.
- “System board component locations” on page 279.
- “System board jumpers” on page 280.
- “System board removal” on page 282.
- “Top cover removal” on page 284

Adapters

You can add adapters to extend the capabilities and power of the 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 six adapters in the expansion connectors, called slots, on the system board of the server. Five of the slots are peripheral component interconnect (PCI) expansion slots and one is an industry standard architecture (ISA) expansion slot.

In four of the PCI slots, you can install a new PCI adapter or replace an existing PCI adapter with the same type of adapter without turning off the server power and restarting the system, if these features are supported by the operating system. These slots are called *hot-pluggable* PCI slots. They are also referred to as hot-plug PCI slots.

The remaining, non-hot-plug PCI slot supports only a short adapter.

The expansion slots have Plug and Play capabilities. See "Plug and Play technology" on page 164 for additional information.

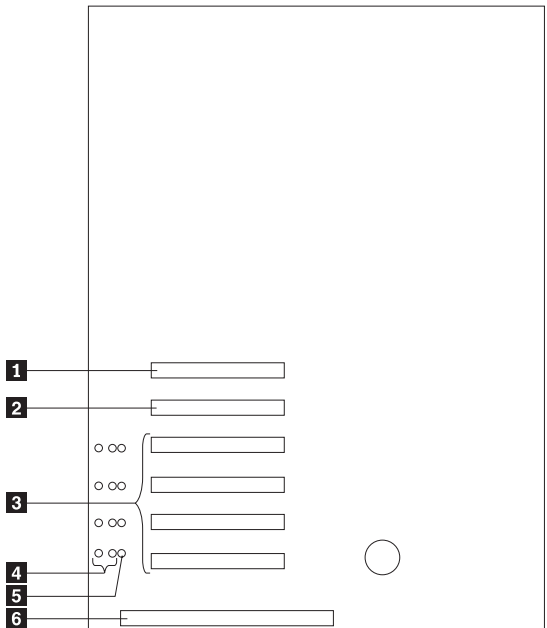
The server comes with a video controller. This video controller is an integrated component on the system board. It is *not* in an expansion slot. The integrated video controller has super video graphics array (SVGA) technology.

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 280 for more information.

Note

Video adapters are not supported in PCI slots on PCI primary bus 1 (PCI slots 1–4).

The following illustration shows the location of the PCI and ISA expansion slots on the system board.



- 1** Not available for use
- 2** Non-hot-plug 32-bit PCI slot 5 (on PCI primary bus 0, half card only)
- 3** Hot-plug 32-bit PCI slots 1–4 (on PCI primary bus 1)
- 4** Attention LEDs for hot-swap slots
- 5** Power LEDs for hot-swap slots
- 6** 16-bit ISA slot

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 the 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 the operating system.

Refer to the operating system documentation to determine if it supports hot-plug PCI adapters and, if so, what the Attention LEDs indicate.

The following table describes the LEDs:

Power LED	Attention LED	Description
On	Flashing	The adapter requires attention. Slot still has power applied. Do not remove or install an adapter in the slot. Refer to the 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 the 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 PCI expansion slots 1-4.
- You can install only a short adapter in PCI expansion slot 5.
- You can install hot-plug PCI adapters in PCI slots 1–4, if the operating system supports this feature. Non-hot-plug PCI adapters can also be installed in these slots.
- The server supports 5.0V and universal PCI adapters; it does not support 3.3V adapters.

Note

A universal PCI adapter supports both 3.3V and 5.0V operation.

- The server uses a rotational interrupt technique to configure PCI adapters. Because of this technique, you can install a variety of PCI adapters that currently do not support sharing of PCI interrupts.
- PCI slot 5 is on PCI bus 0 and PCI slots 1–4 are on the PCI bus 1. Both PCI buses are primary buses.

The performance of the PCI adapters depends on the configuration of adapters in the system.

Plug and Play technology:

Plug and Play is an ISA technology designed to make expanding the server easier. Plug and Play adapter support is built into the system board in the server. If the operating system supports Plug and Play technology, the 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, you can use the Configuration/Setup Utility program to manually configure the adapter. Adapters that are not Plug and Play compatible are known as *legacy adapters*.

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 the server are listed as [**Plug and Play**]. 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 [**Plug and Play**]. 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 31.)

Enabling hot-plug PCI support:

The Netfinity 5500 M20 has hot-plug PCI capability. In order to enable this feature, you must install the operating system services for hot-plug PCI support code. To obtain the operating system hot-plug PCI support code, access the IBM Web site at:

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

Select **Intel Processor Based Servers Support**. From the **Select family** field, select **Netfinity 5500 M20**. Select **Downloadable files**.

Attention

All hot-plug operations must be done through the operating system console (or supported user interface). Failure to do this can result in a system hang or serious damage to the adapter card or system unit.

Hot-plug PCI adapter installation: Use the following information for installing a hot-plug PCI adapter. If you want to remove a hot-plug adapter, reverse the steps. If the 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 the operating system and adapter also support the hot-add feature, you can install a new adapter without turning off the power to the server.

The color orange on components or labels in the Netfinity 5500 M20 indicates hot-plug components.

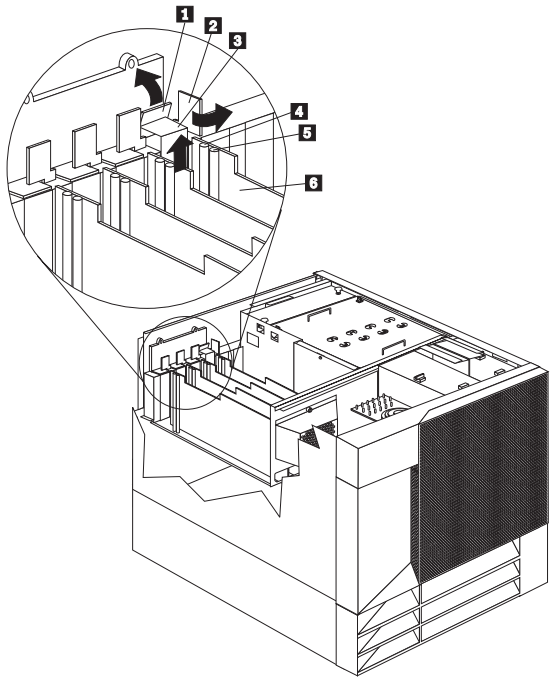
Notes

1. Read "Safety information" on page 338.
2. Read the documentation that comes with the adapter for any special requirements or restrictions.
3. Read the documentation that comes with the operating system.

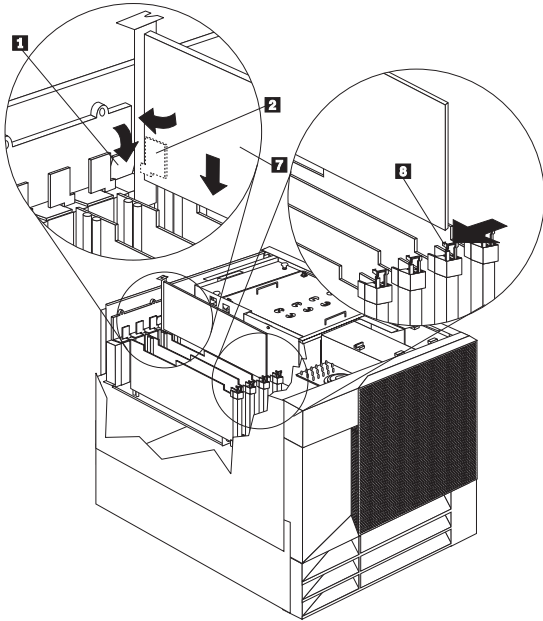
Attention

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 the system to lock up. Refer to the 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
- 3** - **6** See preceding page
- 7** Adapter
- 8** Adapter retention latch

To install a hot-plug PCI adapter:

1. Remove the top cover (see "Top cover removal" on page 284).
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 the operating system. (Refer to the documentation that comes with the 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 orange 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 the 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 orange 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 the operating system. (Refer to the documentation that comes with the 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.

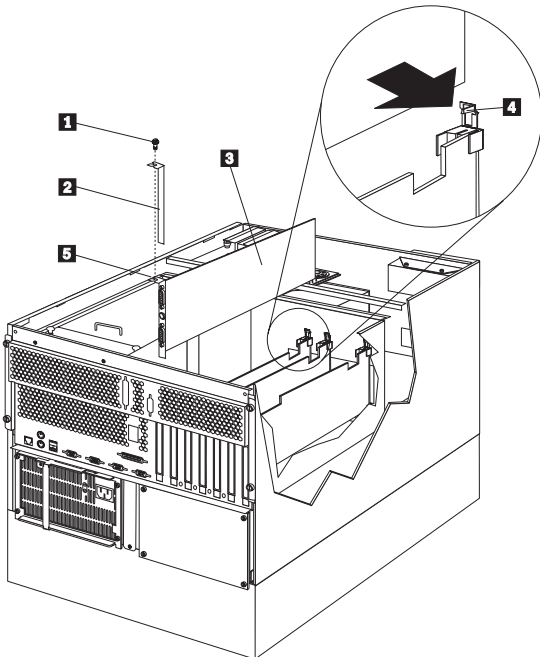
11. If you have other options to install or remove, do so now; otherwise, go to “Completing the installation” on page 178.

Non-hot-plug adapter installation: Use the following procedure for installing a non-hot-plug adapter. If you want to remove a non-hot-plug adapter, reverse the steps.

Note

- Read “Safety information” on page 338.
- Read the documentation that comes with the 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
- 5** Retaining bracket on adapter

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 246); then remove the top cover (see “Top cover removal” on page 284).

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 165 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 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 the 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 165 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 slot 5 or in the ISA slot:

- a. Align the rounded notch in the retaining bracket on the adapter **5** 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 178.

Verifying compatibility between network adapters and device drivers:

The 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 up to four processors. Refer to the network adapter documentation for additional information about adapter compatibility requirements.

Battery replacement

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 FRU Number 33F8354 or an equivalent type battery recommended by the manufacturer. If the 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.

Notes

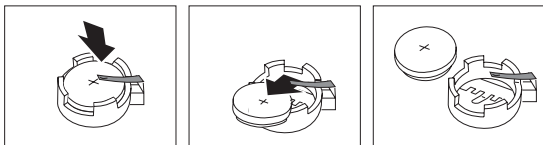
- Read "Safety information" on page 338.
- Follow any special handling and installation instructions supplied with the replacement battery.
- After you replace the battery, you must reconfigure the server and reset the system date and time.

To replace the battery:

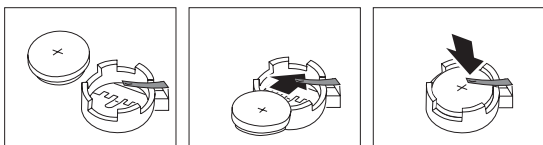
1. Turn off the server and peripheral devices and disconnect all external cables and power cords (see

“Preparing to install options” on page 246); then remove the top cover (see “Top cover removal” on page 284).

2. Locate the battery on the system board (see “System board component locations” on page 279).
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 165 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 165 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 178).

Note

You will have to wait approximately 20 seconds after you plug the power cord of the server into an electrical outlet for the Power Control button to become active.

10. Start the Configuration/Setup Utility program and set configuration parameters as needed.
 - To set the system date and time, go to “Date and time” on page 25.
 - To set the power-on password, go to “Using the power-on password menu” on page 26.
 - To reconfigure the server, follow the instructions given in “Configuration/Setup Utility program” on page 21 (all models).

Changing jumper positions

Jumpers located on the system board and the processor board help you to customize the way the server operates.

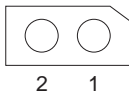
The system board, processor board, and SCSI backplane contain two-pin and three-pin jumper blocks.

In some cases, groups of jumpers might combine to define a function.

Two-pin jumper blocks:

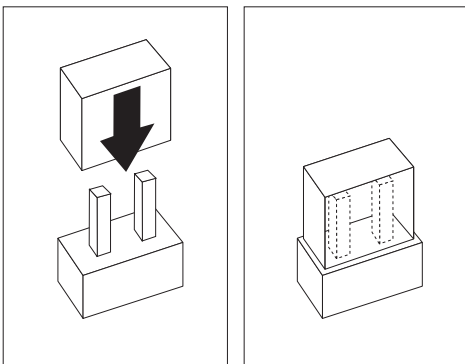
Covering both pins with a jumper defines one function of the jumper block. To change the function of the jumper block, cover one pin only or remove the jumper entirely.

The following illustration identifies pins 1 and 2 on a two-pin jumper block.

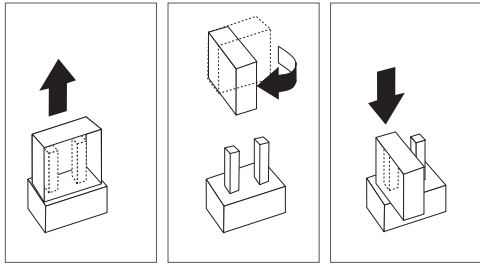


To change a jumper's position for a two-pin jumper block:

1. Turn off the server; then, disconnect the server power cords.
2. Remove the server cover (see "Preparing to install options" on page 246).
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.

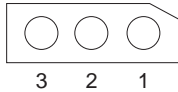


4. Reinstall the server cover and connect the cables (see “Completing the installation” on page 178).

Three-pin jumper blocks:

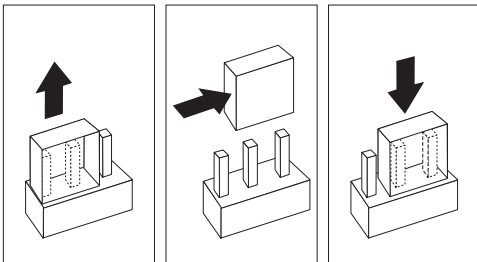
With the three-pin jumper blocks, each jumper covers two of the three pins on a pin block. You can position the jumper to fit over the center pin and either of the other two pins.

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 246).
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 178).

Completing the installation

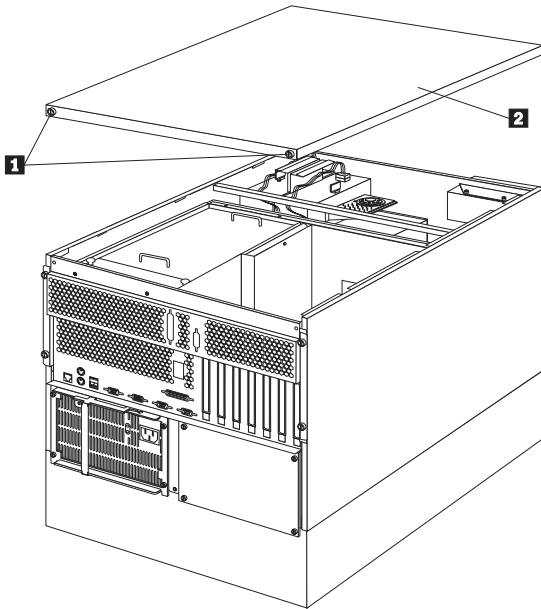
To complete the installation, you must reinstall the side and top covers, reconnect all the cables that you disconnected in “Preparing to install options” on page 246, and, for certain options, run the Configuration/Setup Utility program.

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:

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



1 Thumbscrews

2 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.

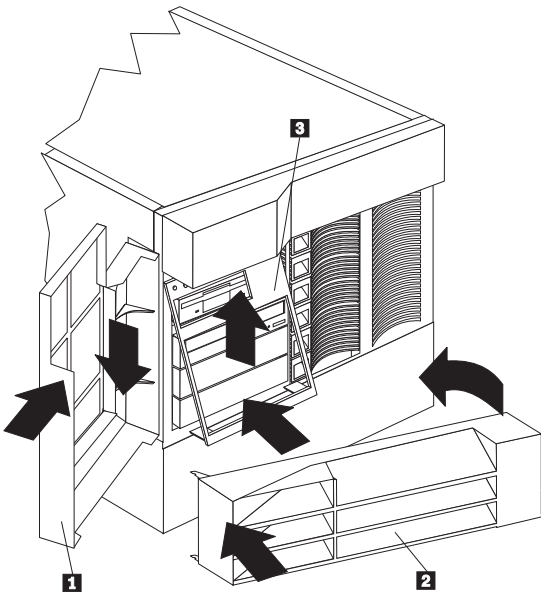
4. Tighten the two thumbscrews **1** on the back edge of the cover.
5. If you disconnected any cables from the back of the server, reconnect the cables; then, plug the power cords into properly grounded electrical outlets.

Notes

1. If you are in the United Kingdom and have a modem or fax machine attached to the server, reconnect the telephone line *after* you plug in the power cords.
2. If necessary, see “Input/output connectors and expansion slots” on page 209 for connector locations.

Installing the trim bezels and server door:

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



- 1** Server door
- 2** NetBAY3 bezel
- 3** Media-bay trim bezel

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.

Reconfiguring the server:

When you start the 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.

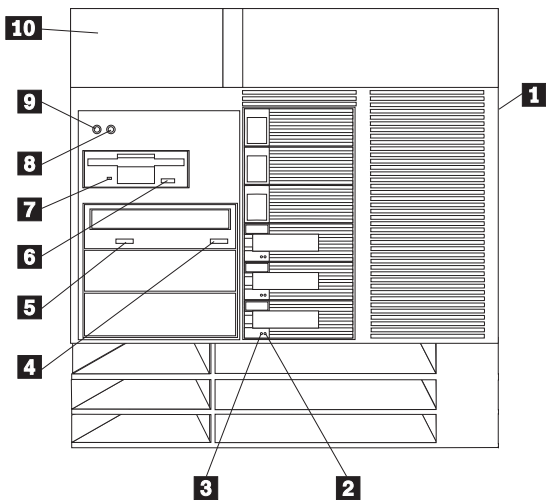
Some options have device drivers that you need to install. Refer to the documentation that comes with the option for information about installing any required device drivers.

If you have more than one microprocessor installed, you might want to upgrade the operating system. If you have installed or removed hard disk drives, refer to "ServeRAID system board controller" on page 66 for information about reconfiguring the disk arrays.

Run the Configuration/Setup Utility program to save the new configuration information.

Controls and indicators

The most commonly used controls and indicators on the front of the server appear in the following illustration.

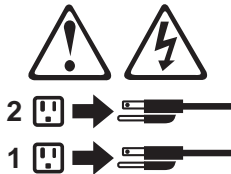


- 1 Door Lock (On Side Cover, Tower Models Only):** You can lock the door on the server to deter tampering with the internal components. This same lock also locks the top cover in place.
- 2 Hard Disk Status Light:** Each of the hot-swap drive bays has a Hard Disk Status light. When this amber light is on continuously, the drive has failed. When the light flashes slowly (one flash per second), the drive is being rebuilt. When the light flashes rapidly (three flashes per second), the controller is identifying the drive.
- 3 Hard Disk Activity Light:** Each of the hot-swap drive bays has a Hard Disk Activity light. When this green light is flashing, the drive is being accessed.
- 4 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.
- 5 CD-ROM Drive In-Use Light:** When this light is on, the CD-ROM drive is being accessed.
- 6 Diskette-Eject Button:** Press this button to eject a diskette from the drive.
- 7 Diskette Drive In-Use Light:** When this light is on, the diskette drive is being accessed.
- 8 Reset Button:** Press this button to reset the server and run the power-on self-test (POST).
- 9 Power Control Button:** Press this button to manually turn the server on or off.



Caution

The Power Control button on the device and the power switch do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.



The server can be activated in several ways:

- You can turn on the server by pressing the Power Control button on the front of the server.

Note

If you have just plugged the power cord of the 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 when power is restored.
- The server can also be powered on by the Netfinity Advanced System Management Processor.

The server can be deactivated as follows:

- You can turn off the server by pressing the Power Control button on the front of the server. Pressing the Power Control button starts an orderly shutdown of the operating system, if this feature is supported by the 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.

- You can press and hold the Power Control button for more than 4 seconds to cause an immediate shutdown of the server and place the server in standby mode. This feature can be used if the operating system hangs.
- You can disconnect the server power cords from the electrical outlets to shut off all power to the server.

Note

Wait about 15 seconds after disconnecting the power cord for the system to stop running. Watch for the System Power light on the information LED panel to stop blinking.

10 Information LED Panel: The lights on this panel give status information for the server. See “Information LED panel” on page 205 for more information.

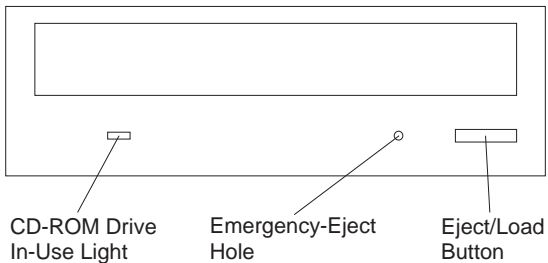
CD-ROM drive

An IDE CD-ROM drive is a standard feature on the 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.



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.

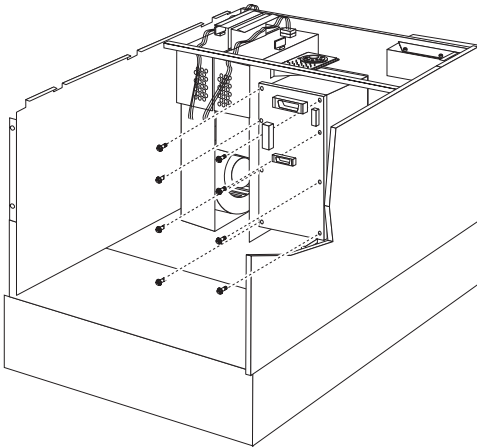
DASD backplane removal

Note

Read "Safety information" on page 338.

To remove the DASD backplane, do the following:

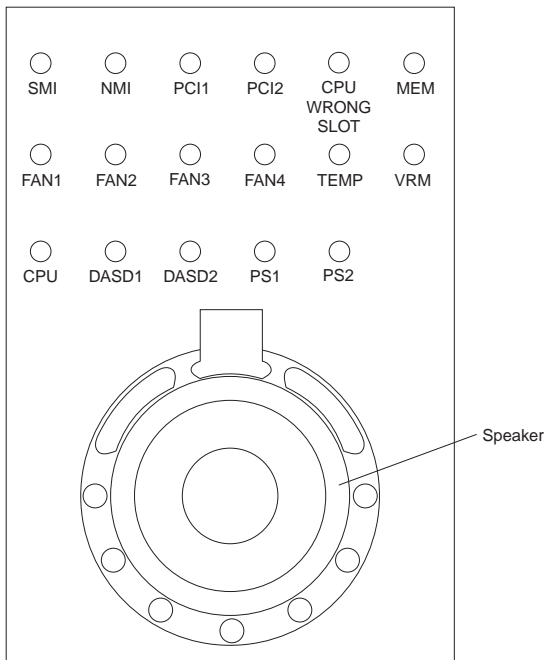
1. Remove the top cover (see "Top cover removal" on page 284).
2. To access the cable(s) attached to the DASD backplane, slide the shuttle to the rear of the system (see "Shuttle removal" on page 277).
3. Disconnect the DASD backplane cables.
4. Remove the DASD backplane.



- a. Remove the DASD backplane screws; 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 285 and “Light path diagnostics” on page 48 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 212).

External options

Note

- Read “Safety information” on page 338.
- Read the documentation that comes with the options.

Connecting external SCSI devices:

You can attach a SCSI storage expansion enclosure to the server.

Cabling requirements: The ServeRAID controller in the server has one channel that can be used to attach external devices. This channel is connected to the SCSI connector on the back of the server. To select and order the correct cables for use with external devices, contact your IBM reseller or IBM marketing representative.

Refer to “ServeRAID system board controller” on page 66 to determine the number of internal and external connectors, channels, and SCSI devices that the controller 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 the 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 215 and refer 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 the server. The I/O connectors on the server include:

- Two serial-port connectors
- One system management connector
- One parallel-port connector
- One video-port connector
- One keyboard-port connector
- One auxiliary-device-port connector
- One SCSI-port connector
- One Ethernet-port connector
- Two USB-port connectors
- One RS-485-port connector

See the illustration in “Input/output connectors and expansion slots” on page 209 for the locations of the connectors.

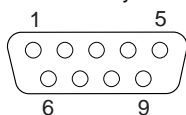
Serial ports: The server comes with two serial ports. (See “Input/output connectors and expansion slots” on page 209 for the locations of the connectors.) These ports are used to communicate with printers, plotters, external modems, scanners, and auxiliary terminals. These ports also enable you to transfer 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 Netfinity Advanced System Management Processor. Serial port B can be used 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.

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		

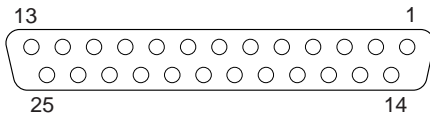
When you turn on the server, the POST routine assigns the serial ports to specific communication port addresses.

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: The server has a dedicated system-management I/O port. This port can be used to attach a modem that is dedicated to communication with the Netfinity Advanced 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 the server. It support three standard IEEE 1284 modes of operation: Standard Parallel Port (SPP), Enhanced Parallel Port (EPP), and Extended Capability Port (ECP). (See "Input/output connectors and expansion slots" on page 209 for the location of the connector.)

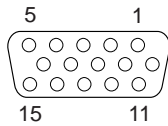


The following table shows the pin-number assignments for the parallel-port connector.

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 the 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.

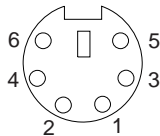
Video port: The system board in the server has one SVGA video port. This port is used to attach a video monitor. The video port has a 15-pin analog connector on the back of the server. (See “Input/output connectors and expansion slots” on page 209 for the location of the connector.)



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

Pin	Signal
1	Red
2	Green or monochrome
3	Blue
4	Monitor ID bit 2
5	Ground
6	Ground
7	Ground
8	Ground
9	+5 V dc
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 209 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 6. 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

SCSI port: Your server comes with a RAID controller on the system board, which provides two independent SCSI channels. A 16-bit (wide) SCSI cable connects the hot-swap backplane to one channel of the integrated RAID SCSI controller. Another SCSI cable connects the other channel of the controller to the SCSI connector on the rear of the server.

To attach an external SCSI device to your server, connect an external SCSI cable from the SCSI device to the SCSI connector on the back of the server. Ensure that the last device on the external SCSI cable is terminated. Table 7 shows the pin-number assignments for the 68-pin SCSI connectors.

Table 7. 68-pin SCSI port connector pin-number assignments

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

Ethernet port: The system board in the Netfinity 5500 M20 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 the server.

Note

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

See “Configuring the ethernet controller” on page 35 for additional information about the Ethernet controller.

Table 8 shows the pin-number assignments for the RJ-45 connector. These assignments apply to both 10BASE-T and 100BASE-TX devices.

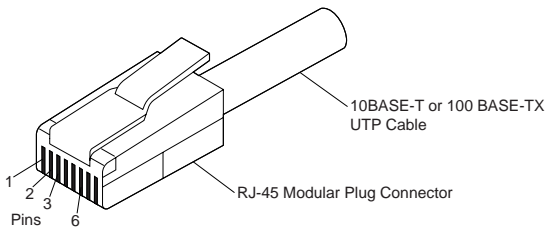


Table 8. Ethernet connector pin-number assignments

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

Universal serial bus ports: The system board in the Netfinity 5500 M20 contains two universal serial bus (USB) ports. Each USB port has an external connector on the rear of 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 9 shows the pin-number assignments for the USB connectors.

Table 9. USB connector pin-number assignments

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

RS-485 port: The system board has an RS-485 port that can be used by the Advanced System Management Processors of several servers mounted in a rack enclosure to communicate with each other in half-duplex mode.

Table 10 shows the pin-number assignments for the RS-485 connector.

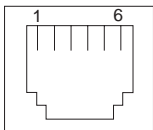


Table 10. RS-485 port pin-number assignments

Pin	Signal
1	+5 V dc
2	+Data (tied to pin 4)
3	-Data (tied to pin 5)
4	+Data (tied to pin 2)
5	-Data (tied to pin 3)
6	Ground

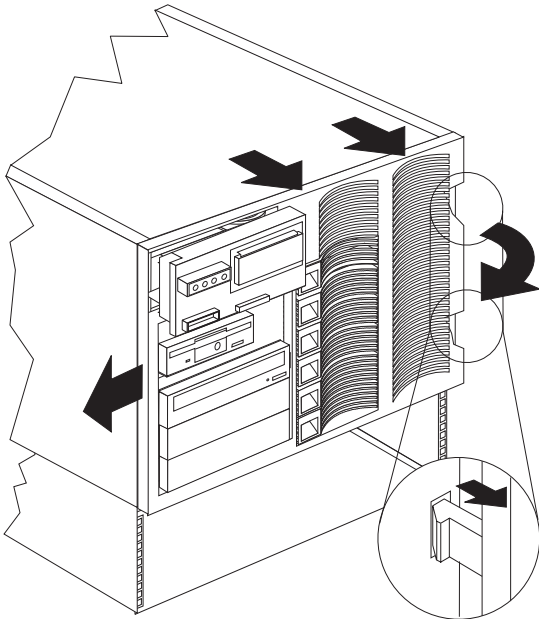
Front bezel removal

Note

Read "Safety information" on page 338.

To remove the front bezel, do the following:

1. Remove the top cover (see "Top cover removal" on page 284).
2. Remove the door and trim bezel (see "Server door and trim bezels removal" on page 276).
3. Remove the side covers (see "Side cover(s) removal" on page 278).
4. Remove the front bezel.



- a. While releasing the side bezel tabs, rotate the right side of the bezel away from the system; then, unhook the left side bezel tabs.

Hot-swap power supply installation

The 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 250 for details.

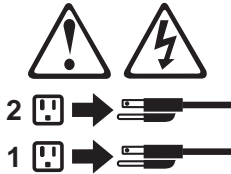


Caution

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



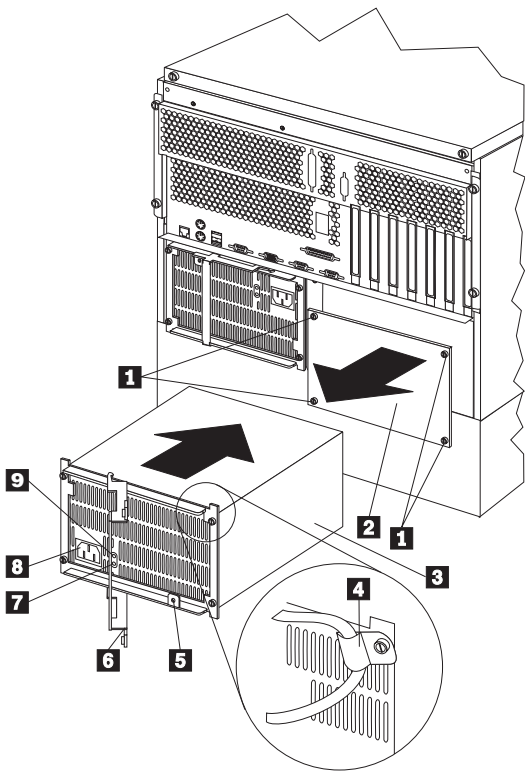
Hazardous voltage, current, and energy levels are present inside any component that has this label attached. There are no serviceable parts inside these components.



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** Screws
- 2** Filler panel
- 3** Power supply
- 4** Power-cord strain-relief bracket
- 5** Hole for shipping thumbscrew
- 6** Handle
- 7** AC Power light
- 8** Power cord connector for power supply 2
- 9** DC Power light

To add a power supply:

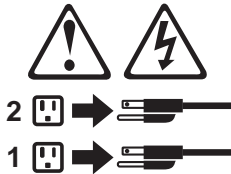


Caution

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



Hazardous voltage, current, and energy levels are present inside any component that has this label attached. There are no serviceable parts inside these components.



1. Remove the filler panel **2** :
 - a. Remove the four screws **1** from the filler panel.
 - b. Remove the filler panel **2** from the power-supply bay and save it and the four screws you removed.

Note

During normal operation, each power-supply bay must have either a power supply or filler panel installed for proper cooling.

2. Place the handle **6** on the power supply in the open position, and slide the power supply into the chassis.
3. Gently close the handle **6** 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 **8** .



Caution

If you install a strain-relief bracket option over the end of the power cord that is connected to the device, you must connect the other end of the power cord to an easily accessible power source.

5. Install a power-cord strain-relief bracket **4**, if desired.
6. Plug the power cord into a properly grounded electrical outlet.
7. Verify that the DC Power light **9** and AC Power light **7** on the power supply are lit, indicating that the power supply is operating correctly.

Hot-swap power supply removal

The 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 250 for information about the status indicators.

Attention

You cannot hot swap a power supply if the server has only one power supply installed.

Refer to the illustration in “Hot-swap power supply installation” on page 196 while you perform the steps in this procedure.

To remove a hot-swap power supply:

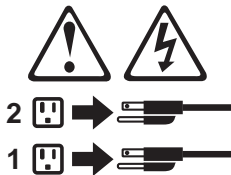


Caution

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



Hazardous voltage, current, and energy levels are present inside any component that has this label attached. There are no serviceable parts inside these components.



1. If the server has only one power supply installed, turn off the server and peripheral devices (see “Preparing to install options” on page 246); otherwise, go to the next step.
2. Remove the power supply **3**:
 - a. Remove the blue shipping thumbscrew from its hole **5** on the power supply, if it has not already been removed.

Note

You do not need to replace the shipping thumbscrew.

- b. Remove the power-cord strain-relief bracket **4**, if one is installed.

- c. Grasp the handle **6** 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.

3. If you are not installing a replacement power supply:
 - a. Disconnect the power cord for the power supply that you removed.
 - b. Install a power supply filler panel; then go to step 4.

If you are replacing the power supply:

- a. Place the handle **6** on the power supply in the open position, and slide the power supply into the chassis.
- b. Gently close the handle **6** on the power supply to seat the power supply in the bay.
- c. Verify that the AC Power light **7** and DC Power light **9** are lit, indicating that the power supply is operating correctly.



Caution

If you install a strain-relief bracket option over the end of the power cord that is connected to the device, you must connect the other end of the power cord to an easily accessible power source.

- d. Install a power-cord strain-relief bracket **4**, if desired.
4. If you have other options to install or remove, do so now; otherwise, go to "Completing the installation" on page 178.

Hot-swap fan assembly replacement

The server comes with four hot-swap fan assemblies.

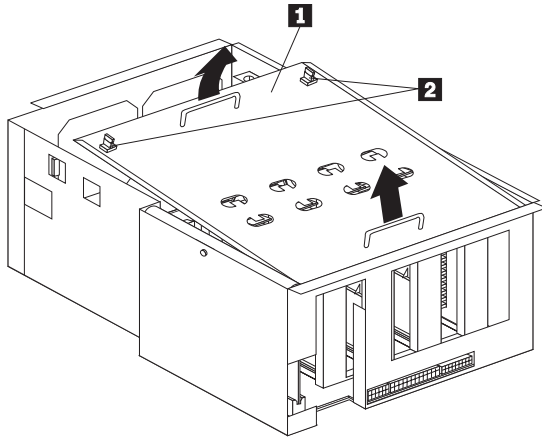
Attention

Replace a fan that has failed within 48 hours to help ensure proper cooling.

Note

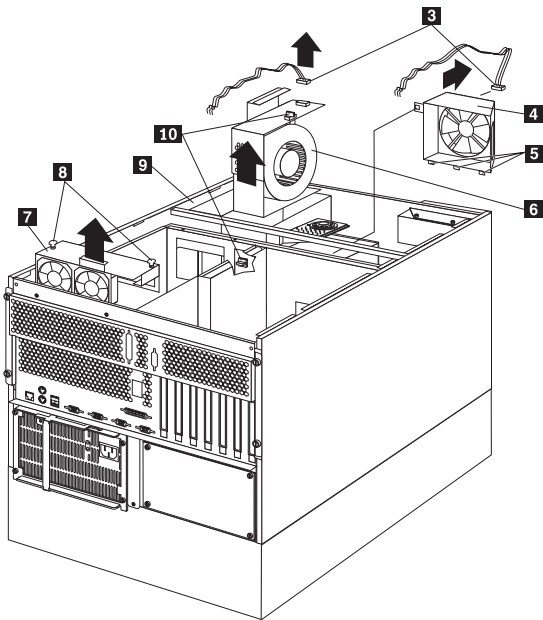
You do not need to turn off the power to the server to replace a hot-swap fan assembly.

The following illustrations show the replacement of a hot-swap fan assembly. Refer to these illustrations while performing the steps in this procedure.



1 Processor support tray cover

2 Quarter-turn fasteners for support tray cover



- 3** Fan power cables
- 4** Hot-swap fan assembly 1
- 5** Tabs
- 6** Hot-swap fan assembly 2
- 7** Hot-swap fan assembly 4
- 8** Fasteners
- 9** Hot-swap fan assembly 3
- 10** Quarter-turn fasteners for fan assemblies

To replace a hot-swap fan assembly:



Caution

To avoid personal injury, disconnect the hot-swap fan cables before removing the fan from the device.

1. Remove the top cover (see “Top cover removal” on page 284).

Attention

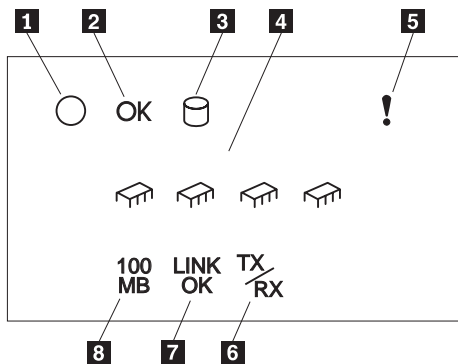
To ensure proper system cooling, do not remove the top cover for more than 30 minutes during this procedure.

2. Determine which fan assembly (fan 1 **4**, fan 2 **6**, fan 3 **9**, or fan 4 **7**) to replace by checking the fan LEDs on the diagnostic panel (see “Diagnostics panel LEDs” on page 187).

3. If you are replacing fan assembly 1, 2, or 3:
 - a. Disconnect the fan power cable **3** from the fan assembly that you are replacing.
 - b. If you are removing fan assembly 1 **4**, turn the two quarter-turn fasteners **2** one quarter turn and remove the processor support tray cover **2**.
 - c. Turn the fan assembly quarter-turn fastener **10** one quarter turn and remove the fan assembly from the server.
 - d. Slide the replacement fan assembly into the server. (If you are replacing fan assembly 1 **4**, make sure the tabs **5** fit into the slots at the bottom of the fan opening in the server.)
 - e. When you have the fan assembly correctly seated, turn its quarter-turn fastener **10** one quarter turn to secure the fan in the server.
 - f. If you removed the processor support tray cover **1**, install it and turn the two quarter-turn fasteners **2** one quarter turn to secure the cover.
 - g. Connect the fan power cable **3** to the power connector.
4. If fan assembly 4 **7** needs to be replaced:
 - a. Turn the two processor support tray cover quarter-turn fasteners **2** one quarter turn and remove the processor support tray cover **1**.
 - b. Lift up on the fasteners **8** for fan assembly 4 **7** and remove the fan assembly from the server.
 - c. Slide the replacement fan assembly into the server. (Make sure the fan assembly fits into the slots on the processor support tray.)
 - d. When you have the fan assembly correctly seated, push down on the fasteners **8** until they click into place.
 - e. Install the processor support tray cover **1** turn the two quarter-turn fasteners **2** one quarter turn to secure the cover.
5. Replace the top cover (see "Installing the top cover" on page 178).

Information LED panel

The information LED panel on the front of the server contains the following status lights.



- 1 System Power Light:** When this green light is on, system power is present in the server. When this light flashes, the server is in standby mode (the system power supply is turned off and AC current is present). When this light is off, either a power supply, AC power, or a light has failed.

Attention

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.

- 2 System POST Complete Light:** This green light is on when the power-on self-test (POST) completes without any errors.
- 3 SCSI Hard Disk Drive Activity Light:** This green light is on when there is activity on a hard disk drive.
- 4 Processor Activity Lights:** These green lights indicate activity on each of the installed microprocessors.
- 5 System Error Light:** This amber light is on when a system error occurs. A light on the diagnostics LED panel will also be on to further isolate the error. (For more information, see "Status LEDs" on page 63.)
- 6 Ethernet Transmit/Receive Activity Light:** When this green light is on, there is transmit or receive activity to or from the server.

- 7 Ethernet Link Status Light:** When this green light is on, there is an active connection on the Ethernet port.
- 8 Ethernet Speed 100 Mbps:** When this green light is on, the Ethernet speed is 100 Mbps. When this light is off, the Ethernet speed is 10 Mbps.

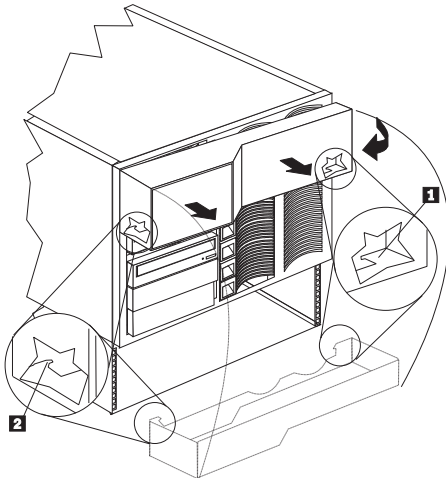
Information LED panel cover removal

Note

Read "Safety information" on page 338.

To remove the information LED panel cover, do the following:

1. Remove the door (see "Server door and trim bezels removal" on page 276).
2. Remove the right side panel (see "Side cover(s) removal" on page 278).
3. Remove the information LED panel cover.



- a. Place your fingers inside the right side of the cover, near the latch tab **1**.
- 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. **Gently** lift up on the cover and pivot the right side of the cover away from the front of the server.
- d. **Gently** move the cover to the left to release the left latch tab **2** and remove the cover from the server.

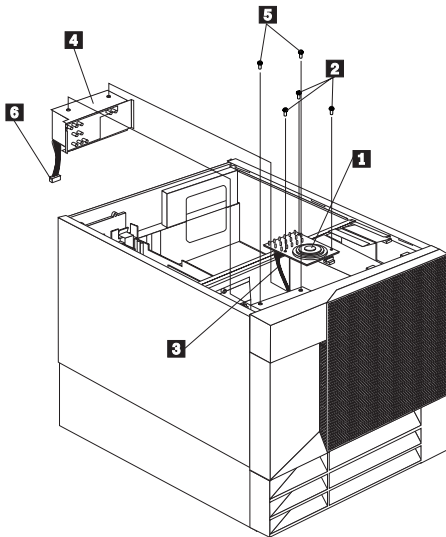
Information LED panel assembly removal

Note

Read "Safety information" on page 338.

To remove the information LED panel assembly, do the following:

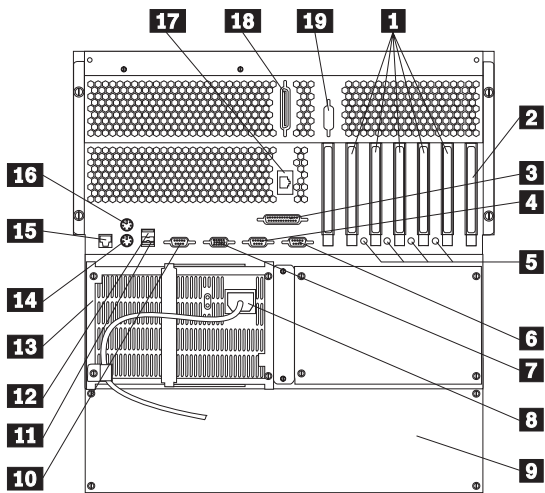
1. Remove the server door, see "Server door and trim bezels removal" on page 276.
2. Remove the top cover (see "Top cover removal" on page 284).
3. Remove the side covers (see "Side cover(s) removal" on page 278).
4. Remove the front bezel, leaving the information LED panel cover attached. See "Front bezel removal" on page 195.
5. Disconnect the information LED panel assembly cable **6**.
6. Remove the information LED panel assembly **4**.



- a. Remove the information LED panel assembly screws **5**; then, remove the assembly **4**.

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.



- 1 PCI Expansion Slots:** The server has five peripheral component interconnect (PCI) expansion slots. Four of the PCI slots support hot-plug PCI adapters. The remaining, non-hot-plug PCI slot supports only a short adapter.
Many adapters provide bus-master capabilities, which enable the adapters to perform operations without interrupting the system microprocessors.
- 2 ISA Expansion Slot:** The server has one industry standard architecture (ISA) expansion slot.
Many adapters provide bus-master capabilities, which enable the adapters to perform operations without interrupting the system microprocessors.
- 3 Parallel Connector:** A signal cable for a parallel device, such as a printer, connects here.
- 4 Serial A Connector:** A serial signal cable for a modem or other serial device connects to this 9-pin serial connector. Serial port A can be shared by the Netfinity Advanced System Management Processor and the operating system. See "Devices and I/O ports" on page 24 for port assignment information. If you are using a 25-pin signal cable, you need a 9-pin-to-25-pin adapter cable.
- 5 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 the operating system. Refer to the operating system documentation to determine if it supports hot-plug PCI adapters and, if so, what the Attention lights indicate.

6 Serial B Connector: A serial signal cable for a modem or other serial device connects to this 9-pin serial connector. Serial port B is used by the operating system and cannot be shared by the Netfinity Advanced System Management Processor. See “Devices and I/O ports” on page 24 for port assignment information. If you are using a 25-pin signal cable, you need a 9-pin-to-25-pin adapter cable.

7 Video Connector: The monitor signal cable connects here.

8 Power Supply 1 Power Connector: The power cord for power supply 1 connects here.

9 NetBAY3: The tower models of the Netfinity 5500 M20 come 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.

10 Management C Connector: This connector is used to attach a modem that is dedicated to communication with the Netfinity Advanced System Management Processor.

11 Universal Serial Bus 2 Connector: You can attach an I/O device to this universal serial bus (USB) connector. You need a 4-pin cable to connect devices to USB 1 or 2.

Note

If a standard (non-USB) keyboard is attached to the keyboard port, the USB ports are disabled while the power-on self-test (POST) is running and no USB devices will work during POST.

12 Universal Serial Bus 1 Connector: You can attach an I/O device to this universal serial bus (USB) connector. You need a 4-pin cable to connect devices to USB 1 or 2.

Note

If a standard (non-USB) keyboard is attached to the keyboard port, the USB ports are disabled while the power-on self-test (POST) is running and no USB devices will work during POST.

- 13 Power Supply 1:** The server comes with one hot-swap power supply installed. See “Power supplies” on page 250 for more information about power supplies.
- 14 Keyboard Connector:** The keyboard cable connects here.
- 15 Ethernet Connector:** The server has one RJ-45 Ethernet connector. This connector is for attaching the network cable to the integrated 10BASE-T or 100BASE-TX, twisted-pair transceiver.
- 16 Mouse Connector:** The mouse cable connects here. This port sometimes is called an auxiliary-device or pointing-device port.
- 17 Management RS-485 Connector:** This connector is for connecting rack or multirack systems through a daisy-chain cable in half-duplex mode.
- 18 SCSI Connector:** External SCSI devices attach here. For more information, see “External options” on page 188.
- 19 External Connector Knockout:** The server has one external connector knockout that can be used when you install options.

Note

For pin assignments and other details about these connectors, see “External options” on page 188.

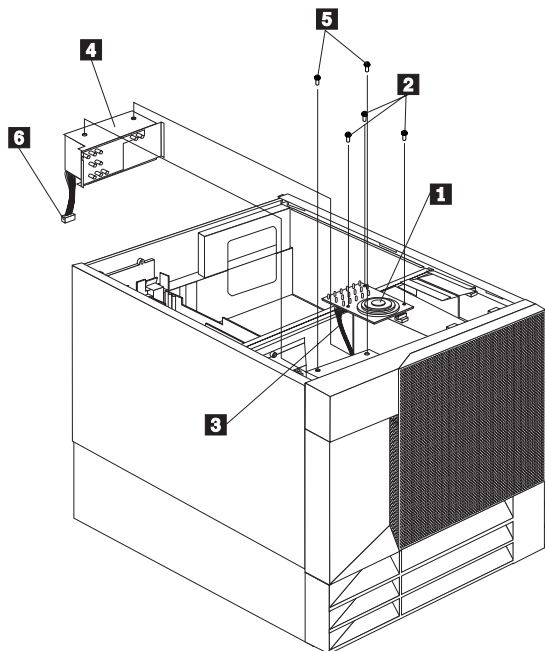
Interior LED and speaker assembly

Note

Read "Safety information" on page 338.

To remove the interior LED and speaker assembly (diagnostic LEDs), do the following:

1. Remove the top cover (see "Top cover removal" on page 284).
2. Disconnect the cable **3** attached to interior LED and speaker assembly **1**.
3. Remove the interior LED and speaker assembly **1**.



- a. Remove the interior LED and speaker assembly mounting screws **2**. then; remove the interior LED and speaker assembly **1**.

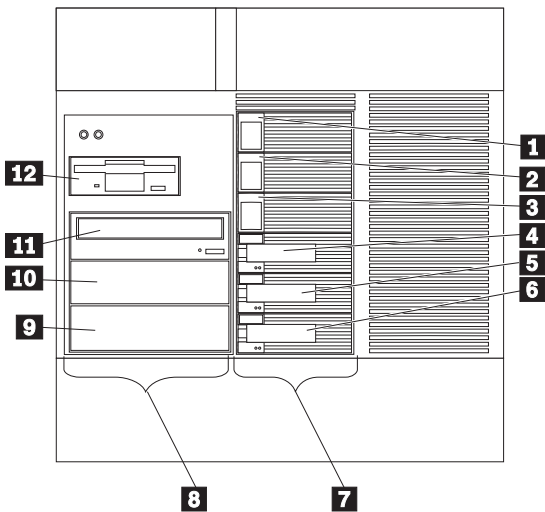
Internal drives installation

Different types of drives allow the 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*. The server comes with one 3.5-inch, 1.44 MB diskette drive and one CD-ROM drive.



- 1** Bay 1
- 2** Bay 2
- 3** Bay 3
- 4** Bay 4
- 5** Bay 5
- 6** Bay 6
- 7** Hot-swap bays
- 8** Removable-media bays
- 9** Bay B
- 10** Bay A
- 11** CD-ROM drive bay
- 12** Diskette drive bay

The 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 the 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 205). If the amber Hard Disk Status light for a drive is lit continuously, that individual drive might be faulty and needs to be checked. See “ServeRAID system board controller” on page 66. 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.

- The 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 M20 supports only one diskette drive.
- The 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.
- The 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 188, in addition to these instructions.

A 16-bit (wide) SCSI cable connects the hot-swap backplane to one channel of the integrated RAID SCSI controller on the system board. The other channel of the integrated RAID SCSI controller is connected to the SCSI connector on the back of your server.

A 16-bit SCSI cable with connectors for optional devices in bays A and B is folded and restrained with a cable clamp to the bottom of your server between the open bays and the power supply area. This cable has a terminator on one end.

If you want to install a device in bay A or B, you can either:

- Install an additional SCSI adapter
- Disconnect the cable from the RAID channel 1 connector on the system board (see "System board component locations" on page 279). (This cable goes to the external SCSI connector on the back of the server, so you will not be able to attach external SCSI devices using the external SCSI connector.) Use the 16-bit SCSI cable to connect the device in bay A or B to the RAID channel 1 connector on the system board.

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.

The 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 11 on page 216 shows the default SCSI IDs that the backplane assigns for hot-swap hard disk drives.

Table 11. 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 274. A simplified layout of the SCSI backplane is shown in “SCSI backplane component locations” on page 273.

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).

Termination (internal SCSI devices): SCSI buses must be terminated at each end. The ends of the SCSI buses in the server are already terminated.

All the hot-swap drives in the 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 supplied with your server 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 the 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.

Note

- Read “Safety information” on page 338.
- 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 220.

Installing a 5.25-inch removable-media drive:

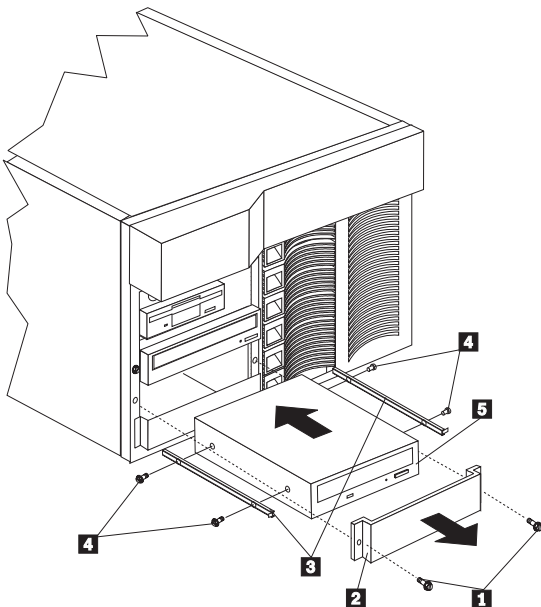
Note

- Read “Safety information” on page 338.
- Read the documentation that comes with the drive.
- Prepare the drive for installation (see “Preinstallation steps (all bays)” on page 216).

Note

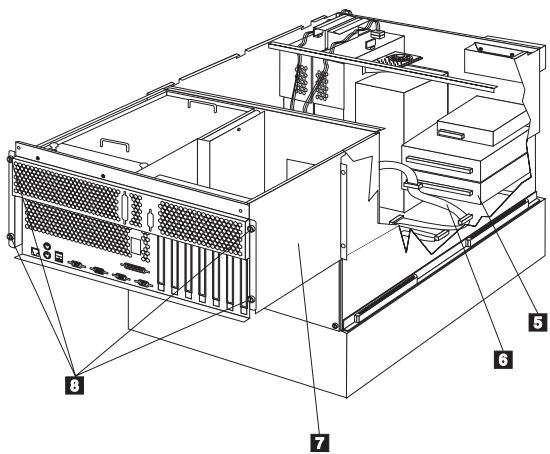
The server's EMI integrity and cooling are both protected by having the left front bays covered or occupied. When you install a drive, save the filler panel from the bay, in case you later remove the drive and do not replace it with another.

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 246) and remove the top cover (see “Top cover removal” on page 284).
2. Remove the NetBAY3 bezel and the media-bay trim bezel. (See “Server door and trim bezels removal” on page 276.)
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 the 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 the server. The connectors are keyed and can be inserted only one way.
12. If you have not previously done so, connect the SCSI cable to either the RAID channel 1 connector on the system board or to an additional SCSI adapter that you have installed. For more information see "SCSI IDs" on page 215.

If you choose to use the RAID channel 1 connector to attach the removable-media drive:

- a. Remove the processor support tray to allow access to the RAID channel 1 connector. (See "Processor support tray removal" on page 259.)
 - b. Disconnect the cable from the RAID channel 1 connector on the system board. (See "System board component locations" on page 279 for the location of the RAID channel 1 connector.) You can leave the other end of the cable connected to the external SCSI connector on the back of the server, but you will not be able to use the external SCSI connector to attach external SCSI devices without adding an additional SCSI adapter.
 - c. Connect the SCSI cable from the removable-media drive to the RAID channel 1 connector on the system board.
 - d. Install the processor support tray. (See "Processor support tray installation" on page 261.)
13. If you are installing another 5.25-inch drive, do so at this time. Otherwise, continue with the next step.
 14. Push the shuttle **7** toward the front of the server and tighten the four thumbscrews **8** at the back of the shuttle.
 15. Install the media-bay trim bezel and the NetBAY3 bezel that you removed earlier. (See "Installing the trim bezels and server door" on page 179.)
 16. If you have other options to install or remove, do so now; otherwise, go to "Completing the installation" on page 178.

Installing a drive in a hot-swap bay:

The bays on the right front of the server support hot-swap drives only.

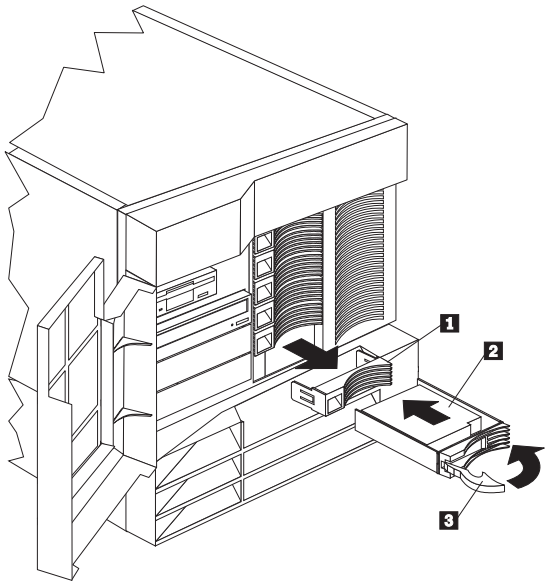
Note

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.

Note

- Read “Safety information” on page 338.
- Read the documentation that comes with the drive.
- Review “ServeRAID system board controller” on page 66 for information about the RAID controller and disk-array configuration.
- Prepare the drive for installation (see “Preinstallation steps (all bays)” on page 216).

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 246).

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 **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. See “Status LEDs” on page 63 for details.
5. Close and lock the server door.

Note

Because the server has a RAID controller, you must reconfigure the disk arrays after installing hard disk drives.

Replacing a drive in a hot-swap bay:

You do not have to turn off the server to remove a drive from the hot-swap bays.

Attention

1. Before you remove a hard disk drive that is not defective from a hot-swap bay, back up all important data.
2. To avoid damage to a hard disk drive, DO NOT remove the drive from the hot-swap bay until it has had time to spin down (approximately 30 seconds). Handle the drive carefully.

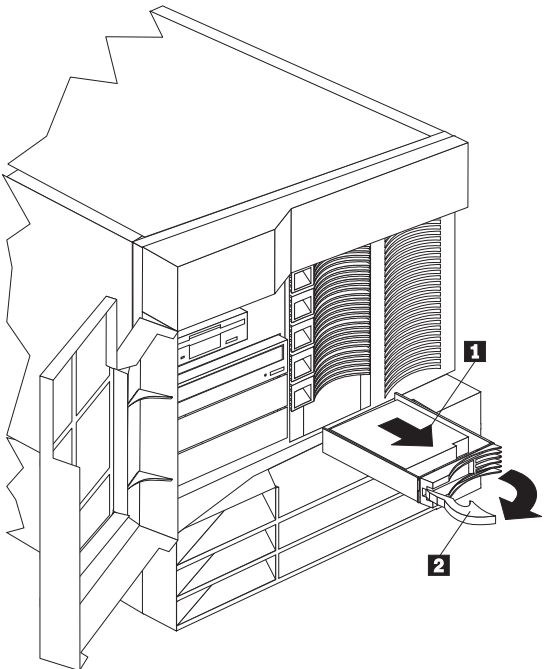
Before you attempt to remove a defective drive, thoroughly review the information that appears on the server screen to determine the location of the failed drive. “ServeRAID system board controller” on page 66 explains the status codes that the server uses to indicate a defective drive. Also, if the amber Hard Disk Status light for a drive is lit continuously, that individual drive is faulty and needs to be replaced. If you remove a hard disk drive that is not defective from an array that already has a defective hard disk drive, all data in the array will be lost. This situation is especially relevant if you assigned RAID level 1 or 5 to the

logical drives in the disk array. However, the RAID controller can rebuild the data that you need, provided that certain conditions are met. Refer to “ServeRAID system board controller” on page 66 for further details.

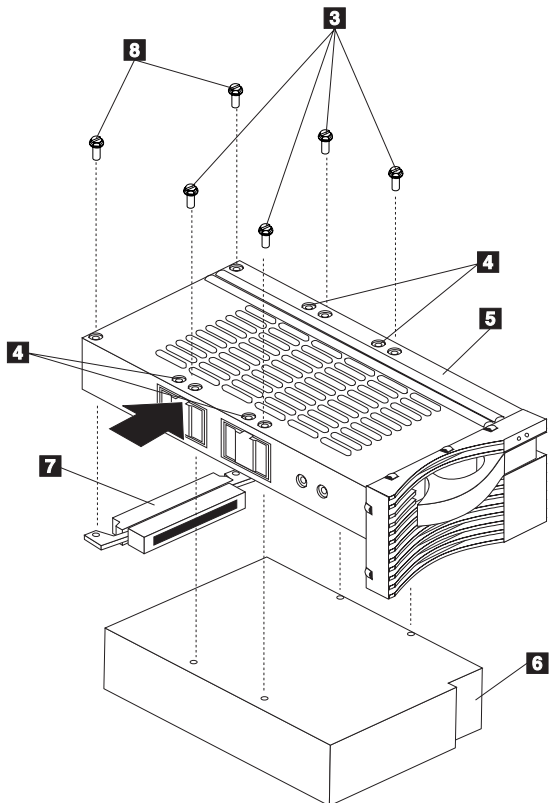
Note

- Read “Safety information” on page 338.
- Read the documentation that comes with the drive.
- Review “ServeRAID system board controller” on page 66 for information about the ServeRAID controller and disk-array configuration.
- Prepare the drive for installation (see “Preinstallation steps (all bays)” on page 216).

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 246).

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 of the drive tray.
 - 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. See "Status LEDs" on page 63 for details.
7. Close and lock the server door.

Installing devices in the NetBAY3

Use the following information for installing devices in the NetBAY3.

Note

The illustrations in this section do not show the server on top of the NetBAY3; however, you do not need to remove the NetBAY3 to install devices.

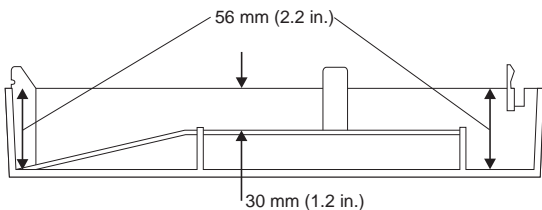
General considerations:

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 mm (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.

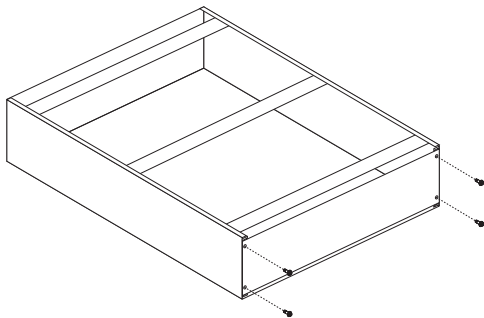


Removing the rear panel:

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.

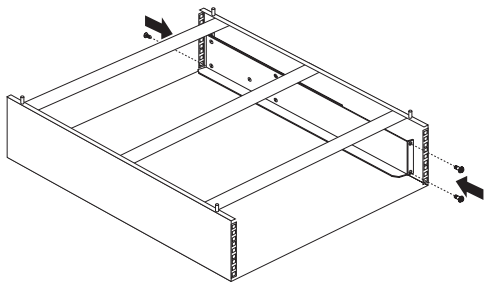


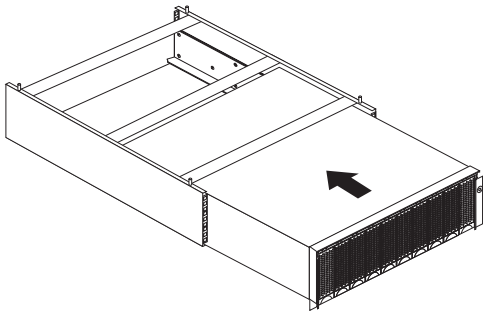
2. After you remove the rear panel, do one of the following:
- Install a device on rails in the NetBAY3. (Go to “Installing devices on side rails.”)
 - Install a cantilevered device in the NetBAY3. (Go to “Installing cantilevered devices” on page 228.)
 - Install a device on the NetBAY3 base plate. (Go to “Installing devices on the NetBAY3 base plate” on page 229.)

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 227.

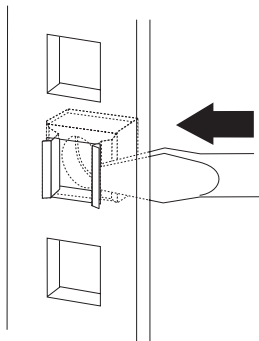




Removing cage nuts:

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” 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.

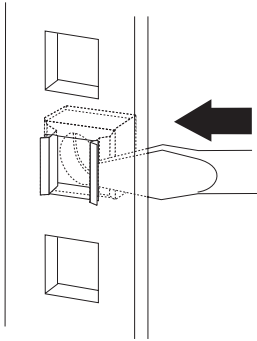


2. With the cage nut-clip compressed, push the cage nut-clip out of the square hole.
3. Release the screwdriver pressure on the clip. The cage nut is now loose and can be removed from the square hole.

Installing cage nuts:

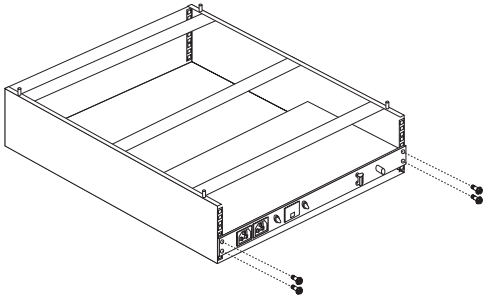
The nuts go toward the inside of the NetBAY3. Make sure you install all the cage nuts at the same level on the mounting rails.

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.



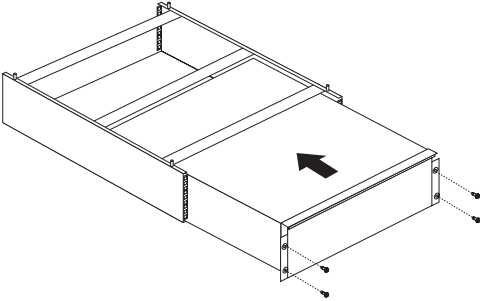
Installing cantilevered devices:

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.



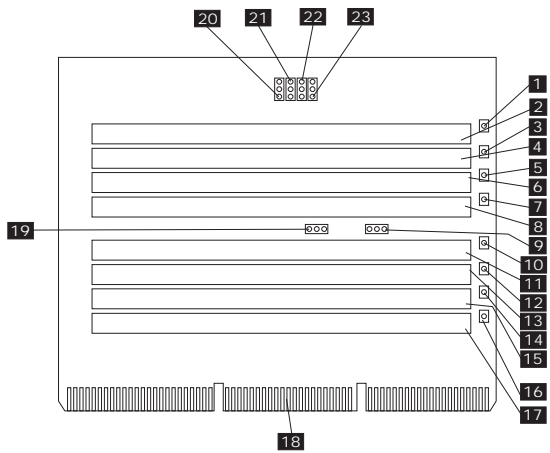
Installing devices on the NetBAY3 base plate:

Some devices rest on the NetBAY3 base plate. These devices must be screwed to the NetBAY3 vertical mounting rails.



Memory board component locations

A layout of the memory board is shown in the following illustration.



- 1** DIMM 1 error LED (CR5)
- 2** DIMM connector 1 (J1)
- 3** DIMM 2 error LED (CR6)
- 4** DIMM connector 2 (J2)
- 5** DIMM 3 error LED (CR3)
- 6** DIMM connector 3 (J3)
- 7** DIMM 4 error LED (CR2)
- 8** DIMM connector 4 (J4)
- 9** Reserved (J13)
- 10** DIMM 5 error LED (CR7)
- 11** DIMM connector 5 (J5)
- 12** DIMM 6 error LED (CR4)
- 13** DIMM connector 6 (J6)
- 14** DIMM 7 error LED (CR1)
- 15** DIMM connector 7 (J7)
- 16** DIMM 8 error LED (CR8)
- 17** DIMM connector 8 (J8)
- 18** Memory board connector to processor board
- 19** Reserved (might not be present) (J15)
- 20** Reserved (J12)
- 21** Reserved (might not be present) (J14)
- 22** Reserved (J9)
- 23** Reserved (J11)

Memory board jumpers

Table 12 contains the names and descriptions of the jumper blocks located on the memory board.

<i>Table 12. Memory board jumpers</i>		
Jumper Name		Description
9	J13 Reserved	The default position is a jumper on pins 2 and 3.
19	J15 Reserved	The default position is a jumper on pins 1 and 2.
20	J12 Reserved	The default position is a jumper on pins 2 and 3.
21	J14 Reserved	The default position is a jumper on pins 1 and 2.
22	J9 Reserved	The default position is a jumper on pins 2 and 3.
23	J11 Reserved	The default position is a jumper on pins 2 and 3.

Memory board removal

Note

Read “Safety information” on page 338.

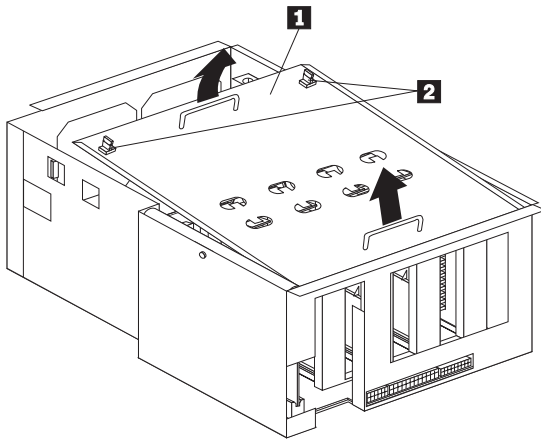
Refer to the following illustrations when performing the following procedure. To re-install the memory board after it has been removed, reverse the following procedure.

Note

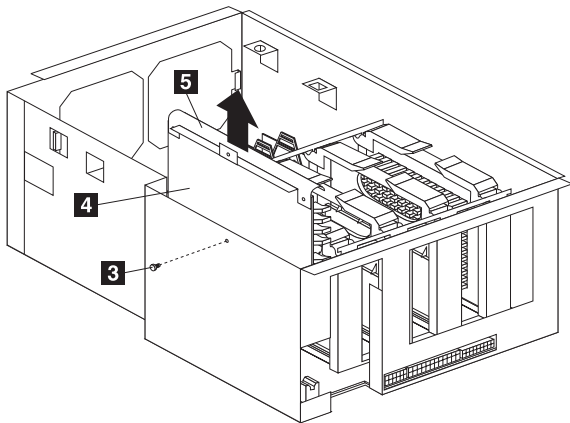
When inserting the memory board into its slot on the processor board, be sure to push down on the edges of the board itself and not on its handle.

Note

The illustrations show only the processor support tray, processor board, and memory board for simplicity; you do not need to remove the processor support tray from the server to remove the memory board.



- 1** Processor support tray cover
- 2** Quarter-turn fasteners



- 3** Thumbscrew
- 4** Memory board
- 5** Memory board handle

To remove the memory board, do the following:

1. Turn off the server and peripheral devices and disconnect all external cables and power cords (see “Preparing to install options” on page 246); then remove the top cover (see “Top cover removal” on page 284).
2. Turn the quarter-turn fasteners **2** on the processor support tray cover **1** one quarter turn and remove the cover from the processor support tray.
3. Remove the thumbscrew **3** from the side of the processor support tray.
4. Lift up on the memory board handle **5** and remove the memory board **4** from the server.
5. Place the memory board **4** on a static-protective surface, such as the static-protective package in which an option came.

Memory modules

Adding memory to the server is an easy way to make programs run faster. You can increase the amount of memory in the server by installing options called *memory-module kits*. Each kit contains one industry-standard, dual-inline memory module (DIMM). The server uses a non-interleaved memory configuration.

The server comes with a memory module installed on the memory board in connector J1, the connector nearest the top of the server. Install additional memory modules in connectors J5, J2, J6, J3, J7, J4, and J8, in that order. (See the following illustration for memory connector locations.) If you mix DIMM sizes, install the largest-sized DIMM in connector J1, the next-largest-sized DIMM in connector J5, and so forth.

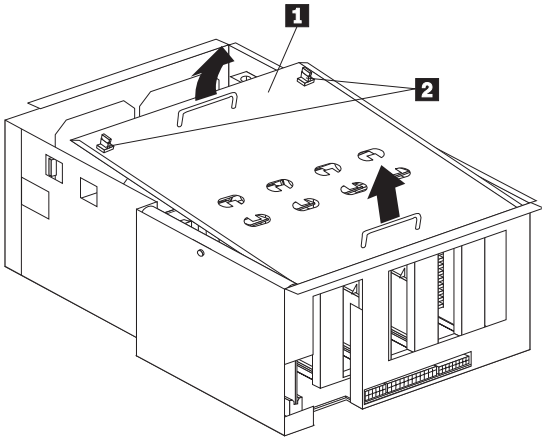
Notes

1. The memory-module kit sizes available for the server are 128 MB, 256 MB, and 512 MB. The server supports a minimum of 128 MB and a maximum of 4 GB of system memory.
2. Install only 3.3 V, 168-pin, 8-byte, registered DIMMs. Only 100 MHz, 72-bit, registered, synchronous, error correcting code (ECC), x4 configuration DIMM memory is supported for the 128 MB, 256 MB, and 512 MB DIMMs.
3. Installing or removing memory modules changes the configuration information in the server. Therefore, after installing or removing a DIMM, you must save the new configuration information in the Configuration/Setup Utility program. When you restart the server, the system displays a message indicating that the memory configuration has changed. Start the Configuration/Setup Utility program and select **Save Settings**. See "Configuration/Setup Utility main menu" on page 22 for more information.

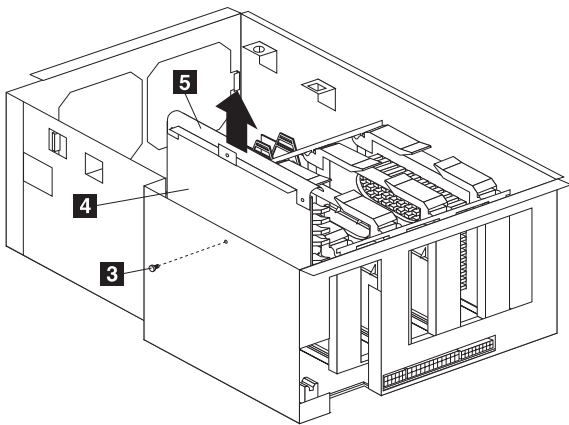
Refer to the following illustrations of the processor support tray and the processor board while you perform the steps in this procedure.

Note

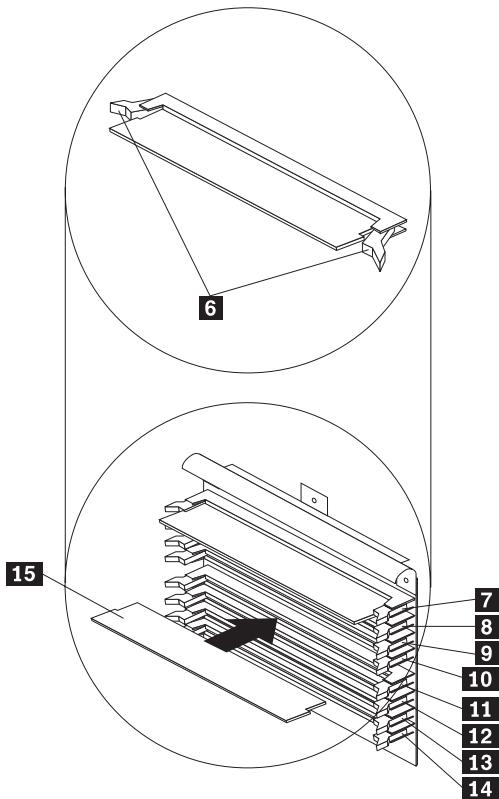
For simplicity, the illustrations show only the processor support tray and processor board; you do not need to remove the processor support tray and processor board to install a memory module.



- 1** Processor support tray cover
- 2** Quarter-turn fasteners



- 3** Thumbscrew
- 4** Memory board
- 5** Memory board handle



- 6** Retaining clips
- 7** Memory connector 1 (J1)
- 8** Memory connector 2 (J2)
- 9** Memory connector 3 (J3)
- 10** Memory connector 4 (J4)
- 11** Memory connector 5 (J5)
- 12** Memory connector 6 (J6)
- 13** Memory connector 7 (J7)
- 14** Memory connector 8 (J8)
- 15** DIMM

Note

- Read “Safety information” on page 338.
- Read the documentation that comes with the 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 246); then remove the top cover (see “Top cover removal” on page 284).

2. Turn the two quarter-turn fasteners **2** on the processor support tray cover **1** one quarter turn and remove the cover from the processor support tray.
3. Remove the memory board **4** (see “Memory board removal” on page 232).
4. Locate the memory-module connectors on the memory board. Determine the memory-module connector into which you will install the memory module. (See the notes at the beginning of this procedure.)
5. 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.

Note

To avoid breaking the retaining clips or damaging the memory-module connectors, handle the clips gently.

6. Install the memory module:
 - a. Turn the memory module (DIMM) **15** so that the pins align correctly with the connector **11**.
 - b. 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. Be sure that the retaining clips **6** snap into the closed positions.
 - c. Make sure the retaining clips **6** are in the closed position. 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.
 - d. Repeat these steps for each memory module that you install.
7. Install the memory board **4** (see “Memory board removal” on page 232).
8. Install the processor support tray cover **1** and turn the two quarter-turn fasteners **2** one quarter turn to secure the cover.
9. If you have other options to install or remove, do so now; otherwise, go to “Completing the installation” on page 178.

Microprocessor installation

The server comes with one microprocessor installed on the processor board. If you install additional microprocessors, the 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.

Note

1. Read "Safety information" on page 338.
2. 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 the server is available through the World Wide Web and the IBM Bulletin Board System (BBS). Refer to "Online support" on page iv for the appropriate World Wide Web addresses and bulletin-board telephone numbers.
3. 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.

Attention

To avoid damage and ensure proper server operation when you install new or additional microprocessors, use microprocessors that have the same cache size and type, and the same clock speed. Microprocessor internal and external clock frequencies must be identical.

Notes

1. The following illustrations might differ slightly from the hardware.
2. If you replace the microprocessor in the server with a microprocessor that operates at a different speed, be sure to set the microprocessor core frequency selection jumpers correctly. See "Processor board jumpers" on page 255 for more information.
3. The microprocessor that is installed in microprocessor connector J1 is CPU or microprocessor 1. If a microprocessor is installed in microprocessor connector J2, it is CPU or microprocessor 2; a microprocessor installed in J3 is CPU or microprocessor 3; a microprocessor installed in J4 is CPU or microprocessor 4. See Table 13 on page 240 for information on the order in which microprocessors and voltage regulator modules (VRMs) must be installed. If the server has only one microprocessor installed, that microprocessor is installed in microprocessor connector J1 and is the startup (boot) processor. If more than one microprocessor is installed, the microprocessor installed in the highest numbered microprocessor connector (normally J4) is the startup processor and the microprocessor installed in J1 is the application processor.
4. VRM 2 is shared between microprocessor 1 and microprocessor 2. VRM 5 is shared between microprocessor 4 and microprocessor 6.
5. Terminator cards are installed with the arrow pointing towards the rear of the system.

The following table shows the order in which additional microprocessors and VRMs should be installed.

Table 13 (Page 1 of 2). Microprocessor and VRM installation order

Note: "T" indicates an installed terminator card. "√" indicates an installed microprocessor or VRM. A terminator card must be installed in each microprocessor connector that does not contain a microprocessor.

One Microprocessor Installed									
Microprocessor Connectors					VRM Connectors				
J1 (P1)	J2 (P2)	J3 (P3)	J4 (P4)	J12 (VRM 1)	J13 (VRM 2)	J14 (VRM 3)	J16 (VRM 4)	J17 (VRM 5)	J18 (VRM 6)
√	T	T	T	√					
Two Microprocessors Installed									
Microprocessor Connectors					VRM Connectors				
J1 (P1)	J2 (P2)	J3 (P3)	J4 (P4)	J12 (VRM 1)	J13 (VRM 2)	J14 (VRM 3)	J16 (VRM 4)	J17 (VRM 5)	J18 (VRM 6)
√	T	T	√	√	√			√	√
Three Microprocessors Installed									
Microprocessor Connectors					VRM Connectors				
J1 (P1)	J2 (P2)	J3 (P3)	J4 (P4)	J12 (VRM 1)	J13 (VRM 2)	J14 (VRM 3)	J16 (VRM 4)	J17 (VRM 5)	J18 (VRM 6)
√	√	T	√	√	√	√		√	√

Continued on next page

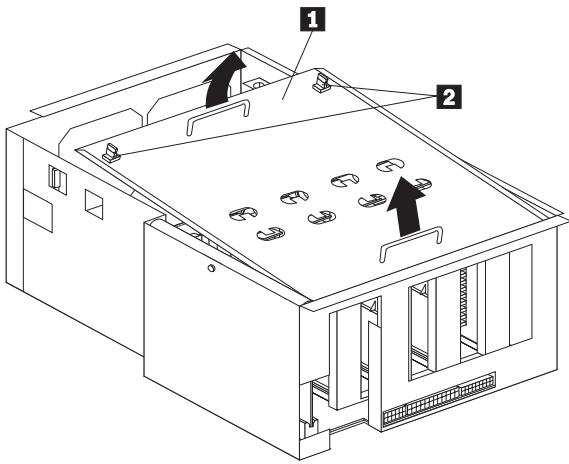
Table 13 (Page 2 of 2). Microprocessor and VRM installation order

Four Microprocessors Installed									
Microprocessor Connectors					VRM Connectors				
J1 (P1)	J2 (P2)	J3 (P3)	J4 (P4)	J12 (VRM 1)	J13 (VRM 2)	J14 (VRM 3)	J16 (VRM 4)	J17 (VRM 5)	J18 (VRM 6)
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

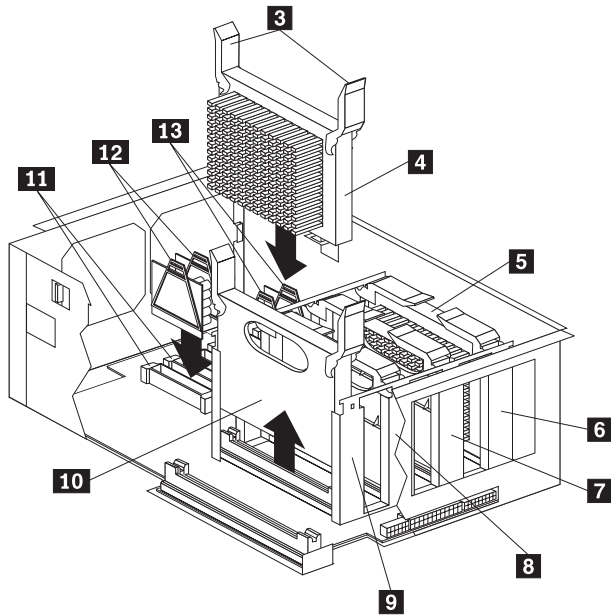
Refer to the following illustrations of the processor support tray and processor board while you perform the following steps.

Note

For simplicity, the illustrations show only the processor support tray and processor board; you do not need to remove the processor support tray and processor board to install a microprocessor.



- 1** Processor support tray cover
- 2** Quarter-turn fasteners



- 3** Latches
- 4** Second installed microprocessor (microprocessor 4)
- 5** First installed microprocessor (microprocessor 1)
- 6** Microprocessor connector 1 (J1)
- 7** Microprocessor connector 2 (J2)
- 8** Microprocessor connector 3 (J3)
- 9** Microprocessor connector 4 (J4)
- 10** Terminator card
- 11** VRM connectors 5 (J17) and 6 (J18)
- 12** VRMs for second microprocessor (VRMs 5 and 6)
- 13** VRMs for first microprocessor (VRMs 1 and 2)

To install an additional microprocessor:

1. Turn off the server and peripheral devices and disconnect all external cables and power cords (see “Preparing to install options” on page 246); then remove the top cover (see “Top cover removal” on page 284).
2. Turn the two quarter-turn fasteners **2** on the processor support tray cover **1** one quarter turn and remove the cover from the processor support tray.
3. Determine the connectors where the microprocessor and VRMs are to be installed. See Table 13 on page 240.
4. Remove the terminator card **10** from the microprocessor connector **9**. Store the terminator card in a safe place in the static-protective package that the new microprocessor is shipped in; you will

need to install it again if you ever remove the microprocessor.

5. 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. Hold the microprocessor **4** by the open latches **3**, and center the microprocessor over the microprocessor connector **9**.

Attention

Make sure the microprocessor is oriented and aligned correctly before you try to close the latches.

- c. Carefully close the latches **3** to seat the microprocessor in the connector.
6. Install the voltage regulator modules (VRMs) **12** included in the microprocessor kit:
 - a. Remove fan assembly 4 to allow access to the VRM connectors. See "Hot-swap fan assembly replacement" on page 202 for instructions on removing fan assembly 4.
 - b. Determine the connectors where the VRMs are to be installed. See Table 13 on page 240. The microprocessor upgrade kit comes with two VRMs. You might need to install only one, depending upon the number of microprocessors in the server.
 - c. Center the VRM **12** over the connector **11**. Make sure that the VRM is oriented and aligned correctly; then, press the VRM into the connector.
 - d. Repeat the preceding step for the second VRM, if needed. If you need to install only one VRM, store the remaining VRM in a safe place to use as a replacement, if you ever need one.

Note

If you remove the microprocessor at some time in the future, remember to install the terminator card in the appropriate microprocessor connector and to remove the VRMs for that microprocessor.

- e. Install fan assembly 4. See "Hot-swap fan assembly replacement" on page 202 for instructions on installing fan assembly 4.
7. Install the processor support tray cover **1** and turn the two quarter-turn fasteners **2** one quarter turn to secure the cover.

8. If you have other options to install or remove, do so now; otherwise, go to "Completing the installation" on page 178.

Preparing to install options

Note

1. Read "Safety information" on page 338.
2. 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.
3. Make sure that you have an adequate number of properly grounded electrical outlets for the server, monitor, and any other options that you intend to install.
4. Place the server in a location that is dry. Rain or spilled liquids might damage the server.
5. 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.
6. Have a supply of 1 MB and 2 MB, 3.5-inch diskettes available.
7. Back up all important data before you make changes to disk drives.
8. Have a small, flat-blade screwdriver available.
9. For a list of supported options for the Netfinity 5500 M20, refer to <http://www.pc.ibm.com/us/compat> on the World Wide Web.

If you are:

- Installing or removing a hot-plug PCI adapter, go to "Adapters" on page 161.
 - Installing or replacing a hot-swap hard disk drive, go to "Internal drives installation" on page 213.
 - Installing or replacing a hot-swap power supply, go to "Hot-swap power supply installation" on page 196.
 - Removing a hot-swap power supply, go to "Hot-swap power supply removal" on page 200.
 - Replacing a hot-swap fan, go to "Hot-swap fan assembly replacement" on page 202.
 - Installing or removing an option not listed in the preceding list, continue with the following steps.
1. Unlock and open the server door.



Caution

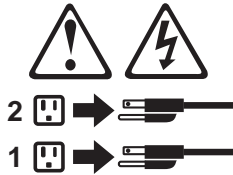
If the device has doors, be sure to remove or secure the doors before moving or lifting the device to avoid personal injury. The doors will not support the weight of the device.

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 device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, 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 server and from the wall 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.



Danger

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

To avoid a shock hazard:

- Do not connect or disconnect any cables or perform installation, maintenance, or reconfiguration of this product during an electrical storm.
- Connect all power cords to a properly wired and grounded electrical outlet.
- Connect to properly wired outlets any equipment that will be attached to this product.
- When possible, use one hand only to connect or disconnect signal cables.
- Never turn on any equipment when there is evidence of fire, water, or structural damage.
- Disconnect the attached power cords, telecommunications systems, networks, and modems before you open the device covers, unless instructed otherwise in the installation and configuration procedures.

Go to "Top cover removal" on page 284; then continue with the procedure which referred you to this procedure.

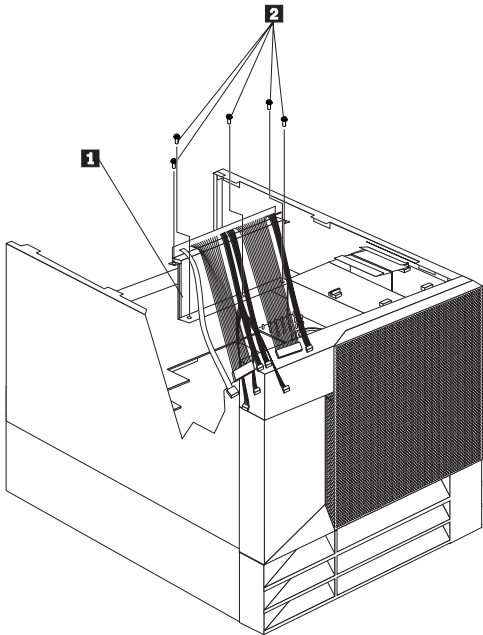
Power backplane removal

Note

Read "Safety information" on page 338.

To remove the power backplane, to the following

1. Turn off the server and peripheral devices and disconnect all external cables and power cords (see "Preparing to install options" on page 246); then remove the top cover (see "Top cover removal" on page 284).
2. To access the power backplane cables, slide the shuttle to the rear of the system (see "Shuttle removal" on page 277).
3. Disconnect the power backplane cables.
4. Remove the power backplane **1**.



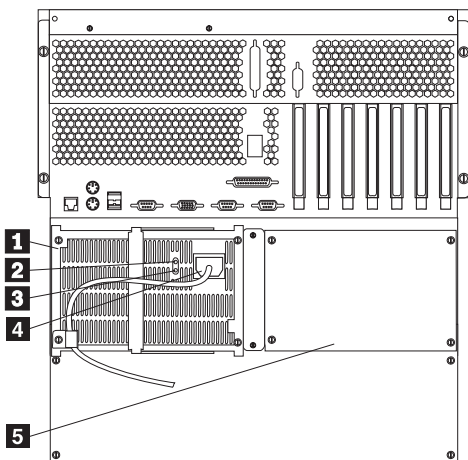
- a. Remove the 5 power backplane screws **2** on the two top tabs and across the bottom front flange of the power backplane; then, remove the power backplane.

Power supplies

The following illustration shows the power supplies and power lights on the server.

Note

See “Safety information” on page 338 for information about power cords for use with your server in your country or region.



- 1 Power Supply 1:** The 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 the server has only one power supply installed. (See “Hot-swap power supply installation” on page 196 for instructions.)
- 2 AC Power Light:** This light provides status information about the power supply. During normal operation, both the AC and DC Power lights are on. For any other combination of lights, see “Power supply LEDs” on page 251 for more information.
- 3 DC Power Light:** This light provides status information about the power supply. During normal operation, both the AC and DC Power lights are on. For any other combination of lights, see “Power supply LEDs” on page 251 for more information.
- 4 Power Supply 1 Power Connector:** The power cord for power supply 1 connects here.
- 5 Filler Panel:** You can remove this filler panel and install a second hot-swap power supply in power supply bay 2. The second power supply provides redundant power.

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 250 for the location of these LEDs.

The following table describes the AC and DC Power LEDs.

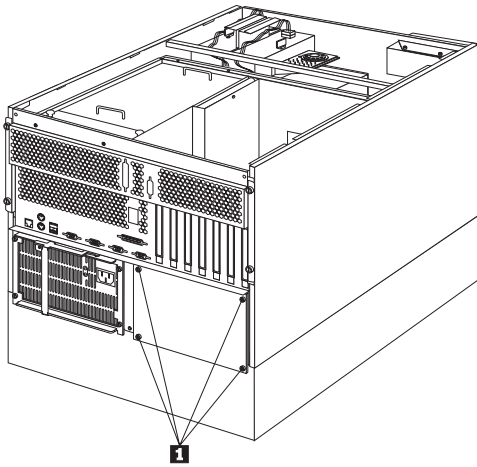
AC Power LED	DC Power LED	Description and action
On	On	The power supply is on and operating correctly.
On	Off	<p>There is a DC power problem.</p> <p>Possible causes:</p> <ol style="list-style-type: none">1. The Power Control button on the front of the server is in the Off position. <p>Action: Press the Power Control button to start the server.</p> <ol style="list-style-type: none">2. The power supply has failed. <p>Action: Replace the power supply.</p> <p>If the problem persists, go to "General checkout" on page 8.</p>
Off	Off	<p>There is an AC power problem.</p> <p>Possible causes:</p> <ol style="list-style-type: none">1. There is no AC power to the power supply. <p>Actions: Verify that:</p> <ul style="list-style-type: none">• The power cord is properly connected to the server.• The power outlet functions properly. <ol style="list-style-type: none">2. The power supply has failed. <p>Action: Replace the power supply.</p> <p>If the problem persists, go to "General checkout" on page 8.</p>

Power supply filler panel

Note

Read "Safety information" on page 338.

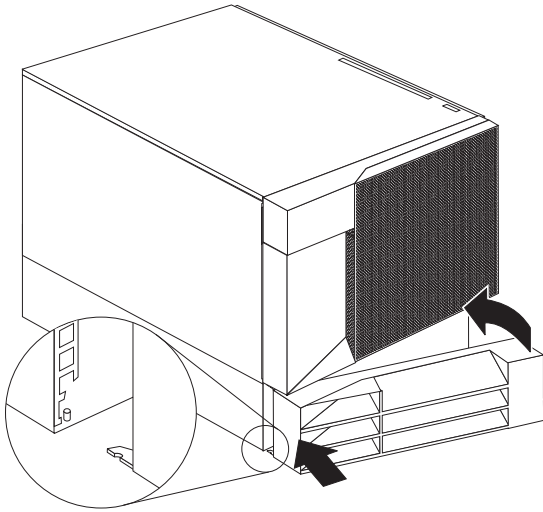
To remove the power supply filler panel, do the following:



1. Remove the power supply filler panel screws **1**; then, remove the power supply filler panel.

NetBAY3 bezel installation

The NetBAY3 bezel is shipped, unattached, inside the NetBAY3.

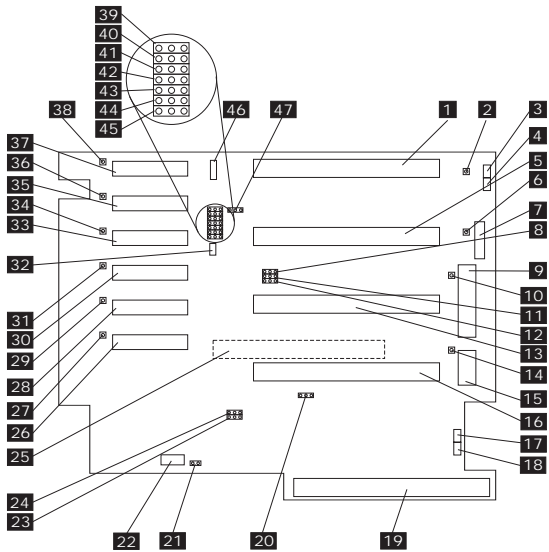


To install the NetBAY3 bezel:

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** Microprocessor 1 connector (J1)
- 2** Microprocessor 1 error LED (CR16)
- 3** Microprocessor 1 fan power connector (J7)
- 4** Microprocessor 2 fan power connector (J8)
- 5** Microprocessor 2 connector (J2)
- 6** Microprocessor 2 error LED (CR15)
- 7** Power control connector (to power backplane) (J33)
- 8** Reserved (might not be present) (J15)
- 9** Power connector (to power backplane) (J32)
- 10** Microprocessor 3 error LED (CR18)
- 11** Reserved (might not be present) (J22)
- 12** Reserved (might not be present) (J23)
- 13** Microprocessor 3 connector (J3)
- 14** Microprocessor 4 error LED (CR21)
- 15** Power connector (J35)
- 16** Microprocessor 4 connector (J4)
- 17** Microprocessor 3 fan power connector (J9)
- 18** Microprocessor 4 fan power connector (J10)
- 19** Memory board connector
- 20** Reserved (J24)
- 21** Reserved (J37)
- 22** Fan 4 connector (J36)
- 23** Reserved (might not be present) (J21)
- 24** Reserved (J20)
- 25** System board connector (on reverse side of processor board)
- 26** VRM 6 connector (J18)
- 27** VRM 6 error LED (CR4)

- 28** VRM 5 connector (J17)
- 29** VRM 5 error LED (CR7)
- 30** VRM 4 connector (J16)
- 31** VRM 4 error LED (CR2)
- 32** Reserved (J11)
- 33** VRM 3 connector (J14)
- 34** VRM 3 error LED (CR3)
- 35** VRM 2 connector (J13)
- 36** VRM 2 error LED (CR6)
- 37** VRM 1 connector (J12)
- 38** VRM 1 error LED (CR5)
- 39** – **42** Microprocessor core-frequency-selection jumper block (J31–J28)
- 43** Reserved (J27)
- 44** Reserved (J25)
- 45** Reserved (J26)
- 46** Reserved (J19)
- 47** Reset system jumper block (J34)

Processor board jumpers

Table 14 on page 256 contains the names and descriptions of the jumper blocks located on the processor board. Table 15 on page 256 shows the microprocessor core-frequency-selection jumper settings. The highlighted numbers in the table refer to the highlighted numbers in the illustration in “Processor board component locations” on page 254.

Notes

1. Turn off the server, and disconnect the power cords before moving any jumpers.
2. Be sure the microprocessor bus-to-core fraction is set correctly. For example, if you have a 400 MHz² microprocessor installed and the system bus speed is 100 MHz (the default), jumpers J28-J31 are set to a bus-to-core fraction of 4 (400/100). See Table 15 on page 256.

Attention

If the microprocessor bus-to-core fraction is incorrect, system board components will overheat and component damage might occur. Be sure that the microprocessor core frequency selection is properly set.

² 400 MHz denotes internal clock speed of the microprocessor only; other factors also affect application performance.

<i>Table 14. Processor board jumpers</i>	
Jumper Name	Description
20 J24 Reserved	The default position is a jumper on pins 1 and 2.
22 J37 Reserved	The default position is a jumper on pins 1 and 2.
23 J21 Reserved	The default position is a jumper on pins 2 and 3.
24 J20 Reserved	The default position is a jumper on pins 1 and 2.
39 – 42 J31–J28 Microprocessor core frequency selection	For the core/bus fraction 4 (400/100 MHz), jumpers are installed on pins 1 and 2 of J28, J30, and J31 and on pins 2 and 3 of J29. For the core/bus fraction 4.5 (450/100 MHz), jumpers are installed on pins 1 and 2 of J28 and J31 and on pins 2 and 3 of J29 and J30. For the core/bus fraction 5 (500/100 MHz), jumpers are installed on pins 1 and 2 of J30 and J31 and on pins 2 and 3 of J28 and J29.
43 J27 Reserved	The default position is a jumper on pins 1 and 2.
44 J25 Reserved	The default position is a jumper on pins 1 and 2.
45 J26 Reserved	The default position is a jumper on pins 2 and 3.
47 J34 Reset system	The default position for normal operation is no jumper on J34. Installing a jumper on pins 1 and 2 will force the system into the reset state.

<i>Table 15. Microprocessor core frequency selection switch (SW1) settings</i>				
Core/bus fraction	J28 Jumper	J29 Jumper	J30 Jumper	J31 Jumper
4	Pins 1 and 2	Pins 2 and 3	Pins 1 and 2	Pins 1 and 2
4.5	Pins 1 and 2	Pins 2 and 3	Pins 2 and 3	Pins 1 and 2
5	Pins 2 and 3	Pins 2 and 3	Pins 1 and 2	Pins 1 and 2
Note: For jumper settings for other speed microprocessors, refer to the label on the inside top cover of the server.				

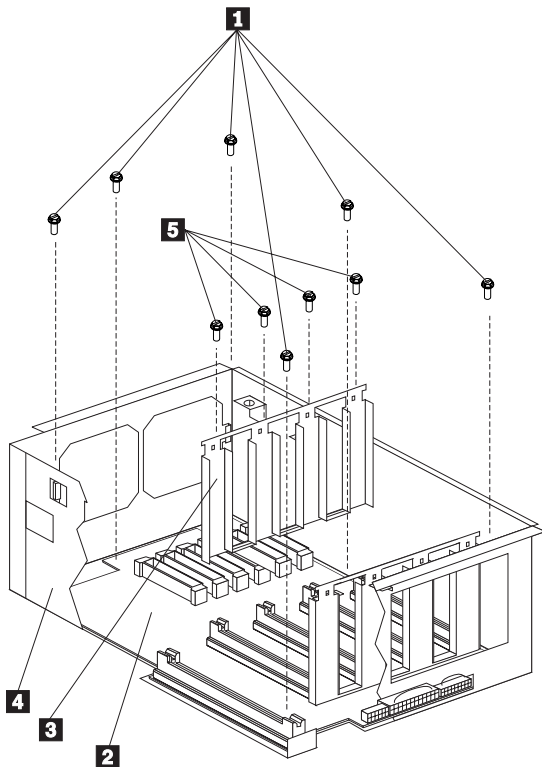
Processor board removal

Note

Read "Safety information" on page 338.

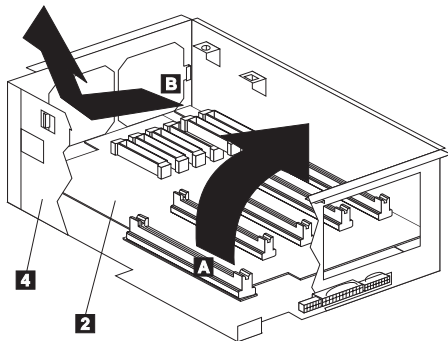
To remove the processor board, do the following.

1. Remove the processor support tray (see "Processor support tray removal" on page 259).
2. Remove memory board (see "Memory board removal" on page 232).
3. Remove Fan 4 (see "Hot-swap fan assembly replacement" on page 202).
4. Remove all VRMs from their slots.
5. Remove all microprocessors and terminators from microprocessor connectors 1 through 4 (see "Microprocessor installation" on page 238).
6. Disconnect all processor board cables.
7. Remove microprocessor brackets.



- a. Remove 4 screws **5** on each bracket **3**; then, lift brackets out of the support tray **4**.
8. Remove the processor board screws **1**.
9. Remove the processor board **2**.

- a. Lift the processor board **2** out of the support tray **4**.



- 1) Tilt the side of the processor board **2** into which the memory board attaches away from its side of the support tray **4** (arrow **A**).
- 2) Slide the lower edge of the processor board **2** towards the memory board side of the support tray **4**; then, lift it out of the support tray (arrow **B**).

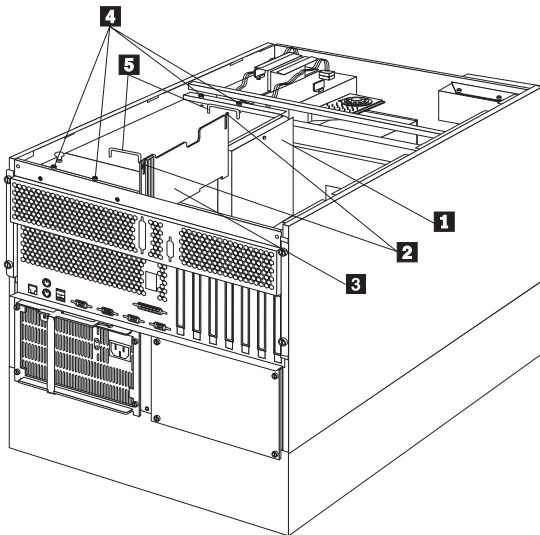
Processor support tray removal

The RAID channel 1 connector (J7) and some jumper blocks are located on the system board under the processor support tray. To access these components, you must remove the processor support tray.

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

Note

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



- 1** Processor support tray
- 4** Thumbscrews
- 5** Processor support tray handles

To remove the processor support tray:

1. Disconnect all power cables from the rear of the server.
2. Remove the top cover (see "Top cover removal" on page 284).
3. Remove the four blue thumbscrews **4** on the processor support tray **1**.

Note

- If you have not already done so, you might want to loosen the four thumbscrews on the shuttle at the back of the server and pull the shuttle toward the back of the server to allow easier access to the cables. (See “Installing a 5.25-inch removable-media drive” on page 217 for an illustration of the shuttle and the thumbscrews.)
- The processor support tray should always be removed or replaced using the handles on the support tray cover. If the cover is not on the support tray, you must install it before removing or replacing the tray.

4. Disconnect the cables from the cable connectors on the processor board. (The cable connectors are located at the end of the processor support tray toward the front of the processor.)
5. Using the processor support tray handles **5**, carefully lift the processor support tray from the server.
6. Place the processor support tray in a safe place until you are ready to install it again.

Processor support tray installation

See the illustration in “Processor support tray removal” on page 259 while you perform the steps in this section.

To install the processor support tray:

1. Grasp the processor support tray **1** by the handles **5**, lift the support tray, and orient the processor support tray with the cable connectors toward the front of the server.

Attention

When you install the processor support tray in the server, make sure that it is aligned correctly before you seat it in the shuttle. Incorrect seating might damage server components.

2. Align the processor support tray with the processor support tray guide on the inside rear of the server. Carefully lower the processor support tray into the shuttle until it is fully seated.
3. Install and tighten the four blue thumbscrews **4** on the processor support tray **1**.
4. Connect the cables that you disconnected when you removed the processor support tray.

Rack installation

The following information provides instructions for installing a server in a rack and for removing a server from a rack.

The server comes with all the rack installation hardware (rack models only).



>82 kg (180 lbs)

Caution

Do not place any object weighing more than 82 kg (180 lbs) on top of the rack model of the server.

Note

1. Review "Safety information" on page 338 before you begin.
2. You will need the following items:
 - An assortment of small screwdrivers
 - 8-inch adjustable wrench or pliers
3. Some of the installation procedures require three people.
4. 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 the ServerGuide CDs.
5. Review the documentation that comes with the rack enclosure for safety or cabling considerations. Ensure that the planned installation is within the rack's guidelines for heat generation, electrical requirements, air flow, and mechanical loading.
6. Verify that the rack can meet the operating parameters, as detailed in "Specifications" on page 61.

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:



≥18 kg
(37 lbs)



≥32 kg
(70.5 lbs)



≥55 kg
(121.2 lbs)

Caution

Use safe practices when lifting.

You will use the following parts:

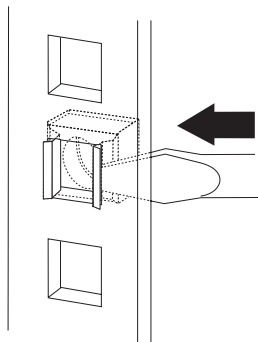
- IBM Installation Template
- Two slide-bracket assemblies
- One cable-management arm
- Two bezel brackets
- Six screws (for attaching the bezel brackets)
- Sixteen long screws (M6 by 16 mm)
- Eight short screws (M4 by 8 mm)
- Six cage nuts
- Two hex nuts (M6)
- Four nut bars
- Four lift handles (shipped 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.

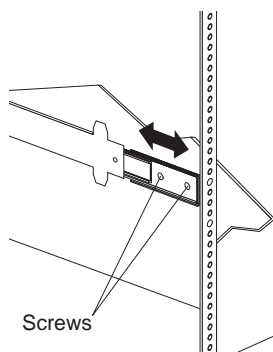


3. Attach a slide-bracket assembly to the front of the rack:

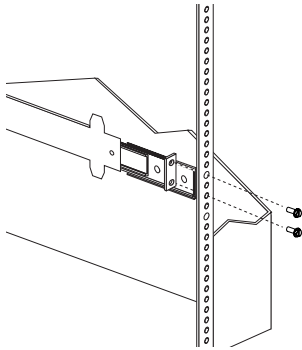
Notes

1. Get another person to help you attach the slide-bracket assemblies to the rack.
2. The slide-bracket assemblies can be installed on either the left or right side of the rack.
3. Refer to the illustrations for examples of the proper alignment of the slide-bracket assemblies.

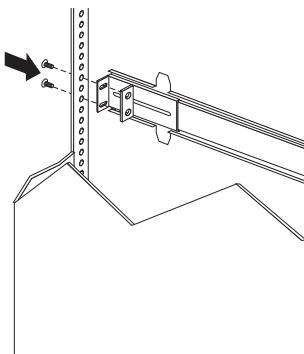
- a. Position the slide-bracket assembly behind the mounting rail so that the slides will extend out from the front of the rack.
- b. If necessary, loosen the screws at the rear of the slide bracket assembly and adjust the length of the slide-bracket to fit the mounting rail. Tighten the screws.



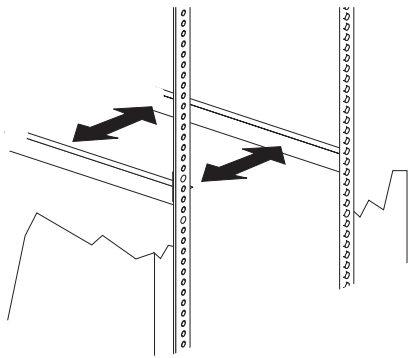
- c. Position a nut bar behind the slide-bracket assembly.
- d. Insert screws (6M by 16 mm) through the mounting rail, the slide-bracket assembly, and nut bars. Do not tighten the screws.



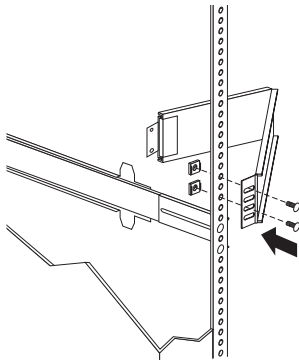
4. Attach the slide-bracket assembly to the rear of the rack:
 - a. Position the slide-bracket assembly inside the mounting rail.
 - b. Position a nut bar behind the slide-bracket assembly.
 - c. Insert screws (6M by 16mm) through the mounting rail to the slide-bracket assembly. Do not tighten the screws.



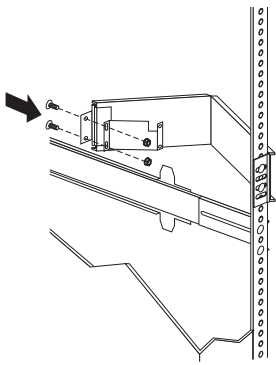
5. Attach the other slide-bracket assembly to the front and rear of the rack.
6. Push the slide-bracket assemblies to the outermost positions on the rack.



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.



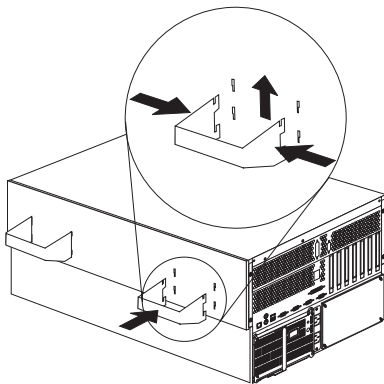
- c. Position the server bracket on the cable-management arm.
- d. Insert screws through the cable-management arm and the server bracket. Attach M6 hex nuts to the screws and tighten the hex nuts.



Installing the server in the rack: 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.



≥18 kg
(37 lbs)



≥32 kg
(70.5 lbs)

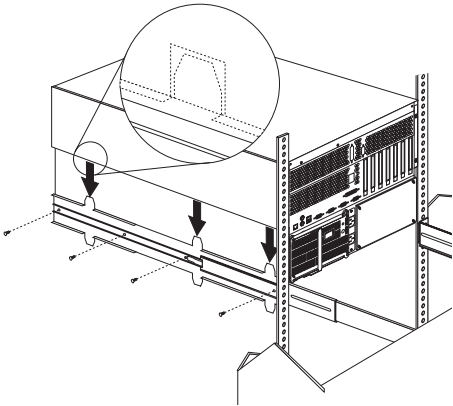


≥55 kg
(121.2 lbs)

Caution

Use safe practices when lifting.

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.

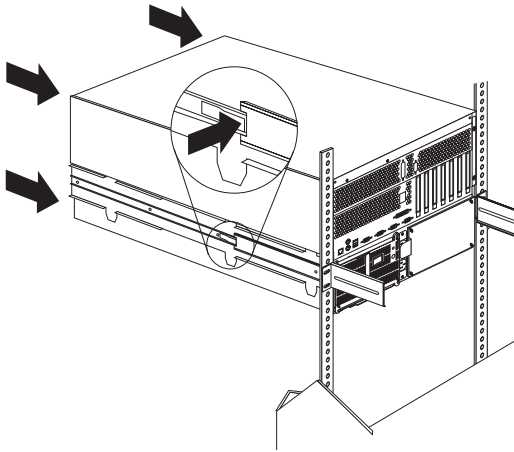


6. Remove the four lift handles from the sides of the server:
 - a. Grasp the lift handle and press in on the sides of the lift handle near the tabs until the tabs touch the inside edges of the slots.
 - b. Move the handle down in the slots so that the hooked parts of the tabs clear the top edges of the slots; then, pull the handle away from the server.
 - c. Remove the remaining three handles. Store the handles in a safe place.

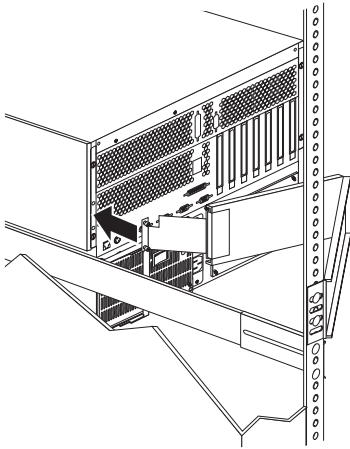
Note

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.

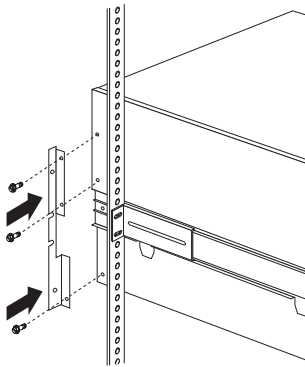
7. Press the safety latches and slide the drawer about halfway into the rack.



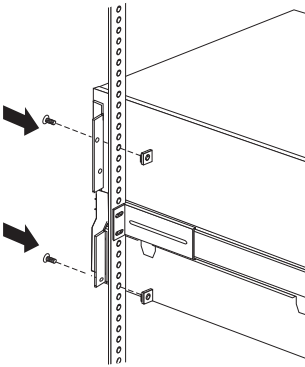
8. Attach the cable-management arm to the server using the captive screws.



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

Note

- Read "Safety information" on page 338.
- 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.



≥18 kg
(37 lbs)



≥32 kg
(70.5 lbs)

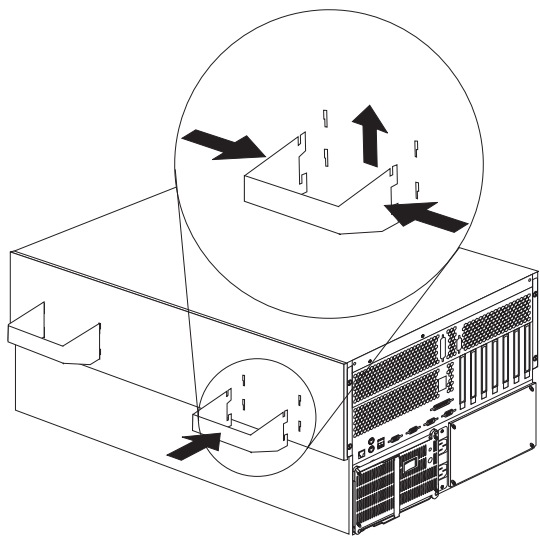


≥55 kg
(121.2 lbs)

Caution

Use safe practices when lifting.

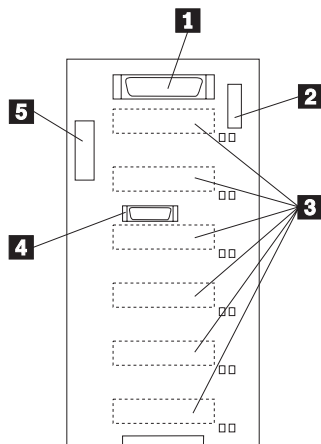
9. Install the four lift handles on the sides of the server:
 - a. Press in on the sides of the lift handle near the tabs and insert the handle tabs into the slots on the side of the server.
 - b. Move the handle up in the slots so that the hooked part of each tab is inside the server. Release the pressure 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 273 for the location of the option jumper block.

Table 16 summarizes the settings for the SCSI backplane option jumper block (J10).

<i>Table 16. Backplane option jumper block</i>	
Pins	Description
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 17 shows the SCSI IDs that you can use for hot-swap drives.

<i>Table 17. SCSI IDs for hot-swap drives</i>							
J10 Pins 5–6	J10 Pins 11–12	Bay 1	Bay 2	Bay 3	Bay 4	Bay 5	Bay 6
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 the server, monitor, and any other options that you installed. Place the server in a location that is dry. Rain or spilled liquids might damage the server. Leave about 50 mm (2 inches) of space at the right and left sides of the server to allow the server's cooling system to work properly. Leave about 100 mm (4 inches) clearance at the rear for cables.

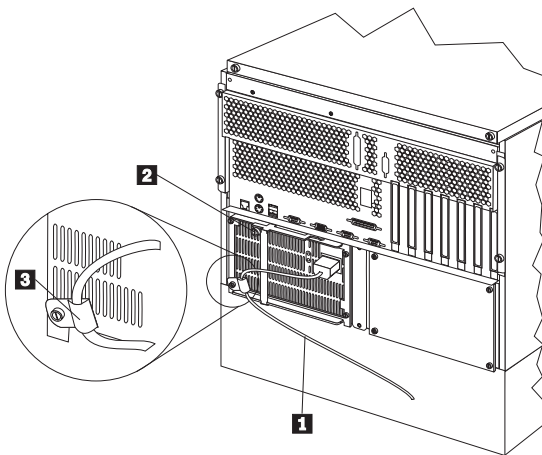
1. Use the illustration in "Input/output connectors and expansion slots" on page 209 to cable the server.
2. Remove any shipping screws **2** from the power supply.
3. Connect the power cord **1** to the server.



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.

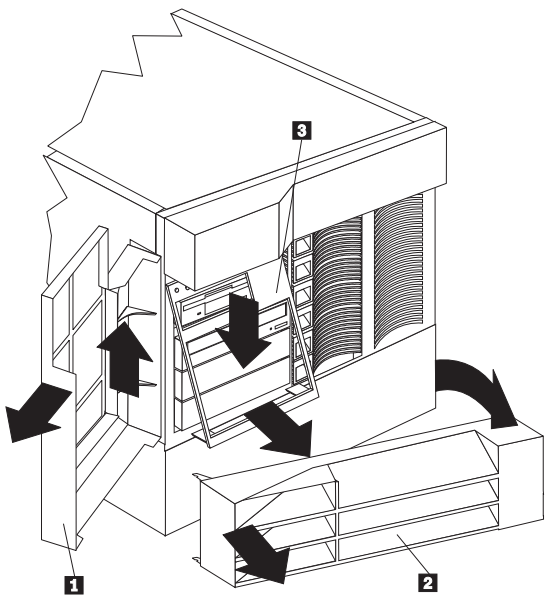
4. Install the power-cord strain-relief bracket **3** (if desired).



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.



- 1** Server door
- 2** NetBAY3 bezel
- 3** Media-bay trim bezel

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 models 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.

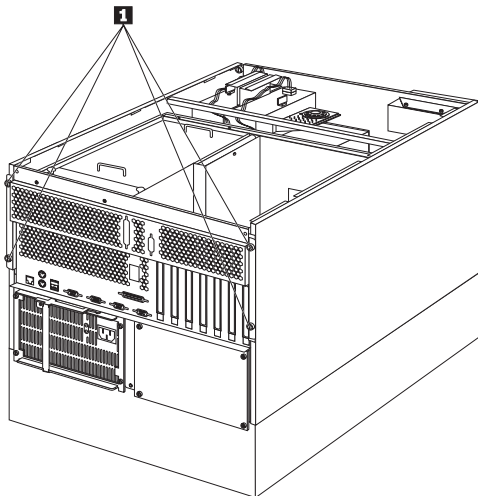
Shuttle removal

Note

Read "Safety information" on page 338.

To remove the shuttle, do the following:

1. If you have not already done so, turn off the server and peripheral devices and disconnect all external cables and power cords (see "Preparing to install options" on page 246).
2. Remove the top cover (see "Top cover removal" on page 284).
3. Remove processor support tray (see "Processor support tray removal" on page 259).
4. Disconnect all cables attached to the front of the shuttle.
5. Remove the shuttle.

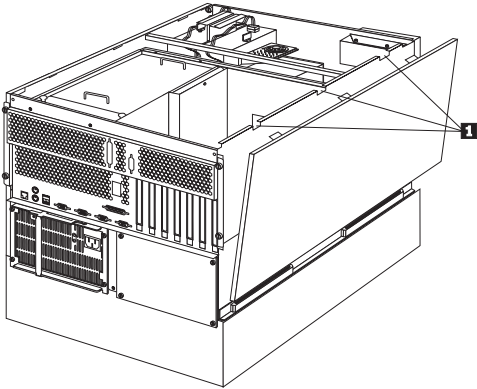


- a. Loosen the screws **1** on the back of the shuttle; then, slide the shuttle to the rear of the system.

Side cover(s) removal

To remove the side cover(s), do the following:

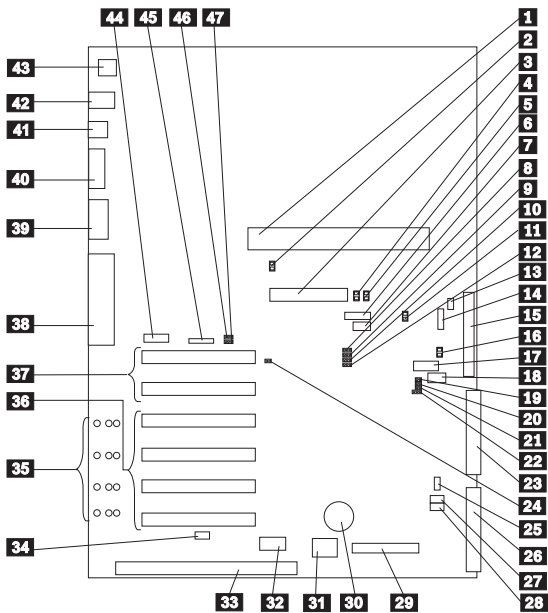
1. Remove the top cover (see "Top cover removal" on page 284).
2. Remove the server front door (see "Server door and trim bezels removal" on page 276).
3. Remove the side cover.



- 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 a layout of the system board and identifies system board components. You might need to refer to this figure before you install hardware in the server, or when you record information in the tables in this chapter. You might also need to refer to this figure when you set configuration jumpers on the system board.



- 1** Processor board connector (J19)
- 2** Advanced 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 with cable (J32)
- 11** RAID download jumper block (J15)
- 12** Reserved (J25)
- 13** Reserved (J9)
- 14** Power backplane cable connector (J8)
- 15** RAID channel 2 connector (to backplane) (J3)
- 16** RAID system error LED (CR32)
- 17** RS-485 connector (J27)
- 18** Reserved (J35)
- 19** SCSI activity LED connector (J52)
- 20** Reserved (J34)
- 21** Reserved (J29)
- 22** Reserved (J29)
- 23** Reserved (J29)
- 24** Reserved (J29)
- 25** Reserved (J29)
- 26** Reserved (J29)
- 27** Reserved (J29)
- 28** Reserved (J29)
- 29** SCSI activity LED connector (J52)
- 30** SCSI activity LED connector (J52)
- 31** SCSI activity LED connector (J52)
- 32** SCSI activity LED connector (J52)
- 33** SCSI activity LED connector (J52)
- 34** SCSI activity LED connector (J52)
- 35** SCSI activity LED connector (J52)
- 36** SCSI activity LED connector (J52)
- 37** SCSI activity LED connector (J52)
- 38** SCSI activity LED connector (J52)
- 39** SCSI activity LED connector (J52)
- 40** SCSI activity LED connector (J52)
- 41** SCSI activity LED connector (J52)
- 42** SCSI activity LED connector (J52)
- 43** SCSI activity LED connector (J52)
- 44** SCSI activity LED connector (J52)
- 45** SCSI activity LED connector (J52)
- 46** SCSI activity LED connector (J52)
- 47** SCSI activity LED connector (J52)

- 22** RS-485 termination jumper block (J26)
 - 23** IDE connector (J33)
 - 24** Disable Advanced System Management Processor jumper block (J51)
 - 25** Fan connector (J36)
 - 26** Diskette drive connector (J22)
 - 27** Power-on password override jumper block (J24)
 - 28** Flash ROM page swap jumper block (J30)
 - 29** Information LED panel connector (J20)
 - 30** Battery
 - 31** Reserved (J46)
 - 32** Hot-plug PCI controller programmer interface connector (J53)
 - 33** ISA expansion slot
 - 34** Hot-plug switch connector (J16)
 - 35** PCI slot LEDs (four are on the side of the board)
 - 36** PCI (hot-plug) slots 1–4 (on PCI primary bus 1)
 - 37** PCI slots 5 and 6 (on PCI primary bus 0)
- Note:** Because of the processor support tray, PCI slot 6 is not available for use and PCI slot 5 supports only a short adapter.
- 38** Parallel port connector (J56) (Serial port A and B connectors are below the parallel port connector.)
 - 39** Video port connector (J2)
 - 40** Management port C connector (J42)
 - 41** USB 1 and USB 2 port connectors (J31) (USB 2 is below USB 1)
 - 42** Mouse and keyboard connectors (J1) (The mouse connector is above the keyboard connector.)
 - 43** Ethernet port connector (J4)
 - 44** Reserved (J17)
 - 45** Reserved (J18)
 - 46** Disable Ethernet controller jumper block (J5)
 - 47** Disable video controller jumper block (J14)

System board jumpers

Table 18 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 279.

Note

Turn off the server and disconnect the power cords before moving any jumpers.

Table 18 (Page 1 of 2). System board jumpers

Jumper Name	Description
8 J11 Disable RAID controller	The default position is Enabled (jumper on pins 1 and 2). Move 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.

Table 18 (Page 2 of 2). System board jumpers

Jumper Name	Description
10 J32 Power-on control with extension cable	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 power switch assembly or Netfinity Advanced System Management Processor. A cable is connected to these pins to allow easy access while the processor support tray is still installed; its white wire indicates pin 1.
11 J15 RAID download	The default is no jumpers on the pins. This jumper block is used when the RAID adapter EEPROM is being updated.
12 J25 Reserved	The default position is a jumper on pins 1 and 2.
13 J9 Reserved	The default position is a jumper on pins 1 and 2.
20 J34 Reserved	The default position is a jumper installed on pins 1 and 2.
21 J29 Reserved	The default position is a jumper installed on pins 1 and 2.
22 J26 RS-485	The default is no jumper installed on J26.
24 J51 Disable Advanced System Management Processor	<p>In normal operation, there is no jumper on J51. Installing a jumper on J51 disables the Netfinity Advanced System Management Processor. A jumper should only be installed on J51 for diagnostic purposes. Normal operation of the server with J51 jumpered is not supported.</p> <p>A system operated in this manner is limited in the following ways:</p> <ol style="list-style-type: none"> 1. No system error logging. 2. No monitoring of system functions for problem. 3. No automatic recovery after an NMI error. 4. Error indication ability is severely limited.
27 J24 Power-on password override	<p>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.</p> <p>Changing the position of this jumper does not affect the administrator password check if an administrator password is set.</p>
28 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.
46 J5 Disable Ethernet controller	The default position is Enabled (jumper on pins 1 and 2). Move the jumper to pins 2 and 3 to disable the Ethernet controller.
47 J14 Disable video controller	The default position is Enabled (jumper on pins 1 and 2). Move the jumper to pins 2 and 3 to disable the video controller.

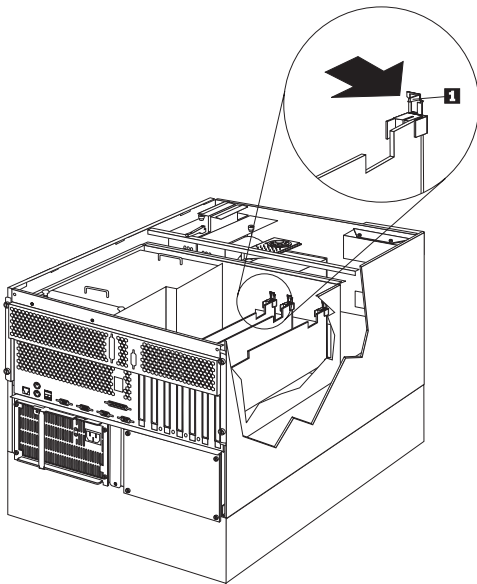
System board removal

Notes

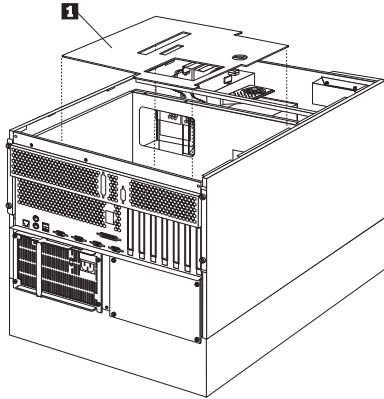
1. Read “Safety information” on page 338.
2. If possible, record the configuration settings before removing the system board (see “Configuration/Setup Utility program” on page 21).

To remove the system board, do the following:

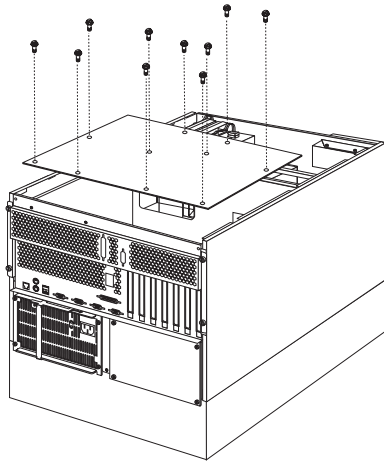
1. Turn off the server and peripheral devices and disconnect all external cables and power cords (see “Preparing to install options” on page 246); then remove the top cover (see “Top cover removal” on page 284).
2. Disconnect all adapter cables and remove the adapters (see “Hot-plug PCI adapter installation” on page 165).
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 support tray (see “Processor support tray removal” on page 259).
 5. Disconnect all system board cables.
 6. Remove the system board dust cover **1**.



7. Remove the system board.

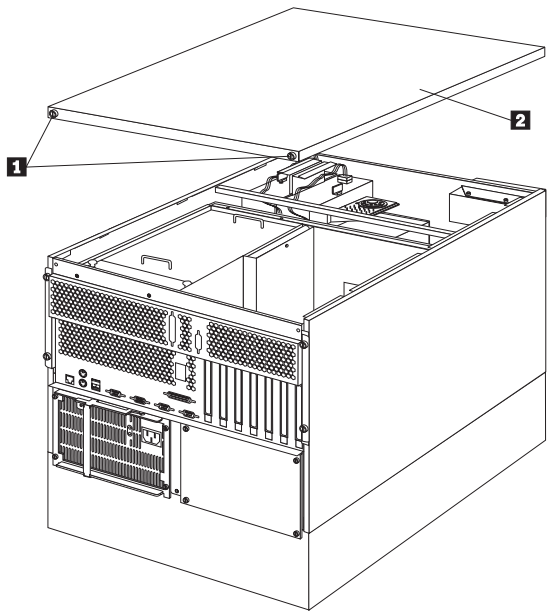


a. Remove the system board mounting screws;
then, remove the system board.

Top cover removal

Note

Read "Safety information" on page 338.



1 Thumbscrews

2 Top cover

To remove the server top cover:

1. Loosen the two thumbscrews **1** on the back edge of the top cover.
2. 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.

Symptom-to-FRU index

This index supports Netfinity Netfinity 5500 M20 - Type 8662 servers.

Notes

1. Check the configuration before you replace a FRU. Configuration problems can cause false errors and symptoms.
2. The default configuration can be loaded by starting the system and then pressing the reset button four times, waiting 15 seconds between each press. Once the configuration has reset to the default, it must be saved in Setup to be stored in CMOS.
3. For IBM devices not supported by index, refer to the manual for that device.
4. Always start with "General checkout" on page 8.

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	<ul style="list-style-type: none"> • 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)	<ol style="list-style-type: none"> 1. Optional Processor (if installed) 2. Processor
1-1-3 (CMOS write/read test failed)	<ol style="list-style-type: none"> 1. Battery 2. System Board
1-1-4 (BIOS ROM checksum failed)	<ol style="list-style-type: none"> 1. System Board
1-2-1 (Programmable Interval Timer failed)	<ol style="list-style-type: none"> 1. System Board 2. Processor Board
1-2-2 (DMA initialization failed)	<ol style="list-style-type: none"> 1. System Board 2. Processor Board
1-2-3 (DMA page register write/read failed)	<ol style="list-style-type: none"> 1. System Board 2. Processor Board
1-2-4 RAM refresh verification failed	<ol style="list-style-type: none"> 1. System Board 2. Processor Board
1-3-1 (1st 64K RAM test failed)	<ol style="list-style-type: none"> 1. DIMM 2. Processor Board
1-3-2 (1st 64K RAM parity test failed)	<ol style="list-style-type: none"> 1. DIMM 2. Processor Board 3. System Board
2-1-1 (Secondary DMA register failed)	<ol style="list-style-type: none"> 1. System Board 2. Processor Board
2-1-2 (Primary DMA register failed)	<ol style="list-style-type: none"> 1. System Board 2. Processor Board

Beep/Symptom	FRU/Action
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 2. System Board
2-2-4 (CMOS configuration info validation failed)	1. Battery 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
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 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

Beep/Symptom	FRU/Action
3-3-1 (Memory size mismatch occurred, see "Memory settings" on page 30)	<ol style="list-style-type: none"> DIMM Processor Board Battery
3-3-2 (Critical SMBUS error occurred)	<ol style="list-style-type: none"> Disconnect the server power cord from outlet, wait 30 seconds and retry. Processor Board Memory DIMMs
3-3-3 (No operational memory in system)	<ol style="list-style-type: none"> Install or reseat the memory modules, then do a 3 boot reset (see "Configuration/Setup Utility program" on page 21) DIMMs Memory Board Processor Board System Board
Two Short Beeps (Information only, the configuration has changed)	<ol style="list-style-type: none"> Run Diagnostics Run Configuration/Setup
Three Short Beeps	<ol style="list-style-type: none"> DIMM Processor Board System Board
One Continuous Beep	<ol style="list-style-type: none"> Processor Optional Processor (if installed) Processor Board System Board
Repeating Short Beeps	<ol style="list-style-type: none"> Keyboard System Board
One Long and One Short Beep	<ol style="list-style-type: none"> Video adapter (if present) System Board
One Long and Two Short Beeps	<ol style="list-style-type: none"> Video adapter (if present) System Board
Two Long and Two Short Beeps	<ol style="list-style-type: none"> Video adapter

No beep symptoms

No Beep Symptom	FRU/Action
No beep and the system operates correctly.	<ol style="list-style-type: none"> Check speaker cables Speaker System Board

No Beep Symptom	FRU/Action
<p>No Beeps occur after successfully completing POST (The Power-On Status is disabled.)</p>	<ol style="list-style-type: none"> 1. Run Configuration/Setup, set the Start Options Power-On Status to enable. 2. Check speaker connection. 3. Speaker 4. System Board
<p>No AC power (Power supply AC LED is off)</p>	<ol style="list-style-type: none"> 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
<p>No beep and no video</p>	<ol style="list-style-type: none"> 1. See “Undetermined problems” on page 325.
<p>System will not power-up (Power supply AC LED is on)</p>	<ol style="list-style-type: none"> 1. See “Power supply LED errors” on page 301.

Information panel system error LED

The system error LED is turned 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.

Important

If a diagnostic panel LED is on and the information LED panel system error LED is off, there is probably an LED problem. Run LED diagnostics.

Notes

1. To locate the LEDs on the processor board see "Processor board component locations" on page 254.
2. Check the System Error Log for additional information before replacing a FRU.
3. The memory board DIMM error LEDs, processor error LEDs, and VRM error LEDs turn off when the system is powered down.

Diagnostic Panel LED	FRU/Action
All LEDs off (Check System Error Log for error condition, then clear System Error Log when the problem is found.)	<ol style="list-style-type: none"> 1. System Error Log is 75% full; clear the log 2. PFA alert; power the system off then on 3. Run Information Panel diagnostics
Only CPU LED on (The LED next to the failing CPU should be on.)	<ol style="list-style-type: none"> 1. Processor 1, 2, 3, or 4 2. Processor Board
CPU LED and VRM LED on (The LED next to the failing VRM should be on.)	<ol style="list-style-type: none"> 1. Voltage regulator module indicated by the VRM LED on the processor board that is turned on 2. Processor indicated by the Processor LED. 3. Processor Board
CPU Wrong Slot LED on (CPU and terminator card installation order is wrong.)	<ol style="list-style-type: none"> 1. CPU and terminator card installation order See "Microprocessor installation" on page 238 . 2. Processor(s) 3. Processor Board
DASD 1 LED on (The LED located next to the drive bay that the failing drive is installed in will be turned on.)	<ol style="list-style-type: none"> 1. Failing drive. 2. Be sure the fans are operating correctly and the air flow is good. 3. SCSI Backplane

Diagnostic Panel LED	FRU/Action
DASD 2 LED on (The LED located next to the drive bay that the failing drive is installed in will be turned on.)	<ol style="list-style-type: none"> 1. Failing drive. 2. Be sure the fans are operating correctly and the air flow is good. 3. SCSI Backplane
FAN 1 LED on	<ol style="list-style-type: none"> 1. Fan 1 2. Fan Cable 3. System Board
FAN 2 LED on	<ol style="list-style-type: none"> 1. Fan 2 2. Fan Cable 3. System Board
FAN 3 LED on	<ol style="list-style-type: none"> 1. Fan 3 2. Fan Cable 3. System Board
FAN 4 LED on	<ol style="list-style-type: none"> 1. Fan 4 2. Fan Cable 3. Processor Board
MEM LED on (The LED next to the failing DIMM is on.)	<ol style="list-style-type: none"> 1. Failing DIMM in slot J1, J2, J3, J4, J5, J6, J7, or J8). 2. Memory Board 3. Processor Board
NMI LED on	<ol style="list-style-type: none"> 1. Reboot the system. 2. Check the System Error Log.
PCI 1 LED on	<ol style="list-style-type: none"> 1. PCI Card in slot 5. See "System board component locations" on page 279. 2. System Board 3. Processor Board
PCI 2 LED on	<ol style="list-style-type: none"> 1. Card in slot 1 to 4 See "System board component locations" on page 279. 2. System Board 3. Processor Board
PS1 LED on	<ol style="list-style-type: none"> 1. Check the DC Good LED on power supply 1. If off, replace power supply 1. 2. Power Backplane
PS2 LED on	<ol style="list-style-type: none"> 1. Check the DC Good LED on power supply 2. If off, replace power supply 2. 2. Power Backplane
SMI LED on	<ol style="list-style-type: none"> 1. Reboot the system.

Diagnostic Panel LED	FRU/Action
<p>TEMP LED on</p>	<ol style="list-style-type: none"> 1. Be sure the fans are operating correctly and the air flow is good. 2. Check processor 1 through 4 LEDs. If the CPU LED on the diagnostics panel is also on, one of the microprocessors has caused the error. 3. Be sure the power supply fans are operating correctly and the air flow is good. 4. Processor Board 5. System Board
<p>VRM LED on (Check the VRM (voltage regulator module) LEDs on the processor board.)</p>	<ol style="list-style-type: none"> 1. Voltage regulator module indicated by the VRM LED on the processor board that is turned on 2. Processor for the VRM LED that is turned on. See "Microprocessor installation" on page 238. 3. Processor Board

Diagnostic error codes

Attention

In the following error codes, if *XXX* is *000*, *195*, or *197* **do not** replace a FRU. The description for these error codes are:

- 000** The test passed.
195 The **Esc** key was pressed to abort the test.
197 This is a warning error and may not indicate a hardware failure.

For all error codes, replace/follow the FRU/Action indicated.

Error Code/Symptom	FRU/Action
001-XXX-000 (Failed core tests)	1. System Board
001-XXX-001 (Failed core tests)	1. Processor Board
005-XXX-000 (Failed Video test)	1. System Board 2. Processor Board
011-XXX-000 (Failed COM1 Serial Port test)	1. System Board
011-XXX-001 (Failed COM2 Serial Port test)	1. System Board
014-XXX-000 (Failed Parallel Port test)	1. System Board
015-XXX-001 (Failed USB test)	1. System Board
020-XXX-000 (Failed PCI Interface test)	1. Processor Board 2. System Board
020-XXX-001 (Failed Hot Swap Slot 1 PCI Latch test)	1. PCI Hot Swap Latch Assembly 2. System Board
020-XXX-002 (Failed Hot Swap Slot 2 PCI Latch test)	1. PCI Hot Swap Latch Assembly 2. System Board
020-XXX-003 (Failed Hot Swap Slot 3 PCI Latch test)	1. PCI Hot Swap Latch Assembly 2. System Board
020-XXX-004 (Failed Hot Swap Slot 4 PCI Latch test)	1. PCI Hot Swap Latch Assembly 2. System Board
030-XXX-000 (Failed Internal SCSI interface test)	1. System Board

Error Code/Symptom	FRU/Action
035-XXX-000 <i>DUPLICATE ERROR CODE</i> (Failed System Board RAID test. Check System Error Log before replacing a FRU.)	<ol style="list-style-type: none"> 1. Verify RAID adapter disable jumper block is not installed (see "System board jumpers" on page 280). 2. System Board 3. SCSI Backplane 4. Cable
035-XXX-000 <i>DUPLICATE ERROR CODE</i> (Check System Error Log before replacing a FRU.)	<ol style="list-style-type: none"> 1. Fixed Disk with SCSI ID 00 on System Board RAID controller
035-XXX-0NN (Check System Error Log before replacing a FRU. NN = SCSI ID of failing fixed disk.)	<ol style="list-style-type: none"> 1. Fixed Disk with SCSI ID NN on System Board RAID controller
035-XXX-100 <i>DUPLICATE ERROR CODE</i> (Failed RAID test on PCI slot 1. Check System Error Log before replacing a FRU.)	<ol style="list-style-type: none"> 1. Adapter 2. SCSI Backplane 3. Cable
035-XXX-100 <i>DUPLICATE ERROR CODE</i> (Check System Error Log before replacing a FRU.)	<ol style="list-style-type: none"> 1. Fixed Disk with SCSI ID 00 on RAID adapter in PCI slot 1
035-XXX-1NN (Check System Error Log before replacing a FRU. NN = SCSI ID of failing fixed disk.)	<ol style="list-style-type: none"> 1. Fixed Disk with SCSI ID NN on RAID adapter in PCI slot 1
035-XXX-200 <i>DUPLICATE ERROR CODE</i> (Failed RAID test on PCI slot 2. Check System Error Log before replacing a FRU.)	<ol style="list-style-type: none"> 1. Adapter 2. SCSI Backplane 3. Cable
035-XXX-200 <i>DUPLICATE ERROR CODE</i> (Check System Error Log before replacing a FRU.)	<ol style="list-style-type: none"> 1. Fixed Disk with SCSI ID 00 on RAID adapter in PCI slot 2
035-XXX-2NN (Check System Error Log before replacing a FRU. NN = SCSI ID of failing fixed disk.)	<ol style="list-style-type: none"> 1. Fixed Disk with SCSI ID NN on RAID adapter in PCI slot 2
035-XXX-300 <i>DUPLICATE ERROR CODE</i> (Failed RAID test on PCI slot 3. Check System Error Log before replacing a FRU.)	<ol style="list-style-type: none"> 1. Adapter 2. SCSI Backplane 3. Cable

Error Code/Symptom	FRU/Action
035-XXX-300 <i>DUPLICATE ERROR CODE</i> (Check System Error Log before replacing a FRU.)	1. Fixed Disk with SCSI ID 00 on RAID adapter in PCI slot 3
035-XXX-3NN (Check System Error Log before replacing a FRU. NN = SCSI ID of failing fixed disk.)	1. Fixed Disk with SCSI ID NN on RAID adapter in PCI slot 3
035-XXX-400 <i>DUPLICATE ERROR CODE</i> (Failed RAID test on PCI slot 4. Check System Error Log before replacing a FRU.)	1. Adapter 2. SCSI Backplane 3. Cable
035-XXX-400 <i>DUPLICATE ERROR CODE</i> (Check System Error Log before replacing a FRU.)	1. Fixed Disk with SCSI ID 00 on RAID adapter in PCI slot 4
035-XXX-4NN (Check System Error Log before replacing a FRU. NN = SCSI ID of failing fixed disk.)	1. Fixed Disk with SCSI ID NN on RAID adapter in PCI slot 4
035-XXX-500 <i>DUPLICATE ERROR CODE</i> (Failed RAID test on PCI slot 5. Check System Error Log before replacing a FRU.)	1. Adapter 2. SCSI Backplane 3. Cable
035-XXX-500 <i>DUPLICATE ERROR CODE</i> (Check System Error Log before replacing a FRU.)	1. Fixed Disk with SCSI ID 00 on RAID adapter in PCI slot 5
035-XXX-5NN (Check System Error Log before replacing a FRU. NN = SCSI ID of failing fixed disk.)	1. Fixed Disk with SCSI ID NN on RAID adapter in PCI slot 5
075-XXX-000 (Failed Power Supply test)	1. Power Supply
089-XXX-001 (Failed Microprocessor test)	1. VRM 1 or VRM 2 2. Microprocessor CPU 1
089-XXX-002 (Failed Microprocessor test)	1. VRM 3 or VRM 2 2. Microprocessor CPU 2
089-XXX-003 (Failed Microprocessor test)	1. VRM 4 or VRM 5 2. Microprocessor CPU 3
089-XXX-004 (Failed Microprocessor test)	1. VRM 6 or VRM 5 2. Microprocessor CPU 4

Error Code/Symptom	FRU/Action
165-XXX-000 (Failed System Board test)	<ol style="list-style-type: none"> 1. System Board Before replacing the system board, ensure that system board jumper J51 is not installed (the default) when the error occurs. 2. Processor Board 3. Power Backplane 4. Hot-Swap Drive Backplane
180-XXX-000 (Diagnostics LED failure)	<ol style="list-style-type: none"> 1. Run Diagnostic LED test for the failing LED
180-XXX-001 (Failed information LED panel test)	<ol style="list-style-type: none"> 1. Information LED Panel 2. Power Switch Assembly
180-XXX-002 (Failed Diagnostics LED Panel test)	<ol style="list-style-type: none"> 1. Diagnostics LED Panel 2. Power Switch Assembly
180-XXX-003 (Failed System Board LED test)	<ol style="list-style-type: none"> 1. Run hot-swap PCI latch test in Other Devices under Extended Tests 2. System Board
180-XXX-004 (Failed Processor Board LED test)	<ol style="list-style-type: none"> 1. Processor Board 2. System Board
180-XXX-005 (Failed SCSI Backplane LED test)	<ol style="list-style-type: none"> 1. SCSI Backplane 2. SCSI Backplane Cable 3. System Board
201-XXX-001 (Failed Memory test, see"Memory settings" on page 30)	<ol style="list-style-type: none"> 1. DIMM Location J1
201-XXX-002 (Failed Memory test, see"Memory settings" on page 30)	<ol style="list-style-type: none"> 1. DIMM Location J2
201-XXX-003 (Failed Memory test, see"Memory settings" on page 30)	<ol style="list-style-type: none"> 1. DIMM Location J3
201-XXX-004 (Failed Memory test, see"Memory settings" on page 30)	<ol style="list-style-type: none"> 1. DIMM Location J4
201-XXX-005 (Failed Memory test, see"Memory settings" on page 30)	<ol style="list-style-type: none"> 1. DIMM Location J5

Error Code/Symptom	FRU/Action
201-XXX-006 (Failed Memory test, see "Memory settings" on page 30)	1. DIMM Location J6
201-XXX-007 (Failed Memory test, see "Memory settings" on page 30)	1. DIMM Location J7
201-XXX-008 (Failed Memory test, see "Memory settings" on page 30)	1. DIMM Location J8
201-XXX-999 (Multiple DIMM failure, see error text.)	1. See error text for failing DIMMs
202-XXX-001 (Failed System Cache test)	1. VRM 2 or VRM 1 2. Microprocessor CPU 1
202-XXX-002 (Failed System Cache test)	1. VRM 2 or VRM 3 2. Microprocessor CPU 2
202-XXX-003 (Failed System Cache test)	1. VRM 5 or VRM 4 2. Microprocessor CPU 3
202-XXX-004 (Failed System Cache test)	1. VRM 5 or VRM 6 2. Microprocessor CPU 4
206-XXX-000 (Failed Diskette Drive test)	1. Cable 2. Diskette Drive 3. System Board
215-XXX-000 (Failed IDE CD-ROM test)	1. CD-ROM Drive Cables 2. CD-ROM Drive 3. System Board
217-XXX-000 (Failed BIOS Fixed Disk test) Note If RAID is configured, the fixed disk number refers to the RAID logical array.	1. Fixed Disk 1
217-XXX-001 (Failed BIOS Fixed Disk test) Note If RAID is configured, the fixed disk number refers to the RAID logical array.	1. Fixed Disk 2

Error Code/Symptom	FRU/Action
<p>217-XXX-002 (Failed BIOS Fixed Disk test)</p> <p>Note</p> <p>If RAID is configured, the fixed disk number refers to the RAID logical array.</p>	<p>1. Fixed Disk 3</p>
<p>217-XXX-003 (Failed BIOS Fixed Disk test)</p> <p>Note</p> <p>If RAID is configured, the fixed disk number refers to the RAID logical array.</p>	<p>1. Fixed Disk 4</p>
<p>217-XXX-004 (Failed BIOS Fixed Disk test)</p> <p>Note</p> <p>If RAID is configured, the fixed disk number refers to the RAID logical array.</p>	<p>1. Fixed Disk 5</p>
<p>217-XXX-005 (Failed BIOS Fixed Disk test)</p> <p>Note</p> <p>If RAID is configured, the fixed disk number refers to the RAID logical array.</p>	<p>1. Fixed Disk 6</p>
<p>264-XXX-0NN (NN = SCSI ID of failing Tape Drive)</p>	<ol style="list-style-type: none"> 1. Tape Cartridge, if user executed the Read/Write Tape Drive test (XXX = 256) 2. SCSI or Power Cable connected to tape drive with SCSI ID NN. 3. Tape Drive with SCSI ID NN. 4. System board or SCSI Controller. (Run SCSI Controller Diagnostic to determine if the SCSI bus is functioning properly.)

Error Code/Symptom	FRU/Action
264-XXX-999 (Errors on multiple tape drives, see error text for more info)	1. See error messages/text in the error log for detailed information on each individual tape drive error.
301-XXX-000 (Failed Keyboard test)	1. Keyboard
405-XXX-000 (Failed Ethernet test on controller on the system board)	1. Verify that the ethernet disable jumper is not installed (see “System board jumpers” on page 280). 2. System Board
405-XXX-00N (Failed Ethernet test on adapter in PCI slot N)	1. Adapter in PCI slot N 2. System Board
415-XXX-000 (Failed Modem test)	1. Cable 2. Modem 3. System Board

Error symptoms

Error Symptom	FRU/Action
CD is not working properly.	<ol style="list-style-type: none"> 1. Clean the CD 2. CD-ROM Drive
CD-ROM drive tray is not working. (The server must be powered-on.)	<ol style="list-style-type: none"> 1. Insert the end of a paper clip into the manual tray-release opening. 2. CD-ROM Drive
CD-ROM drive is not recognized.	<ol style="list-style-type: none"> 1. Run Configuration/Setup, enable primary IDE channel. 2. Check cables and jumpers. 3. Check for correct device driver.
Power switch does not work and reset button does work.	<ol style="list-style-type: none"> 1. Verify that the power-on control jumper on J32's extension cable is on pins 1 and 2. 2. Power Switch Assembly 3. System Board
Diskette drive in-use light stays on, or the system bypasses the diskette drive, or the diskette drive does not work.	<p>If there is a diskette in the drive, verify that:</p> <ol style="list-style-type: none"> 1. The diskette drive is enabled in the configuration 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. 6. Run Diskette Drive Diagnostics. 7. Cable 8. Diskette Drive 9. System Board
Monitor problems (general) Some IBM monitors have their own self-tests. If you suspect a problem with the monitor, refer to the information that comes with the monitor for adjusting and testing instructions.	<ol style="list-style-type: none"> 1. Monitor 2. Run Video Diagnostics. If diagnostics pass, the problem may be a video driver. 3. 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

System Board (With pins 2 and 3 on J32's extension cable connected together to bypass the power switch; see "System board component locations" on page 279.)

Processor Board (Verify that the J32, J33, and J35 connectors are installed correctly; see "Processor board component locations" on page 254.)

Table 19 (Page 1 of 2). Power supply LED errors

AC Good LED	DC Good LED	Description	FRU/Action
Off	Off	No power to system or AC problem.	Check AC power to system 1. Power Supply 2. Power Backplane 3. Power AC Inlet Box

Table 19 (Page 2 of 2). Power supply LED errors

AC Good LED	DC Good LED	Description	FRU/Action
On	Off	Standby mode or DC problem.	<p>1. Check processor board cable connectors J32, J33, and J35.</p> <p>2. Move jumper on J32's extension cable to pins 2-3 to bypass power control. If the DC Good LED comes on, press Ctrl+Alt+Delete. Watch the screen for any POST errors. Check the System Error Log for any listed problems.</p> <p>If the system powers up with no errors:</p> <ol style="list-style-type: none"> Power Switch Assembly System Board <p>3. 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.</p> <ol style="list-style-type: none"> Power Supply Power Backplane System Board 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.)	<ol style="list-style-type: none"> 1. Run Configuration/Setup 2. Battery 3. System Board
101, 102 (System and processor error)	<ol style="list-style-type: none"> 1. System Board 2. Processor Board
106 (System and processor error)	<ol style="list-style-type: none"> 1. System Board 2. Processor Board
111 (Channel check error)	<ol style="list-style-type: none"> 1. Failing ISA Adapter 2. Memory DIMM 3. System Board
114 (Adapter read-only memory error)	<ol style="list-style-type: none"> 1. Failing Adapter 2. Run Diagnostics
129 (Internal Cache error)	<ol style="list-style-type: none"> 1. Processor 2. Optional Processor (if installed) 3. Processor Board
151 (Real time clock error)	<ol style="list-style-type: none"> 1. Run Diagnostics 2. Battery 3. System Board
161 (Real time clock battery error)	<ol style="list-style-type: none"> 1. Run Configuration/Setup 2. Battery 3. System Board
162 (Device Configuration Error) <div style="border: 1px solid black; padding: 5px; margin-top: 5px;"> <p style="text-align: center;">Important</p> <p>Be sure to load the default settings and any additional desired settings; then, save the configuration.</p> </div>	<ol style="list-style-type: none"> 1. Run Configuration/Setup 2. Battery 3. Failing Device 4. System Board
163 (Real-Time Clock error)	<ol style="list-style-type: none"> 1. Run Configuration/Setup 2. Battery 3. System Board
164 (Memory configuration changed, see "Memory settings" on page 30)	<ol style="list-style-type: none"> 1. Run Configuration/Setup 2. DIMM 3. Processor Board
175 (Hardware error)	<ol style="list-style-type: none"> 1. System Board 2. Processor Board
176 (Computer cover or cable cover was removed without a key being used)	<ol style="list-style-type: none"> 1. Run Configuration/Setup 2. System Board

Error Code/Symptom	FRU/Action
177, 178 (Security hardware error)	<ol style="list-style-type: none"> 1. Run Configuration/Setup 2. System Board
184 (Power-on password corrupted)	<ol style="list-style-type: none"> 1. Run Configuration/Setup 2. System Board
185 (Drive startup sequence information corrupted)	<ol style="list-style-type: none"> 1. Run Configuration/Setup 2. System Board
186 (Security hardware control logic failed)	<ol style="list-style-type: none"> 1. Run Configuration/Setup 2. System Board
187 (VPD serial number not set.)	<ol style="list-style-type: none"> 1. Set serial number in Setup 2. System Board
188 (Bad EEPROM CRC #2)	<ol style="list-style-type: none"> 1. Run Configuration/Setup 2. System Board
189 (An attempt was made to access the server with invalid passwords)	<ol style="list-style-type: none"> 1. Run Configuration/Setup, enter the administrator password
201 (Memory test error, see "Memory settings" on page 30) If your server does not have the latest level of BIOS installed, update the BIOS to the latest level and run the diagnostic program again.	<ol style="list-style-type: none"> 1. DIMM 2. Processor Board 3. System Board
229 (Cache error)	<ol style="list-style-type: none"> 1. Processor 2. Optional Processor (if installed) 3. Processor Board
262 (DRAM parity configuration error)	<ol style="list-style-type: none"> 1. Run Configuration/Setup 2. Battery 3. System Board
289 (DIMM has been disabled the user or system, see "Memory settings" on page 30)	<ol style="list-style-type: none"> 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)	<ol style="list-style-type: none"> 1. Keyboard 2. System Board
303 (Keyboard controller error)	<ol style="list-style-type: none"> 1. Keyboard 2. System Board

Error Code/Symptom	FRU/Action
602 (Invalid diskette boot record)	<ol style="list-style-type: none"> 1. Diskette 2. Diskette Drive 3. Cable
604 (Diskette drive error)	<ol style="list-style-type: none"> 1. Run Configuration/Setup and Diagnostics 2. Diskette Drive 3. Drive Cable 4. System Board
605 (Unlock failure)	<ol style="list-style-type: none"> 1. Diskette Drive 2. Drive Cable 3. System Board
662 (Diskette drive configuration error)	<ol style="list-style-type: none"> 1. Run Configuration/Setup and Diagnostics 2. Diskette Drive 3. Drive Cable 4. System Board
762 (Coprocessor configuration error)	<ol style="list-style-type: none"> 1. Run Configuration/Setup 2. Battery 3. Processor
962 (Parallel port error)	<ol style="list-style-type: none"> 1. Disconnect external cable on parallel port. 2. Run Configuration/Setup 3. System Board
11XX (System board serial port 1 or 2 error)	<ol style="list-style-type: none"> 1. Disconnect external cable on serial port. 2. Run Configuration/Setup 3. System Board
0001200 (Machine check architecture error)	<ol style="list-style-type: none"> 1. Processor 2. Optional Processor 3. Processor Board
000120P0, 000120P1, 000120P2, 000120PF (Processor cache error)	<ol style="list-style-type: none"> 1. Failing Processor 2. Processor Board
1301 (I ² C cable to front panel not found)	<ol style="list-style-type: none"> 1. Cable. 2. Front Panel 3. Power Switch Assembly 4. System Board
1302 (I ² C cable from system board to power on and reset switches not found)	<ol style="list-style-type: none"> 1. Cable. 2. Power Switch Assembly 3. System Board
1303 (I ² C cable from system board to power backplane not found)	<ol style="list-style-type: none"> 1. Cable. 2. Power Backplane 3. System Board

Error Code/Symptom	FRU/Action
<p>1304 (I²C cable to diagnostic LED board not found)</p>	<ol style="list-style-type: none"> 1. Cable. 2. Diagnostic LED Board 3. Power Switch Assembly 4. System Board
<p>1600 (The Service Processor is not functioning) Do the following before replacing a FRU:</p> <ol style="list-style-type: none"> 1. Ensure that a jumper is not installed on J51. 2. Remove the AC power to the system, wait 20 seconds; then, re-connect the AC power. Wait 30 seconds; then, power-on the system. 	<ol style="list-style-type: none"> 1. System Board 2. Processor Board
<p>1601 (The system is able to communicate to the Service Processor, but the Service Processor failed to respond at the start of POST.) Do the following before replacing a FRU:</p> <ol style="list-style-type: none"> 1. Remove the AC power to the system, wait 20 seconds; then, re-connect the AC power. Wait 30 seconds; then, power-on the system. 2. Flash update the Service Processor. 	<ol style="list-style-type: none"> 1. System Board 2. Processor Board
<p>16XX (There is an error with the Service Processor.) Do the following before replacing a FRU:</p> <ol style="list-style-type: none"> 1. Remove the AC power to the system, wait 20 seconds; then, re-connect the AC power. Wait 30 seconds; then, power-on the system. 2. Flash update the Service Processor. 	<ol style="list-style-type: none"> 1. System Board
<p>1762 (Fixed Disk Configuration error)</p>	<ol style="list-style-type: none"> 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)	<ol style="list-style-type: none"> 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)	<ol style="list-style-type: none"> 1. Run Configuration/Setup 2. Failing Adapter 3. System Board
1962 (Drive does not contain a valid boot sector)	<ol style="list-style-type: none"> 1. Verify a bootable operating system is installed 2. Run Diagnostics 3. Hard Disk Drive 4. SCSI Backplane 5. Cable 6. System Board
2400 (Video controller test failure)	<ol style="list-style-type: none"> 1. Video Adapter (if installed) 2. System Board
2462 (Video memory configuration error)	<ol style="list-style-type: none"> 1. Video Adapter (if installed) 2. System Board
5962 (IDE CD-ROM configuration error)	<ol style="list-style-type: none"> 1. Run Configuration/Setup 2. CD-ROM Drive 3. CD-ROM Power Cable 4. IDE Cable 5. System Board 6. Battery
8603 (Pointing Device Error)	<ol style="list-style-type: none"> 1. Pointing Device 2. System Board
00019501 (Processor 1 is not functioning - check VRM and processor LEDs)	<ol style="list-style-type: none"> 1. VRM 1, VRM 2 2. Processor 1 3. Processor Board 4. System Board
00019502 (Processor 2 is not functioning - check VRM and processor LEDs)	<ol style="list-style-type: none"> 1. VRM 2, VRM3 2. Processor 2 3. Processor Board 4. System Board
00019503 (Processor 3 is not functioning - check VRM and processor LEDs)	<ol style="list-style-type: none"> 1. VRM 4, VRM 5 2. Processor 3 3. Processor Board 4. System Board
00019504 (Processor 4 is not functioning - check VRM and processor LEDs)	<ol style="list-style-type: none"> 1. VRM 5, VRM 6 2. Processor 4 3. Processor Board 4. System Board
00019701 (Processor 1 failed BIST)	<ol style="list-style-type: none"> 1. Processor 1 2. Processor Board 3. System Board

Error Code/Symptom	FRU/Action
00019702 (Processor 2 failed BIST)	<ol style="list-style-type: none"> 1. Processor 2 2. Processor Board 3. System Board
00019703 (Processor 3 failed BIST)	<ol style="list-style-type: none"> 1. Processor 3 2. Processor Board 3. System Board
00019704 (Processor 4 failed BIST)	<ol style="list-style-type: none"> 1. Processor 4 2. Processor Board 3. System Board
00180100 (No room for PCI option ROM)	<ol style="list-style-type: none"> 1. Run Configuration/Setup 2. Failing Adapter 3. System Board
00180200 (No more I/O space available for PCI adapter)	<ol style="list-style-type: none"> 1. Run Configuration/Setup 2. Failing Adapter 3. System Board
00180300 (No more memory (above 1MB for PCI adapter)	<ol style="list-style-type: none"> 1. Run Configuration/Setup 2. Failing Adapter 3. System Board
00180400 (No more memory (below 1MB for PCI adapter)	<ol style="list-style-type: none"> 1. Run Configuration/Setup 2. Move the failing adapter to slot 1 or 2 3. Failing Adapter 4. System Board
00180500 (PCI option ROM checksum error)	<ol style="list-style-type: none"> 1. Remove Failing PCI Card 2. System Board
00180600 (PCI to PCI Bridge error)	<ol style="list-style-type: none"> 1. Run Configuration/Setup 2. Move the failing adapter to slot 1 or 2 3. Failing Adapter 4. System Board
00180700, 00180800, 00181000 (General PCI error)	<ol style="list-style-type: none"> 1. System Board 2. PCI Card
01295085 (ECC checking hardware test error)	<ol style="list-style-type: none"> 1. Processor Board 2. Processor
01298001 (No update data for processor 1)	<ol style="list-style-type: none"> 1. Ensure all processors are the same stepping level and cache size. 2. Processor 1
01298002 (No update data for processor 2)	<ol style="list-style-type: none"> 1. Ensure all processors are the same stepping level and cache size. 2. Processor 2

Error Code/Symptom	FRU/Action
01298003 (No update data for processor 3)	<ol style="list-style-type: none"> 1. Ensure all processors are the same stepping level and cache size. 2. Processor 3
01298004 (No update data for processor 4)	<ol style="list-style-type: none"> 1. Ensure all processors are the same stepping level and cache size. 2. Processor 4
01298101 (Bad update data for processor 1)	<ol style="list-style-type: none"> 1. Ensure all processors are the same stepping level and cache size. 2. Processor 1
01298102 (Bad update data for processor 2)	<ol style="list-style-type: none"> 1. Ensure all processors are the same stepping level and cache size. 2. Processor 2
01298103 (Bad update data for processor 3)	<ol style="list-style-type: none"> 1. Ensure all processors are the same stepping level and cache size. 2. Processor 3
01298104 (Bad update data for processor 4)	<ol style="list-style-type: none"> 1. Ensure all processors are the same stepping level and cache size. 2. Processor 4
I9990301 (Fixed boot sector error)	<ol style="list-style-type: none"> 1. Hard Disk Drive 2. SCSI Backplane 3. Cable 4. System Board
I9990305 (Fixed boot sector error, no operating system installed)	<ol style="list-style-type: none"> 1. Install operating system to hard disk drive.
I9990650 (AC power has been restored)	<ol style="list-style-type: none"> 1. Check cable 2. Check for interruption of power supply 3. Power Cable

SCSI error codes

Error Code	FRU/Action
<p>All SCSI Errors One or more of the following might be causing the problem:</p> <ul style="list-style-type: none">• A failing SCSI device (adapter, drive, controller)• An improper SCSI configuration or SCSI termination jumper setting• Duplicate SCSI IDs in the same SCSI chain• A missing or improperly installed SCSI terminator• A defective SCSI terminator• An improperly installed cable• A defective cable	<ol style="list-style-type: none">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 controller error codes/messages

The error codes/messages are displayed on the screen in a line of text immediately after the controller BIOS version.

If POST detects changes in the controller configuration or detects an controller hardware problem, messages appear on the screen. Refer to “ServeRAID POST error procedures” on page 314 and correct the problem.

If there is no POST Error or Configuration Error message, the BIOS screen resembles the sample shown below. Please note that your version may be different from the one shown.

```
IBM ServeRAID BIOS
Copyright IBM Corp. 1995,1998
Ver: 3.00.12      08/14/1998

** Press Ctrl+I to access the Mini-Configuration Program. **

Initializing ServeRAID Controller 1 in Slot 1.
Power-on self-test can take up to 59 Second(s) -- test Passed.
Drive configuration can take up to 6 Minute(s) 0 Second(s) -- test Passed.
ServeRAID Firmware Version:2.82.00
No logical drives found; none are installed.
Non-Disk SCSI Devices Found: CD-ROM 0, Tape 0, Removable-media 0, Other 1.

BIOS not loaded no devices found - Installation stopped.
```

If there is a POST Error message, the BIOS screen resembles the sample shown below. Refer to “ServeRAID POST error codes” on page 314 and correct the problem. The characters XXXX indicate the POST (ISPR) error.

```
IBM ServeRAID BIOS
Copyright IBM Corp. 1995,1998
Ver: 3.00.12      08/14/1998

** Press Ctrl+I to access the Mini-Configuration Program. **

Initializing ServeRAID Controller 1 in Slot 1.
Power-on self-test can take up to 59 Second(s) -- test Failed.
Controller is not responding properly - Run Diagnostics.
Error Code: XXXX-YY

BIOS not loaded no devices found - Installation stopped.
```

The BIOS screen below shows Configuration Status and/or Error information. Refer to “ServeRAID Startup Messages” on page 318.

IBM ServeRAID BIOS
Copyright IBM Corp. 1995,1998
Ver: 3.00.12 08/14/1998

« Press Ctrl+I to access the Mini-Configuration Program. »
Initializing ServeRAID Controller 1 in Slot 1.
Power-on self-test can take up to 59 Second(s) -- test Passed.
Drive configuration-can take up to 6 Minute(s) 0 Second(s) -- test Failed.
Controller POST and Config Error Codes: ISPR = EF10 BCS = 09 ECS = 20.
Following drives not responding(old state: new state: ch SID)
(RDY:EMP: 2:0)
Your system has a configuration error due to above condition(s).
Press: F4 - Retry the command
F5 - Update Controller configuration to exclude NON-RESPONDING drives
Warning:NON-RESPONDING drives will be set to DDD, DHS, or EMP state
F10 - Exit without change

Note

Do not replace a system board containing an imbedded ServeRAID controller for ServeRAID problems unless replacing the controller is listed in the Symptom-to-FRU Index.

ServeRAID POST error codes

The ISPR (Interrupt Status Port Register), BCS (Basic Configuration Status), and ECS (Extended Configuration Status) codes identify the controller state.

Note

Do not replace a system board containing an imbedded ServeRAID controller unless such a replacement is indicated in the recommended Actions in an error code list that appears in "Symptom-to-FRU index" on page 285.

ServeRAID POST error procedures

The ISPR Error Procedures list errors, symptoms, and the possible causes. The most probable cause is listed first. Use these procedures to help you solve ServeRAID problems when servicing the computer.

Note

Where the ISPR Error Procedures refer to a SCSI backplane, see the Hardware Maintenance Manual for the system you are servicing.

EF10 (Default ISPR)

1. No ISPR Error Present.

1XXX (Microcode Checksum Error)

1. Replace the ServeRAID controller.

2XXX thru 5XXX (Code DRAM Error)

1. Install two download jumpers parallel to the PCI slots. For jumper locations, see "System board jumpers" on page 280.
2. Flash the controller with the latest IBM ServeRAID BIOS/Firmware from the IBM Website.
3. Remove the jumpers.
4. If the error persists, replace ServeRAID controller.

6XXX (Cache DRAM Error)

1. Reseat Cache Memory SIMM
2. Install two download jumpers parallel to the PCI slots. For jumper locations, see "System board jumpers" on page 280.
3. Flash the controller with the latest IBM ServeRAID BIOS/Firmware from the IBM Website.
4. Remove the jumpers.
5. If the error persists, replace ServeRAID controller.

7XXX thru 8XXX (Host/Local PCI Bus Interface Error)

1. Install two download jumpers parallel to the PCI slots. For jumper locations, see "System board jumpers" on page 280.

2. Flash the controller with the latest IBM ServeRAID BIOS/Firmware from the IBM Website.
3. Remove the jumpers.
4. If the error persists, replace ServeRAID controller.

9XXX thru BXXX (SCSI bus error caused either by defective drives, termination, etc.)

1. Isolate between SCSI subsystem and controller by disconnecting all SCSI cables from suspect card, and reboot.

CAUTION:

Do not press F5. Doing so changes the customer's configuration.

If an ISPR error is still present, perform the following actions until the error is no longer present:

- a. Reseat the controller
- b. Replace the controller

Note

1. Refer to the HMM (Hardware Maintenance Manual) specific to the system comprising the SCSI channel for SCSI cable details.
2. The controller detects a configuration change. **Do not** choose **Save Changes**. Instead, press **F10** to bypass any options to this effect.

2. If ISPR error is **EF10** after disconnecting cables:
 - a. Identify which channel is causing the error by the second digit of the original ISPR code:
 - ISPR = B1xx = Channel 1
 - ISPR = B2xx = Channel 2
 - ISPR = B3xx = Channel 1 and 2
 - ISPR = B4xx = Channel 3
 - ISPR = B5xx = Channel 1 and 3
 - ISPR = B6xx = Channel 2 and 3
 - ISPR = B7xx = Channel 1, 2 and 3
 - ISPR = BFxx = Channel not identified
 - b. Confirm that the channel(s) identified from the error in step 2a is(are) the cause of the error by verifying that the error presents itself **ONLY** when the offending channel is reconnected.
 - c. Check termination of identified channel.

Note

Refer to the HMM (Hardware Maintenance Manual) specific to the system comprising the SCSI channel for termination details.

- d. Check for proper backplane jumper configuration.

Note

Refer to the HMM (Hardware Maintenance Manual) specific to the system comprising the SCSI channel for jumper details.

- e. Check for proper cabling configuration in systems that use DASD status cables. Reconnect all cables removed in step 1 above.
- f. Disconnect one drive at a time attached to the channel identified in step 2a, then reboot to determine which drive is causing the error.
- g. Replace SCSI cable.
- h. Replace SCSI backplane.

EF10 (Default ISPR)

1. No ISPR error present.
2. Controller is probably functioning properly. **Do not** replace system board unless you have run the controller's diagnostics and you get an error message. If you do not get an error message, assume it is functioning properly.
3. Refer to "ServeRAID Startup Messages" on page 318. Note the resulting BCS and or ECS Error codes, and see the FRU actions respective to those codes. (EF10 is a default code for ISPR indicating that there is no ISPR error present.)

EF10 (Firmware code corrupted or download jumpers are in place.)

1. Verify download jumpers are in their default locations. See "System board jumpers" on page 280 for jumper locations.
2. If download jumpers are **not** in place and error still persists, then flash the controller firmware **with** the jumpers in place; then remove the jumpers.
3. If error persists after step 2, replace the controller or the system board with integrated controller.

FFFF or other code not listed

1. Isolate between SCSI subsystem and controller by disconnecting all SCSI cables attached to the suspect controller and reboot. If ISPR code is **EF10** 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. Check termination of identified channel in step 1a.

Note

Refer to the HMM (Hardware Maintenance Manual) specific to the system comprising the SCSI channel for termination details.

- c. Disconnect one drive at a time attached to channel identified in step 1a and reboot each time to determine which drive is causing the problem.
 - d. Replace SCSI Cable attached to channel identified in step 1a.
 - e. Replace Backplane attached to channel identified in step 1a.
2. If original ISPR code is still present after disconnecting all SCSI cables and rebooting, perform the following actions until the error is no longer present:
- Reseat the controller
 - Replace the controller

ServeRAID Startup Messages

During power-on self-test (POST), the ServeRAID adapter or controller compares the stored configuration information to the configuration that is actually present. If a discrepancy exists, one or more status messages appear after POST completes but before the operating system loads.

Notes

1. When the ServeRAID adapter or controller requires your input, a list of function keys will appear below the message.
2. Where the *Action* information tells you to start the IBM ServeRAID configuration program, insert the IBM ServeRAID Configuration Utility Diskette or CD into the appropriate drive; then, restart the server. The *Action* information also provides general information about the message.
3. Where *SID* and *ch* appear in these messages, *SID* shows the SCSI ID for the device and *ch* shows the channel to which the device is attached.
4. Where *m* or *n* appears in these messages, a number will appear in the actual message.

The following is a list of messages associated with the ServeRAID subsystem.

Auto rearrange

Explanation: Auto rearrange is enabled or disabled.

Action: This is an information message. No action is required.

Following drives not responding (old state: new state: ch: SID)

Explanation: One or more drives did not respond to the ServeRAID controller. This may occur if configured drives are missing or are not ready.

Where: old state is the configured state of the drive.
new state is the state that the ServeRAID adapter or controller will assign to the drive.
ch is the channel where the drive was located previously.
SID is the SCSI ID for where the drive was located previously.

Examples of the possible state changes include:

Online to Defunct	(ONL: DDD: x: y)
Ready to Empty	(RDY: EMP: x: y)
Standby to Empty	(SBY: EMP: x: y)
Rebuild to Defunct	(RBL: DDD: x: y)
Hot-Spare to Defunct	(HSP: DHS: x: y)
Standby Hot-Spare to Defunct	(SHS: DHS: x: y)

Action: Press one of the following keys:

- F4** Retry. Press this key after correcting a problem. For example, press **F4** after you turn on the external storage enclosure that contains the hard disk drive.
- F5** Accept. Press this key to accept the new state that the ServeRAID adapter or controller will assign to the drive. For example, the ServeRAID adapter or controller will assign the drive a state of defunct (DDD) or empty (EMP).
- You can also press **F5** when you must remove a drive, RAID level-1 and RAID level-5 logical drives are present, and performance in a degraded mode is acceptable. The ServeRAID adapter or controller will assign the drive a state of defunct (DDD), but the server can complete startup. However, the array will remain in *Critical* mode and the potential for data loss will exist until you replace and rebuild the defunct drive. To prevent the loss of data, replace and rebuild the defunct drive in a timely manner.

Note

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 properly to the backplane and to the hard disk drive. Also, ensure that all cables inside the server are connected properly.
2. The hot-swap drive trays are seated properly in the drive bay.
3. If you have not already attempted to rebuild the drive, try rebuilding it.

After you perform these steps, if the hard disk drive does not function properly, replace the drive.

- F10** Continue. Press this key to continue without change to the configuration.

Following new drives found (old state: new state: ch: SID)

Explanation: The ServeRAID adapter or controller detects a new drive that is not part of the current configuration.

Action: This is an information message. No action is required.

— or —

Following new drives found: (host id: old ch: old SID > new ch: new SID)

Explanation: New controller installed in a configured server, or drives are imported. This message might be preceded by the previous two messages and the **F5** and **F6** key choices because the drives were not found in the configured location. Appears when the ServeRAID adapter or controller detects that the identifiers of the drives do not match the controller configuration information.

Where: host id identifies the System Name where the ServeRAID adapter or controller resides.
old ch is the channel that matches the drive configuration information.
old SID is the SCSI ID that matches the drive configuration information.
new ch is the channel where the drive is now located.

new SID is the SCSI ID where the drive is now located.

For example, when drives are imported from a server with the System Name of *My Machine*: (My Machine: 1:6 > 1:10)

In this example, the message indicates that the drive from Channel 1, SCSI ID 6 is now located at Channel 1, SCSI ID 10. The drive might have been physically moved to a new drive bay.

Action: Press one of the following keys:

- F4** Retry. Press this key after correcting the problem. For example, press **F4** after you move the hard disk drive to its previously assigned location, or after you install the original hard disk drives back in the server.
- F5** Accept. Press this key to accept the new state that the ServeRAID adapter or controller will assign to the drive. For example, the ServeRAID adapter or controller will assign the drive a state of defunct (DDD) or empty (EMP).

Note

A hard disk drive in the defunct state does not necessarily mean that you need to replace the drive. Before you replace the drive, ensure that:

1. All cables are connected properly to the backplane or system board, and to the hard disk drive. Also, ensure that all cables inside the server are connected properly.
2. The hot-swap drive trays are seated properly in the drive bay.
3. If you have not already attempted to rebuild the drive, try rebuilding it.

After you perform these steps, if the hard disk drive does not function properly, replace the drive.

- F6** Modify. This choice is not always active. Press this key to modify the configuration to match the current drive location.

You might remove the hot-swap drives from the server for security or maintenance reasons. If you replace the drives but install them in different drive bays, you can press **F6** to accept the new locations, and the ServeRAID adapter or controller will update the configuration.

- F7** Import. Press this key to import the configuration information from the drive and to update the configuration information for the ServeRAID adapter or controller. This choice is useful when you replace the ServeRAID adapter or controller in an existing ServeRAID subsystem.

You also might press **F7** if you replace a whole set of drives with drives that were configured in another server with a ServeRAID adapter or controller.

Note

When you install drives in a server that has no logical drives defined, the **F7** choice will not appear. The ServeRAID adapter or controller does not contain any logical drives in its factory configuration. Therefore, **F7** will not appear. In this case, do the following:

1. Restart the server and press **Ctrl+I** to enter the Mini-Configuration program.
2. Select **Advanced Functions**.
3. Select **Import Configuration from Drives to Controller** and follow the instructions on the screen.

Controller is not responding to commands. No logical drives are installed.

Explanation: The ServeRAID adapter or controller is not operational.

Action: Reseat the controller. If problem persists, replace the ServeRAID controller.

Error: Cannot disable this controller BIOS.

Explanation: The ServeRAID adapter or controller was unable to prevent an extra copy of its BIOS code from being stored on the server. This condition occurs when the server contains multiple ServeRAID controllers or controllers.

Action: This is an information message. No action is required.

Following drives found in new location (old ch: old SID >
new ch: new SID)

Explanation: Configured drives are not in the configured location. This message will be preceded by the previous messages and the **F5** key choice because configured drives were not found in the configured location. Appears when the ServeRAID adapter or controller detects that a previously configured drive is present, but the drive is in a new location.

Where: old ch is the channel that matches the existing drive configuration information.
old SID is the SCSI ID that matches the existing drive configuration information.
new ch is the channel where the drive is now located.
new SID is the SCSI ID where the drive is now located.

For example:

(1:5 > 1:14)

In this example, the message indicates that the drive from Channel 1, SCSI ID 5 is now located at Channel 1, SCSI ID 14. The drive might have been physically moved to the new drive bay.

Action: Press one of the following keys:

F4 Retry. Press this key after correcting a problem. For example, press **F4** after you move the hard disk drive to its previously assigned location.

F5 Accept. Press this key to accept the new state that the ServeRAID adapter or controller will assign to the drive. For example, the ServeRAID adapter or controller will assign the drive a state of defunct (DDD) or empty (EMP).

Note

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 properly to the backplane and to the hard disk drive. Also, ensure that all cables inside the server are connected properly.
2. The hot-swap drive trays are seated properly in the drive bay.
3. If you have not already attempted to rebuild the drive, try rebuilding it.

After you perform these steps, if the hard disk drive does not function properly, replace the drive.

F6 Modify. Press this key to modify the configuration to match the current drive location.

You might remove the hot-swap drives from the server for security or maintenance reasons. If you replace the drives but install them in different drive bays, you can press **F6** to accept the new locations, and the ServeRAID adapter or controller will update the configuration.

Installation stopped.

Explanation: The server cannot access the ServeRAID adapter or controller.

Action: This is a follow-on message to a preceding message. Follow the "Action" instructions for the preceding message to resolve the problem.

n logical drives are installed.

Explanation: *n* represents the number of defined logical drives.

Action: This is an information message. No action is required.

NVRAM Cache Controller Not Responding

Explanation: BIOS code detected a bad or failed Battery-Backup.

Action: Press **F9** to remove the Battery-Backup Cache controller from the configuration, or press **F10** to exit without change.

NVRAM Cache Controller Replacement

Explanation: The ServeRAID controller detects that the Battery-Backup Cache controller is defective.

Action: Press **F8** if you replaced the Battery-Backup Cache controller, or press **F10** if you have not replaced the Battery-Backup Cache controller.

Recoverable configuration error

Explanation: The configuration data stored in NVRAM (Battery-Backup Cache) does not match the configuration data stored in the EEPROM.

Action:

1. Press **Ctrl+Alt+Del** to restart the system.
2. Press **CTRL+I** during POST to enter the Mini-Configuration program.
3. Select **Advanced Functions** from the Main Menu; then, select **Import Configuration from Drive(s)**.

WARNING: *n logical drives are critical; n logical drives are offline.*

Explanation: One or more hard disk drives have failed.

Action: Replace the defunct drives as soon as possible to prevent data loss.

Your server has an error due to a Blocked Logical Drive.

Explanation: One or more logical drives are in a blocked state. A blocked logical drive cannot be accessed.

Action: Press **F4** to unblock the logical drive, or press **F5** to continue without unblocking.

Unable to communicate with the controller

Explanation: The controller is not responding to commands.

Action: Reseat the controller. If the problem persists, replace the ServeRAID controller.

Controller Reg. <x> test failed. Test Number: <y>

Explanation: The controller or embedded controller failed the register test, where <x> is the register number and <y> is the test number.

Action: Reseat the controller. If the problem persists, replace the ServeRAID controller.

Controller hardware error

Explanation: The controller is not responding to commands.

Action: Reseat the controller. If the problem persists, replace the ServeRAID controller.

BIOS not loaded no devices found - Installation stopped.

Explanation: The BIOS is unable to find any logical drives attached to any ServeRAID controllers. Therefore the ServeRAID BIOS is not loaded.

Action: Reconnect the cable(s) attaching the hard drives to the controller and restart the system. If performing a service procedure, reconnect them when told to do so.

Controller Ok; Devices not responding check cables or enclosures.

Explanation: A SCSI connection problem has been detected.

Action: Check all cables and devices attached to the ServeRAID controller. Look for bent or missing pins on all cables and devices.

Unable to communicate with the following devices. (Channel : SID)

Explanation: Devices at the channel and SCSI ID specified in the message are not responding. The devices may have been removed.

Action: Check that the device(s) are at the location specified. If they are located in an external enclosure, make sure that the external enclosure is powered on.

Download codeblk (via bootblk) is ready.

Explanation: Preparations for the download of the firmware to the controller are complete.

Action: Insert the BIOS/Firmware Diskette and download the firmware. Restart the system.

Controller is not responding properly - Run Diagnostics.

Explanation: The controller is not responding appropriately to commands.

Action: Use the ServeRAID DOS Configuration Utility and run the diagnostics.

System PCI BIOS does not respond to commands; no logical drives are installed.

Explanation: The system's PCI BIOS is returning error status in response to calls to it.

Action: Refer to the system's HMM and run diagnostics.

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 33.
2. A corrupt CMOS can cause undetermined problems.

Check the LEDs on all the power supplies, see "Power supply LED errors" on page 301. 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-Modules (Minimum requirement = 1 bank of 128 MB DIMMs)

Note

Minimum operating requirements are:

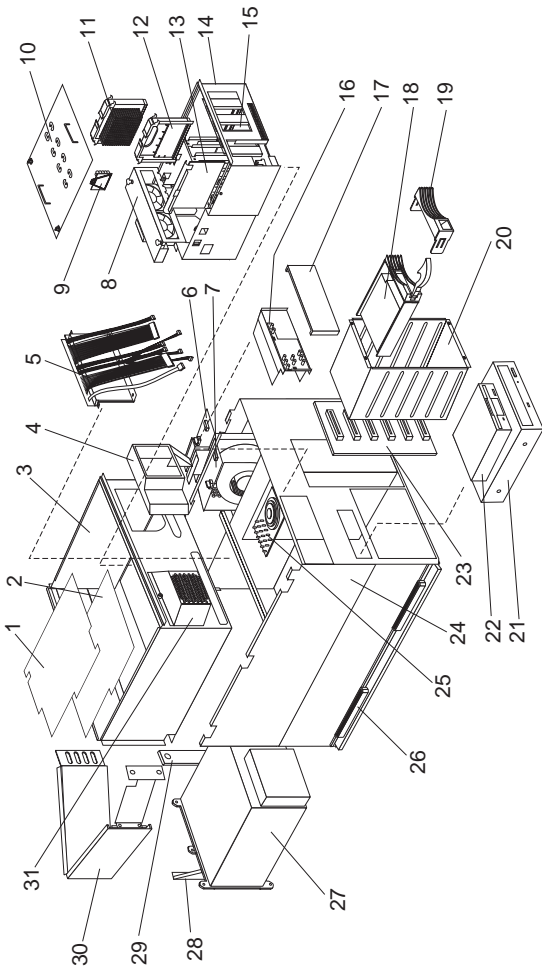
Power Supply
Power Backplane
System Board (With pins 2 and 3 on J32's extension cable connected together to bypass the power switch. The default is pins 1 and 2.)
Processor Board (Verify that the J32, J33, and J35 connectors are installed correctly.)
Memory Module (With a minimum of 1 bank of 128 MB DIMMs)
1 Microprocessor and VRMs
3 Terminator Cards

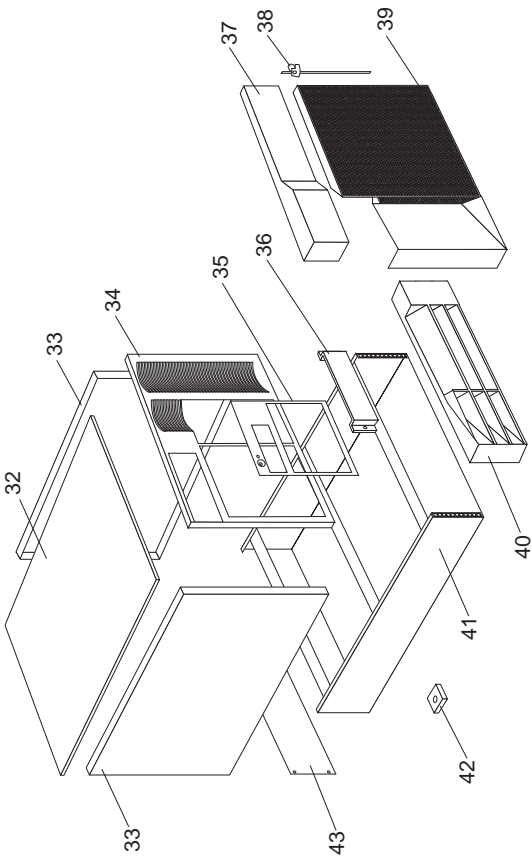
4. Power-on the computer. If the problem remains, suspect the following FRUs in the order listed:
 - Power Supply
 - Power Backplane
 - System Board
 - Processor Board

Notes

1. 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).
2. If you suspect a networking problem and all the system tests pass, suspect a network cabling problem external to the system.

Parts listing (Type 8662)





System

Index	System (Netfinity 5500 M20 - Type 8662) Models 31Y, 3RY, 41Y, 4RY	FRU No.
1	System Board Shield (Models 31Y, 3RY, 41Y, 4RY)	03K9054
2	System Board without Memory and Processor Board (Models 31Y, 3RY, 41Y, 4RY)	28L0714
3	Shuttle with Bracket (Models 31Y, 3RY, 41Y, 4RY)	01K6998
4	Air Diffuser (Models 31Y, 3RY, 41Y, 4RY)	28L0630
5	Hot Swap Power Backplane Card with 5 Power Cables (Model 31Y, 3RY, 41Y, 4RY)	36L9540
6	Fan #3 - Long Blower Fan Assembly with Bracket and Vane (Models 31Y, 3RY, 41Y, 4RY)	01K6990
7	Fan #2 - Short Blower Fan Assembly with Bracket (Models 31Y, 3RY, 41Y, 4RY)	01K6988
8	Fan #4 - Fan Assembly 92 mm with Connector and Bracket (Models 31Y, 3RY, 41Y, 4RY)	28L0635
	System Board to Fans 1, 2, and 3 Power Cable (Models 31Y, 3RY, 41Y, 4RY)	03K9168
	Fan 4 Power Cable (Models 31Y, 3RY, 41Y, 4RY)	36L9552
9	Voltage Regulator Module (Models 31Y, 3RY, 41Y, 4RY)	20L1010
10	Processor Support Tray Cover (Models 31Y, 3RY, 41Y, 4RY)	36L9541
11	See Processor Support Tray Kit below	
11	450/100 MHz Pentium II Xeon Processor with 512 KB L2 Cache (Models 31Y, 3RY, 41Y, 4RY)	28L4557
11	450/100 MHz Pentium II Processor with 1 MB L2 Cache (Models 31Y, 3RY, 41Y, 4RY)	28L4558
11	500/100 MHz Processor with 512 KB L2 Cache (Models 31Y, 3RY, 41Y, 4RY)	28L4441
11	500/100 MHz Processor with 1 MB L2 Cache (Option) (Models 31Y, 3RY, 41Y, 4RY)	28L4442
12	Processor Terminator Card (Models 31Y, 3RY, 41Y, 4RY)	94H0598
13	Memory Board (Models 31Y, 3RY, 41Y, 4RY)	01K7231
14	Processor Support Tray (Models 31Y, 3RY, 41Y, 4RY)	36L9541
15	See Processor Support Tray Kit below	
15	4 GB Processor Board without microprocessor (Models 31Y, 3RY, 41Y, 4RY)	01K7230
16	Front LED Panel and Bracket (Models 31Y, 3RY, 41Y, 4RY)	28L0691
17	Information LED Panel Cover Lens (Models 31Y, 3RY, 41Y, 4RY)	28L0643

Index	System (Netfinity 5500 M20 - Type 8662) Models 31Y, 3RY, 41Y, 4RY	FRU No.
18	Hard Disk Drive (Option) (Models 31Y, 3RY, 41Y, 4RY)	
19	Hard Disk Drive Bezel (Black) (Models 31Y, 3RY, 41Y, 4RY)	12J3072
20	DASD 6-Drive Cage Assembly (Models 31Y, 3RY, 41Y, 4RY)	01K6987
21	Sony 32x CD-ROM Assembly with CD-ROM Drive, 2 Brackets, and 4 Screws (Models 31Y, 3RY, 41Y, 4RY)	28L1637
21	LG 32x CD-ROM Drive Only (Models 31Y, 3RY, 41Y, 4RY)	28L1643
	CD-ROM Signal Cable (IDE) (Models 31Y, 3RY, 41Y, 4RY)	03K9338
22	1.44MB Diskette Drive, Black (Models 31Y, 3RY, 41Y, 4RY)	76H4091
	Diskette Holder Bracket (Models 31Y, 3RY, 41Y, 4RY)	12J3065
	Diskette Drive Signal Cable (Models 31Y, 3RY, 41Y, 4RY)	03K9340
23	DASD Backplane Board (Models 31Y, 3RY, 41Y, 4RY)	76H6880
24	Base Frame Assembly (Models 31Y, 3RY, 41Y, 4RY)	01K6991
25	Interior (Diagnostic) LED and Speaker Assembly (Models 31Y, 3RY, 41Y, 4RY)	28L0692
26	Side Cover Retention Bracket (Models 31Y, 41Y)	12J7040
27	500 Watt Hot Swap PFC Power Supply Assembly with Bracket (Models 31Y, 3RY, 41Y, 4RY)	01K9879
28	Power Supply Bracket (Models 31Y, 3RY, 41Y, 4RY)	36L9520
29	AC Input Blank (Models 31Y, 3RY, 41Y, 4RY)	28L0633
30	Cable Management Arm (Models 3RY, 4RY)	12J3088
	Cable Management Arm Bracket (Models 3RY, 4RY)	12J3089
31	Fan #1 - Fan Assembly 92 mm with Connector and Bracket (Models 31Y, 3RY, 41Y, 4RY)	01K6999
32	Top Cover (Models 31Y, 3RY, 41Y, 4RY)	12J3063
33	Side Access Cover (Models 31Y, 41Y)	03K8776
34	Front Bezel without Door Assembly (Models 31Y, 3RY, 41Y, 4RY)	01K6997
35	Media and Switch Trim Panel (Models 31Y, 3RY, 41Y, 4RY)	03K8773
36	5.25-Inch Blank Bezel (Models 31Y, 3RY, 41Y, 4RY)	12J3073
37	Front Bezel Cap (Models 31Y, 41Y)	12J7041
38	Keylock with Keys and Pawl (Models 31Y, 41Y)	01K6641
	Keylock Linkage (Models 31Y, 41Y)	03K8777
39	DASD Door (Models 31Y, 41Y)	03K8778
40	3-U Front Bezel Assembly with Lock and Keys (Models 31Y, 41Y)	03K8798
41	3-U Pedestal Frame (Models 31Y, 41Y)	03K8797

Index	System (Netfinity 5500 M20 - Type 8662) Models 31Y, 3RY, 41Y, 4RY	FRU No.
42	Foot Pads, 4 each (Models 31Y, 41Y)	03K8800
43	3-U Blank Panel (Models 31Y, 41Y)	03K8799
	128MB ECC 3.3v REG SDRAM DIMM (Option) (Models 31Y, 3RY, 41Y, 4RY)	28L1015
	256MB ECC 3.3v REG DIMM (Models 31Y, 3RY, 41Y, 4RY)	01K7391
	512MB ECC 3.3v REG SDRAM DIMM (Option) (Models 31Y, 3RY, 41Y, 4RY)	28L1016
	Air Baffle (Models 31Y, 3RY, 41Y, 4RY)	36L9549
	Door Hinge (Models 31Y, 41Y)	01K6637
	Extension Cable (for J32) (Models 31Y, 3RY, 41Y, 4RY)	36L9564
	Keyboard with Cable (Models 31Y, 41Y)	
	See "Keyboards" on page 333 .	
	Left and Right EIA Mounting Flange (Models 3RY, 4RY)	01K6981
	Lift Handle (Models 3RY, 4RY)	03K9069
	Media Bracket (Models 31Y, 3RY, 41Y, 4RY)	12J5681
	Microprocessor Bracket (Models 31Y, 3RY, 41Y, 4RY)	36L9541
	See Processor Support Tray Kit below	
	Miscellaneous Parts Kit 1 (Models 31Y, 3RY, 41Y, 4RY)	12J3079
	<ul style="list-style-type: none"> • 32x5/16 Screws (4 each) • M3.5x8 Plastite Screws (2 each) • M3x5 CD/Bracket Screws (8 each) • M3.5x7 Processor Board Screws, (15 each) • 6/32x3/16 Screws (8 each) • 3.9ID Nylon Washers (2 each) • EMC Springs (24 each) • Lock Hole Plug (1 each) • Cable Tie (1 each) • Fan Grommets (4 each) 	
	Miscellaneous Parts Kit 2 (Models 31Y, 3RY, 41Y, 4RY)	03K8782
	<ul style="list-style-type: none"> • EMI I/O Gasket (1 each) • EMI PCI/ISA I/O Gasket (1 each) 	
	Miscellaneous Hot-Swap Parts Kit 3 (Models 31Y, 3RY, 41Y, 4RY)	28L4526
	<ul style="list-style-type: none"> • 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 Housing (1 each) 	

Index	System (Netfinity 5500 M20 - Type 8662) Models 31Y, 3RY, 41Y, 4RY	FRU No.
	Miscellaneous Rack Kit 4 (Models 3RY, 4RY)	12J3090
	<ul style="list-style-type: none"> • M6x16 Screws, Slide-Bracket to Rack (16 each) • M3.5x7 (EIA Flanges to Chassis Screws) (6 each) • M4x8 Screws, Slides to Chassis (8 each) • M6 Nut Clips, Slide-Bracket to Rack (6 each) • M6 Nuts, Flange Arm to Bracket (2 each) 	
	Mouse (Models 31Y, 41Y)	76H0889
	PCI Hot-Swap Latch Card (Models 31Y, 3RY, 41Y, 4RY)	03K8982
	Power Supply Filler Panel (Models 31Y, 41Y)	01K6996
	Power Cord (Models 31Y, 3RY, 41Y, 4RY)	
	See "Power cords" on page 335 .	
	Power Switch (Button) Assembly with Bracket (Models 31Y, 3RY, 41Y, 4RY)	01K7003
	Processor Support Tray Kit (Models 31Y, 3RY, 41Y, 4RY)	36L9541
	Rack Slide-Bracket Assembly (Models 3RY, 4RY)	03K8775
	RS-485 Internal Cable (Models 31Y, 3RY, 41Y, 4RY)	03K9321
	SCSI to Media Bay Cable (3X) (Models 31Y, 3RY, 41Y, 4RY)	12J3711
	SCSI to External Port Cable with Bracket (Models 31Y, 3RY, 41Y, 4RY)	36L9537
	SCSI to Hot-Swap Backplane Cable (Models 31Y, 3RY, 41Y, 4RY)	12J3274
	Short Insulator (Models 31Y, 3RY, 41Y, 4RY)	36L9548
	System Battery (Models 31Y, 3RY, 41Y, 4RY)	33F8354
	System Service Label (Models 31Y, 3RY, 41Y, 4RY)	28L0694

Keyboards

Keyboards	FRU No.
Arabic	37L0818 02K0870
Belgian-French	37L0819 02K0871
Belgian-UK/Dutch	37L0820 02K0872
Brazil/Portugal	37L0817 02K0869
Bulgarian	37L0821 02K0873
Chinese/US	37L0848 02K0900
Czech	37L0822 02K0874
Danish	37L0823 02K0875
Dutch	37L0824 02K0876
French	37L0825 02K0877
French/Canadian-ID 058	37L0815 02K0863
German	37L0826 02K0878
Greek	37L0827 02K0879
Hebrew	37L0828 02K0880
Hungarian	37L0829 02K0881
Icelandic	37L0830 02K0882
Italian	37L0831 02K0883
Japan	37L0847 02K0899
Korean	37L0849
Latin/Spanish	37L0816 02K0867
Norwegian	37L0832 02K0884
Polish	37L0833 02K0885
Portuguese	37L0834 02K0886
Romania	37L0835 02K0887
Russian	37L0836 02K0888
Serbian/Cyrillic	37L0837 02K0889
Slovic	37L0838 02K0890
Spanish	37L0839 02K0891
Swedish/Finnish	37L0840 02K0892

Keyboards	FRU No.
Swiss French/German	37L0841 02K0893
Taiwanese	37L0848
Thailand	37L0850 02K0902
Turkish (ID 179)	37L0842 02K0894
Turkish (ID 440)	37L0843 02K0895
UK English	37L0844 02K0896
US English	37L0814 02K0861
UK English (ISO Compliant)	37L0846 02K0898
Yugoslavia/Lithuania	37L0845 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.

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Safety information

The following section contains the safety information that you need to be familiar with before servicing an IBM mobile computer.



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
<ol style="list-style-type: none">1. Turn Everything OFF.2. First, attach all cables to devices.3. Attach signal cables to receptacles.4. Attach power cord(s) to outlet.5. Turn device ON.	<ol style="list-style-type: none">1. Turn Everything OFF.2. First, remove power cord(s) from outlet.3. Remove signal cables from receptacles.4. Remove all cables from devices.

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

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



CAUTION:

When replacing the battery, use only IBM Part Number 33F8354 or an equivalent type battery recommended by the manufacturer. If the 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 the 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.



≥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.



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

1. DESLIGUE tudo.
2. Conecte primeiro todos os cabos nos dispositivos.
3. Conecte os cabos de sinal nos receptáculos.
4. Conecte o(s) cabo(s) de alimentação nas tomadas.
5. LIGUE o dispositivo.

Para Desconectar

1. DESLIGUE tudo.
2. Remova primeiro o(s) cabo(s) de alimentação das tomadas.
3. Remova os cabos de sinal dos receptáculos.
4. Remova todos os cabos dos dispositivos.



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.

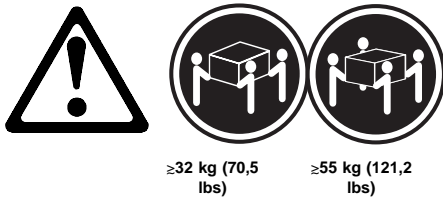
A utilização de controles ou ajustes ou a execução de procedimentos diferentes daqueles especificados nesta publicação pode resultar em exposição perigosa à radiação.

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.



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.



CAUTION:
Não coloque qualquer objeto com peso superior a 50 kg (110 lbs) sobre o modelo de gaveta do servidor.

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

1. 关闭所有设备。
2. 首先将所有电缆与设备连接。
3. 将信号线连接到插座。
4. 将电源线连接到电源插座。
5. 打开设备。

要断开电缆

1. 关闭所有设备。
2. 首先从电源插座拔下电源线。
3. 从插座拔下信号电缆。
4. 从设备上拔下所有电缆。

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 (110 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通過。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. 關掉所有開關。 | 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

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

1. Mettez les unités hors tension.
2. Commencez par brancher tous les cordons sur les unités.
3. Branchez les câbles d'interface sur les prises.
4. Branchez les cordons d'alimentation sur un socle de prise de courant.
5. Mettez les unités sous tension.

Déconnexion

1. Mettez les unités hors tension.
2. Commencez pas débrancher les cordons alimentation des socles de prise de courant.
3. Débranchez les câbles d'interface des prises.
4. Débranchez tous les câbles des unités.



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.

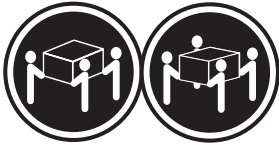
Pour éviter une exposition directe au rayon laser, n'ouvrez pas l'unité de CD-ROM. Vous ne pouvez effectuer aucune opération de maintenance à l'intérieur.



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.



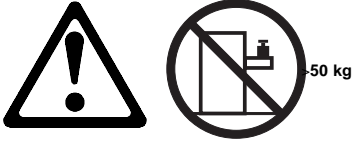
CAUTION:

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.



CAUTION:
Ne posez pas d'objet dont le poids dépasse 50 kg sur
les modèles tiroir de serveur.



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

1. Alle Geräte ausschalten und Netzstecker ziehen.
2. Zuerst alle Kabel an Einheiten anschließen.
3. Signalkabel an Anschlußbuchsen anschließen.
4. Netzstecker an Steckdose anschließen.
5. Gerät einschalten.

Kabel lösen

1. Alle Geräte ausschalten.
2. Zuerst Netzstecker von Steckdose lösen.
3. Signalkabel von Anschlußbuchsen lösen.
4. Alle Kabel von Einheiten lösen.



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.



50 kg

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

1. SPEGNERE tutti i dispositivi.
2. Collegare prima tutti i cavi alle unità.
3. Collegare i cavi di segnale alle prese.
4. Collegare il(i) cavo(i) di alimentazione alla presa elettrica.
5. ACCENDERE le unità.

Per scollegare

1. SPEGNERE tutti i dispositivi.
2. Rimuovere prima il(i) cavo(i) di alimentazione dalla presa elettrica.
3. Rimuovere i cavi di segnale dalle prese.
4. Rimuovere tutti i cavi dalle unità.

**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:

Aperto l'unità vengono emesse radiazioni laser. Non fissare il fascio, non guardarlo direttamente con strumenti ottici ed evitare l'esposizione diretta al fascio.



ATTENZIONE:

Durante il sollevamento della macchina seguire delle norme di sicurezza.



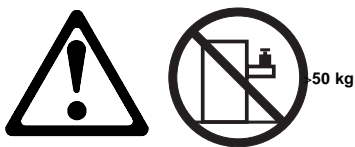
ATTENZIONE:

Il pulsante del controllo dell'alimentazione situato nella parte anteriore del server non disattiva la corrente elettrica fornita al server. Il server potrebbe anche avere più di un cavo di alimentazione. Per disattivare la corrente elettrica del server, 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 server deve essere collocato in prossimità di una presa elettrica facilmente accessibile.



ATTENZIONE:

Non poggiare oggetti che pesano più di 50 kg sulla parte superiore del server.

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 켜다.	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 켜다.	

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.

다음은 주의하십시오.

- 먼지거나 물에 닿지 않도록 하십시오.
- 100°C(212°F) 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 2급 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 껐도 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

1. Apague todos los componentes (OFF).
2. En primer lugar, conecte todos los cables a los dispositivos.
3. Conecte los cables de señal a los receptáculos.
4. Conecte los cables de alimentación a las tomas.
5. Encienda el dispositivo (ON).

Instrucciones de desconexión

1. Encienda todos los componentes (ON).
2. En primer lugar, retire los cables de alimentación de las tomas.
3. Retire los cables de señal de los receptáculos.
4. Retire todos los cables de los dispositivos.



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.



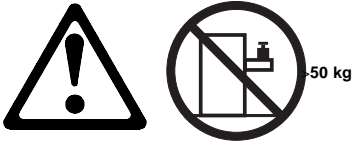
CAUTION:

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.

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.

Laser compliance statement

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

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



CAUTION:

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

O uso de controles, ajustes ou desempenho de procedimentos diferentes daqueles aqui especificados pode resultar em perigosa exposição à radiação.

凡未在这里指明的任何控制用法、调整、行为，都会导致严重后果。

Pour éviter tout risque d'exposition au rayon laser, respectez les consignes de réglage et d'utilisation des commandes, ainsi que les procédures décrites.

Werden Steuer- und Einstellelemente anders als hier festgesetzt verwendet, kann gefährliche Laserstrahlung auftreten.

Az itt előírt eljárásoktól, beállítástól és vezérlésektől eltérni a lézersugárzás veszélye miatt kockázatos !

L'utilizzo di controlli, regolazioni o l'esecuzione di procedure diverse da quelle specificate possono provocare l'esposizione a

Использование элементов настройки и выполнение процедур иных, чем указано здесь, может привести к опасному радиационному облучению.

Použitie kontrol, úprav alebo iných vykonaní od iných výrobcov, ako je v tomto špecifikované, mohlo by mať za následok nebezpečenstvo vystavenia sa vyžiarovaniu.

El uso de controles o ajustes o la ejecución de procedimientos distintos de los aquí especificados puede provocar la exposición a radiaciones peligrosas.

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

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

DANGER:

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

Radiação por raio laser ao abrir. Não olhe fixo no feixe de luz, não olhe diretamente por meio de instrumentos óticos e evite exposição direta com o feixe de luz.

开启时会有激光发射时，请勿盯视激光光束，请勿直接查看视觉仪器，并且避免直接接触在激光光束之中。

Rayonnement laser si carter ouvert. Évitez de fixer le faisceau, de le regarder directement avec des instruments optiques, ou de vous exposer au rayon.

Laserstrahlung bei geöffnetem Gerät. Nicht direkt oder über optische Instrumente in den Laserstrahl sehen und den Strahlungsbereich meiden.

Kinyitáskor lézersugár ! Ne nézzen bele se szabad szemmel, se optikai eszközökkel. Kerülje a sugárnyalábbal való érintkezést !

Aprendo l'unità vengono emesse radiazioni laser. Non fissare il fascio, non guardarlo direttamente con strumenti ottici e evitare l'esposizione diretta al fascio.

Открывая, берегитесь лазерного излучения. Не смотрите на луч, не разглядывайте его с помощью оптических инструментов, а также избегайте прямого воздействия лазерного луча.

Ked' je laserová jednotka otvorená. Vyhňte sa priamemu pohľadu a nehladte priamo s optickými nástrojmi do lúča a vyhňte sa priamemu vystaveniu lúčov.

Radiación láser al abrir. No mire fijamente ni examine con instrumental óptico el haz de luz. Evite la exposición directa al haz.

Send us your comments!

We want to know your opinion about this manual (part number 37L2020). 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
- Microprocessor 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 "Problem determination tips" on page 371.

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	Parts Regular Orders, Exchange (Fax)
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 - Winnipeg
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	Service Management Support (Fax)
905-316-4150	Service (Warranty) Manager
905-316-4100	Service (Warranty) Manager (Fax)
905-316-4872	Service Quality Programs
905-316-4100	Service Quality Programs (Fax)
800-661-2131	Skill Dynamics (Education)
800-565-3344	ThinkPad EasyServe
416-443-5835	Warranty Claim Fulfillment (Fax)
905-316-2445	Warranty Claim Reimbursement
905-316-3515	Warranty Claim Reimbursement (Fax)
416-443-5778	Warranty Claim Parts Inquiry
800-505-1855	Warranty Provider Support Hotline
800-267-7472	Warranty Service, ThinkPad

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Netfinity	Netfinity Manager
OS/2	Predictive Failure Analysis
ServeRAID	SystemXtra
ThinkPad	

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Part Number: 37L2020

Printed in U.S.A.

S37L-2020-00

