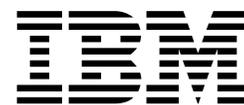Hardware Maintenance Manual

IBM

# xSeries 250

Hardware Maintenance Manual

IBM

xSeries 250

**Note:**

Before using this information and the product it supports, be sure to read the general information under "Notices" on page 215.

**First Edition (March 2001)**

# About this manual

This manual contains diagnostic information, a Symptom-to-FRU index, service information, error codes, error messages, and configuration information for the IBM® @server xSeries 250, Models 6RY, 7RY, 8RY, 61Y, 71Y, 81Y.

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

## Important safety information

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

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

注意和危险声明(简体中文)

重要事项:

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

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

在按说明执行任何操作前，请务必阅读所有注意和危险声明。

注意及危险聲明（中文）

重要資訊：

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

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

執行任何指示之前，請詳讀所有「注意」及「危險」的聲明。

Prenez connaissance de toutes les consignes de type Attention et

Danger avant de procéder aux opérations décrites par les  instructions.

Lesen Sie alle Sicherheitshinweise, bevor Sie eine Anweisung ausführen.

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

<u>주의 및 위험 경고문(한글)</u>

**중요:**

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

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

# Online support

Use the World Wide Web (WWW) to download Diagnostic, BIOS Flash, and Device Driver files.

File download address is:

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

## 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.pc.ibm.com/support/index.html**

The IBM PC Company Home Page is:

**http://www.pc.ibm.com**

# Contents

# 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 ports, hard drives, and parallel port. You can also use them to test some external devices. See "Diagnostic programs and error messages" on page 25.

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 suspected to be part of a shared DASD cluster, all diagnostic tests can be run except diagnostic tests which test 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 143.

4. If the computer hangs and no error is displayed, go to "Undetermined problems" on page 170.

5. Power supply problems, see "Symptom-to-FRU index" on page 143.

6. Safety information, see "Safety information" on page 180.

7. For intermittent problems, check the error log; see "POST error messages" on page 14.


1. **IS THE SYSTEM PART OF A CLUSTER?**

**1**

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

**NO.** Go to step 2.

2. **THE SYSTEM IS NOT PART OF A CLUSTER.**
   - 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 "POST error codes" on page 155.
   - Check the information LED panel System Error LED; if on, see "Diagnostic panel LEDs" on page 146.
   - Check the System Error Log. If an error was recorded by the system, see "Symptom-to-FRU index" on page 143.
   - Start the Diagnostic Programs. See "Diagnostic programs and error messages" on page 25.
   - Check for the following responses:

     a. One beep.

     b. Readable instructions or the Main Menu.

3. **DID YOU RECEIVE BOTH OF THE CORRECT RESPONSES?**

**NO.** Find the failure symptom in "Symptom-to-FRU index" on page 143.

**YES.** Run the Diagnostic Programs. If necessary, refer to "Diagnostic programs and error messages" on page 25.

If you receive an error, go to "Symptom-to-FRU index" on page 143.

If the diagnostics completed successfully and you still suspect a problem, see "Undetermined problems" on page 170.

# General information

The IBM xSeries 250 server is a high-performance server with the capability of microprocessor upgrade to a symmetric multiprocessing (SMP) server. It is ideally suited for networking environments that require superior microprocessor performance, efficient memory management, flexibility, and large amounts of reliable data storage.

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

The xSeries 250 server comes with a three-year limited warranty and 90-Day IBM Start Up Support. If you have access to the World Wide Web, you can obtain up-to-date information about the server model and other IBM server products at the following World Wide Web address: http://www.ibm.com/eserver/xseries

## Features and specifications

The following provides a summary of the features and specifications for the xSeries 250 server.

- **Microprocessor:**
    - Intel® Pentium®III Xeon™
    - 32 KB of level-1 cache
    - 1 MB of Level-2 cache (min.)
    - Expandable to four microprocessors

- **Memory:**
    - Maximum: 16GB
    - Type: ECC, SDRAM, Registered DIMMs
    - Slots: 4-way interleaved, 16 slots

- **Drives standard:**
    - Diskette: 1.44 MB
    - CD-ROM: IDE

- **Expansion bays:**
    - Hot-swap: 10 slim high
    - Non-hot-swap: Two 5.25-inch

- **LVD SCSI Backplane:**
    - Ultra160 capable
    - Two SCSI channels, each with five connectors, in a split configuration
    - Supports a maximum of 10 slim-high hard disk drives

- **PCI expansion slots:**
    - Four 33 MHz 64-bit hot-plug
    - Two 66 MHz 64-bit non-hot-plug

- **Hot-swap power supplies:**
    250 W (115-230 V ac)
    - Minimum: Two

- — Maximum: Four
- — Three for redundancy
- **Redundant cooling:**
  - — Four hot-swap fan assemblies
- **Video:**
  - — S3 video controller
  - — Compatible with SVGA and VGA
  - — 4 MB video memory
- **Size**
  - — Height: 356 mm (14 in.)
  - — Depth: 650 mm (25.6 in.)
  - — Width: 440 mm (17.3 in.)
  - — Weight: 34.4 kg (76 lb.) to 61 kg (134 lb.) depending upon configuration
- **Integrated functions:**
  - — Advanced System Management processor
  - — Dual Ultra-2 (LVD) SCSI controller, one external port, one internal port
  - — One 10BASE-T/100BASE-TX AMD Ethernet controller
  - — Two serial ports
  - — One parallel port
  - — Two Universal Serial Bus ports
  - — Keyboard port
  - — Mouse port
  - — Video port
  - — One management port
  - — Two Advanced System Management Interconnect ports
- **Acoustical noise emissions:**
  - — Sound power, idling: 6.3 bel maximum
  - — Sound power, operating: 6.3  bel maximum
  - — Sound pressure, idle: 49 dBa maximum
  - — Sound pressure, operating: 49 dBa maximum
- **Environment:**
  - — Air temperature:
    - – Server on: 10º to 35º C (50º to 95º F). Altitude: 0 to 914 m (3000 ft.)
    - – Server on: 10º to 32º C (50º to 89.6º F). Altitude: 914 m (3000 ft.) to 2133 m (7000 ft.)
    - – Server off: 10º to 43º C (50º to 110º F). Maximum altitude: 2133 m (7000 ft.)
  - — Humidity:
    - – Server on: 8% to 80%
    - – Server off: 8% to 80%
- **Heat output:**

  Approximate heat output in British Thermal Units (BTU) per hour:
  - — Minimum configuration:1023.9 BTU
  - — Maximum configuration: 2764.6 BTU
- **Electrical input:**
  - — Sine-wave input (50-60 Hz) required
  - — Input voltage low range:
    - – Minimum: 90 V ac
    - – Maximum: 137 V ac

— Input voltage high range:

    – Minimum: 180 V ac

    – Maximum: 265 V ac

— Input kilovolt-amperes (kVA) approximately:

    – Minimum: 0.08 kVA

    – Maximum: 0.52 kVA

## Server features

The unique design of the server takes advantage of advancements in symmetric multiprocessing (SMP), data storage, and memory protection. The server combines:

- Impressive performance using an innovative approach to SMP

  The server supports up to four Pentium III Xeon microprocessors. The server comes with one microprocessor installed; you can install additional microprocessors to enhance performance and provide SMP capability.

- Integrated disk-array subsystem (optional)

  Although many operating systems provide software fault tolerance through mirroring, IBM provides hardware fault tolerance through the redundant array of independent disks (RAID) controller. The IBM ServeRAID™ controller is a standard feature. It provides three channels and supports RAID levels 0, 1, 1E, 5, and 5E.

- Large data-storage and hot-swap capabilities

  All models of the server support up to 10 slim-high disk drives. The *hot-swap* feature enables you to remove and replace hard disk drives without turning off the server.

- Hot-plug PCI adapter capabilities

  The server has four *hot-plug* slots for PCI adapters. With operating system support, you can replace failing hot-plug PCI adapters without turning off the server. If the *hot-add* feature is supported by the operating system and the PCI adapter, you can also add PCI adapters in these slots without turning off the server.

- Redundant cooling and power capabilities

  The redundant cooling and hot-swap capabilities of the fans in the server enable continued operation if one of the fans fails, because you can replace a failing fan without turning off the server.

  The server comes standard with three 250-watt power supplies, which support redundancy for a typical configuration. You can install one additional power supply.

- Large system memory

  The memory bus in the server supports up to 16 GB of system memory. The memory controller provides error correcting code (ECC) support for up to 16 industry-standard, 3.3 V, 168-pin, 8-byte, registered, dual inline memory modules (DIMMs). The memory controller also provides Chipkill™ memory protection. Chipkill memory protection is a technology that protects the system from component failure on a DIMM.

- System-management capabilities

  The server comes with a Advanced System Management Processor. This processor enables you to manage the functions of the server locally and remotely. The Advanced System Management Processor also provides system monitoring, event recording, and dial-out alert capability.

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

Refer to "Advanced System Management ports" on page 104 for more information.

- Integrated network environment support

  The server comes with an Ethernet controller. This Ethernet controller has an interface for connecting to 10-Mbps or 100-Mbps networks. The server automatically selects between 10BASE-T and 100BASE-TX. The controller provides full-duplex (FDX) capability, which enables simultaneous transmission and reception of data on the Ethernet local area network (LAN).

- Redundant network-interface card

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

- IBM ServerGuide CDs

  The ServerGuide CDs included with the server provide programs to help you set up the server and install the network operating system (NOS). The ServerGuide program detects the hardware options that are installed, and provides the correct configuration program and device drivers. In addition, the ServerGuide CDs include a variety of application programs for the server.

## Reliability, availability, and serviceability

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

The following is an abbreviated list of the RAS features that the server supports.

- Active PCI (hot-plug) adapter slots
- Alert on LAN™ capability
- Ambient temperature monitoring
- Automatic error retry/recovery
- Automatic restart after a power failure
- Backup basic input/output system (BIOS) switching under the control of the service processor
- Built-in, menu-driven electronically erasable programmable ROM (EEPROM) based diagnostics
- Built-in temperature/fan/voltages monitoring
- Chipkill memory protection
- Cooling fans with speed-sensing capability (hot-swap)
- Error codes and messages
- Error correcting code (ECC) L2 cache
- ECC FSBs
- ECC memory
- Fast power-on self-test (POST)
- Fault-resistant startup
- 45°C (113°F) normal operating temperature for hard disk drives
- Hot-plug Universal Serial bus (USB) keyboard and mouse
- Hot-swap drive bays
- Hot-swap hard disk drives

- Information and diagnostic light-emitting diode (LED) panels
- Integrated Advanced System Management processor subsystem provides control for remote system management
- Light Path Diagnostics™ (LED panel)
- Memory scrubbing and Predictive Failure Analysis™ (PFA) (background and real time)
- Menu-driven setup, system configuration, SCSISelect configuration, and diagnostic programs
- Microcode and diagnostic levels available
- NIC failover support
- Parity checking on the small computer system interface (SCSI) bus and PCI buses
- Power and temperature monitoring
- Power Managed - Advanced Configuration and Power Interface (ACPI) level
- Power-on self-test (POST)
- Power-supply redundancy monitoring
- Predictive Failure Analysis™ (PFA) alerts
- Processor serial number access
- Redundant Ethernet capabilities (with optional adapter)
- Redundant hot-swap cooling
- Redundant hot-swap power supplies
- Remote Connect
- Remote system problem-determination support
- Standard cables present detection
- Standby voltage for system management features and monitoring
- System auto-configuring from a configuration menu
- System error logging (POST and Advanced System Management processor)
- System management monitoring via Intra-Integrated Circuit ($I^2C$) bus
- Upgradable flash read-only memory (ROM) resident code
- Upgradable POST, basic input/output system (BIOS), diagnostics, and Advanced System Management processor microcode
- Vital Product Data (VPD) on processors, processor board, I/O board, power supplies, hard disk drive backplane, power backplane, and voltage regulator modules (VRMs)
- Wake on LAN™ capability
- Wake on Ring capability
- Windows NT failover support
- xSeries Server Management

## Controls and indicators

The following illustration shows the controls and indicators on the server.

Information LED panel

Power-control button

Reset button

Diskette drive in-use light

Diskette-eject button

CD-ROM drive in-use light

CD-ROM eject/load button

Hard-disk drive activity light     Hard-disk drive status light
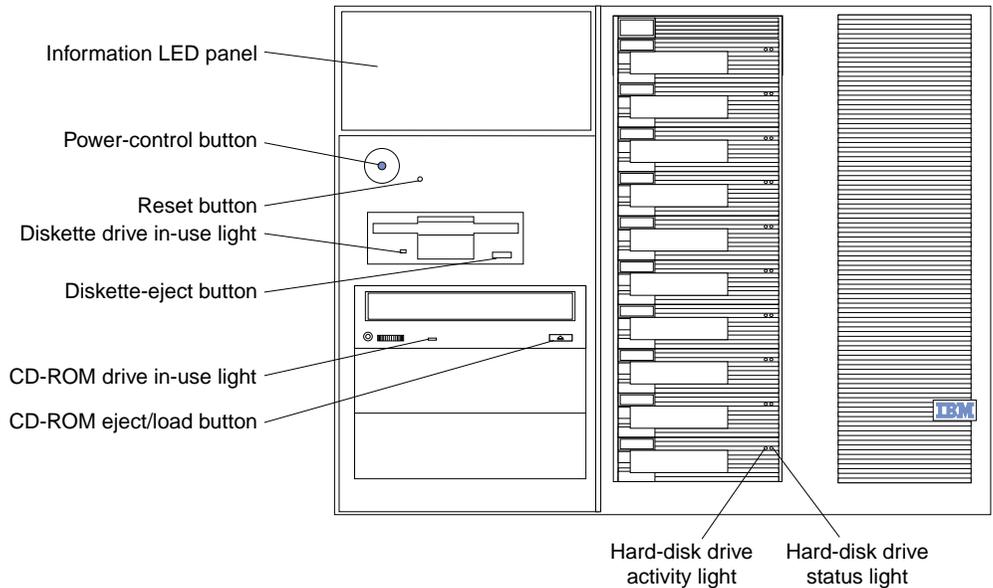
**Hard-disk drive status light:**
> Each of the hot-swap drives has a status light. When this amber light is on continuously, the drive has failed. When the light flashes slowly (one flash per second), the drive is being rebuilt. When the light flashes rapidly (three flashes per second) the controller is identifying the drive.

**Hard-disk activity light:**
> Each of the hot-swap drives has a hard-disk activity light. When this green light is flashing, the drive is being accessed.

**CD-ROM eject/load button:**
> Press this button to eject or retract the CD-ROM tray.

**CD-ROM drive in-use light:**
> When this light is on, the CD-ROM drive is being accessed.

**Diskette-eject button:**
> Press this button to eject a diskette from the drive.

**Diskette drive in-use light:**
> When this light is on, the diskette drive is being accessed.

**Reset button:**
> Press this button to reset the server and run the power-on self-test (POST).

**Power control button:**
> Press this button to manually turn on or off the server.

**CAUTION:**

**The power control button on the device and/or 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.**
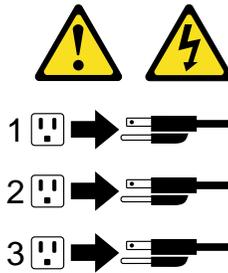


You can start the server in several ways:

- You can turn on the server by pressing the Power Control button on the front of the server.

  **Note:** After you plug the power cords of your server into electrical outlets, wait 20 seconds before pressing the Power Control button. During this time the system-management processor is initializing and the Power Control button does not respond.

- If the server is turned on, a power failure occurs, and unattended- start mode is enabled in the Configuration/Setup utility program, the server will start automatically when power is restored.

- If AC power is present, the server is off, and the wake-up feature is enabled in the Configuration/Setup utility program, the wake-up feature will turn on the server at the set time.

- If AC power is present, the server is off, and ring signal detect is enabled in the Configuration/Setup utility program, you can turn on the server by telephone input.

- The Advanced System Management Processor also can turn on the server.

You can turn off the server in several ways:

- 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 your operating system, and places the server in standby mode.

  **Note:** After turning off the server, wait at least 5 seconds before pressing the Power Control button to power the server on again.

- 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. You can use this feature if the operating system stalls.

- 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 cords for your system to stop running. Watch for the System Power light on the operator information panel to stop blinking.

**Information LED panel:**
The lights on this panel give status information for the server.  See "Information LED panel" on page 10.

# Information LED panel

The following illustration shows the status lights on the Information LED panel.
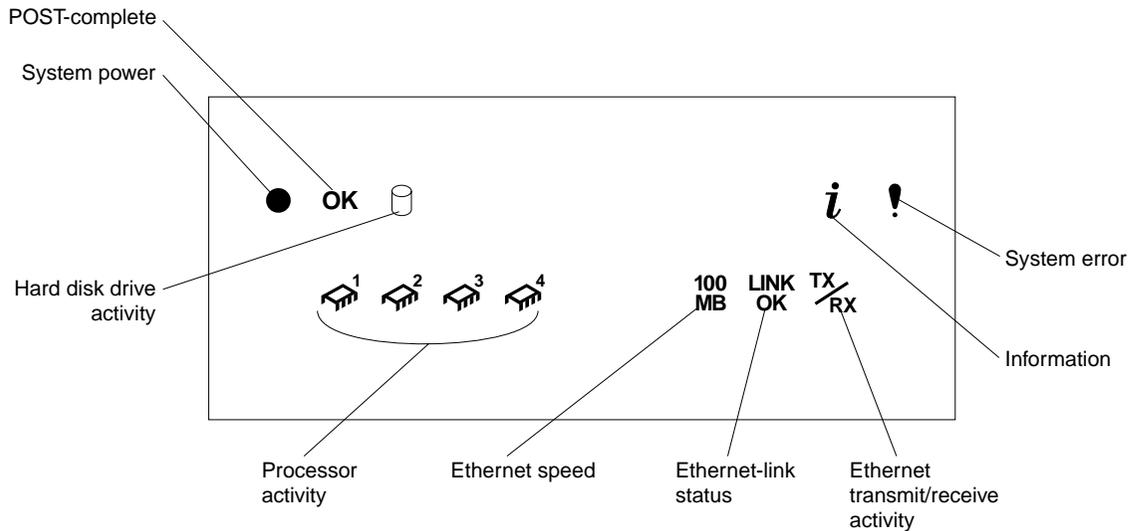


**System power light:**
> When this green light is on, power is present in the server. When this light flashes, the server is in standby mode (the system power supply is turned off and ac current is present). When this light is off, the power subsystem, the ac power, or a light has failed.
>
> **Attention:** If the system power 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 or from the uninterruptible power device.

**POST-complete light:**
> This green light is on when the power-on self-test (POST) completes without any errors.

**Hard disk drive activity light:**
> This green light flickers when there is activity on a hard disk drive.

**Information light:**
> When this amber light is on, the server power supplies are nonredundant or some other noncritical event has occurred. The event is recorded in the Event log. See "Choices available from the Configuration/Setup main menu" on page 46. A light on the diagnostic panel may also be on; see "Diagnostic panel LEDs" on page 29.

**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 "Diagnostic panel LEDs" on page 29.)

**Ethernet transmit/receive activity light:**
> When this green light is on, there is activity between the server from the network.

**Ethernet-link status light:**
> When this green light is on, there is an active connection on the Ethernet port.

**Ethernet speed 100 Mbps:**
> When this green light is on, the Ethernet speed is 100 Mbps. When the light is off, the Ethernet speed is 10 Mbps.

**Processor activity light:**
> One or more of these green lights are on when there is microprocessor activity. The number of lights that are on indicates the number of microprocessors with activity.

# Diagnostics

This section provides basic troubleshooting information to help you resolve some common problems that might occur with the server.

If you cannot locate and correct the problem using the information in this section, refer to "Symptom-to-FRU index" on page 143 for more information.

## Diagnostic tools overview

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

- **POST beep codes, error messages, and error logs**

  The power-on self-test (POST) generates beep codes and messages to indicate successful test completion or the detection of a problem. See "POST" on page 14 for more information.

- **Diagnostic programs and error messages**

  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. See "Diagnostic programs and error messages" on page 25 for more information.

- **Light path diagnostics**

  Your server has light-emitting diodes (LEDs) to help you identify problems with server components. These LEDs are part of the light-path diagnostics that are built into the server. By following the *path of lights*, you can quickly identify the type of system error that occurred. See "Light path diagnostics" on page 28 for more information.

- **Error symptoms**

These charts list problem symptoms, along with suggested steps to correct the problems. See the "Diagnosing errors" on page 35 for more information.

# 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.

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 operator information panel.

If POST detects a problem, more than one beep sounds and an error message appears on the screen. See "POST beep codes" and "POST error messages" for more information.

**Notes:**

1. 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.

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

## 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 more information, see "Beep symptoms" on page 143.

## 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 POST errors, see "POST error codes" on page 155.

## Event/error logs

The POST error log contains the three most recent error codes and messages that the system generated during POST. The System Event/Error Log contains all error messages issued during POST and all system status messages from the Advanced System Management Processor.

To view the contents of the error logs, start the Configuration/Setup Utility program; then, select **Event/Error Logs** from the main menu.

# Small computer system interface messages

If you receive a SCSI error message, see "SCSI error codes" on page 165.

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

You will get these messages only when running the SCSISelect Utility.

# Solving ServeRAID problems

This section describes the ServeRAID text and numeric messages that might appear during startup. This section also includes some basic information about rebuilding a defunct drive.

In addition to the information provided in this section, you might want to use the ServeRAID IPSSEND program to help isolate ServeRAID problems.

## ServeRAID controller messages

This section lists the ServeRAID messages that might appear during system startup.

The ServeRAID controllers provide a Device Event Log that collects statistics on the number and types of events that occur on a selected physical drive. After correcting a problem with the array, clear the log so that you can identify any subsequent errors quickly. For information about clearing the event log, see "eraseevent" on page 137.

All physical drives contain unique identifiers, such as the drive serial number and manufacturer. During configuration, the ServeRAID controller stores this information.

### ServeRAID startup messages

During power-on self-test (POST), the ServeRAID 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 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 Support CD* into the CD-ROM drive; then, restart the server. The Action column also provides general information about the message.

3. Where *SID* or *ch* appears in these messages, *sid* is the SCSI ID for the device, and *ch* is 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.

Following are messages associated with the ServeRAID subsystem in alphabetical order.

---

**A new drive was installed.**

**Explanation:** When the ServeRAID controller detects a new drive that is not part of the current configuration, the following message appears:
*x* new ready drives found
where *x* is the number of ready drives found.

**Action:** This is an information message. No action is required.

---

**Auto rearrange.**

**Explanation:** Auto rearrange is enabled or disabled.

**Action:** This is an information message. No action is required.

---

**Battery-Backup Write Cache Not Responding**

**Explanation:** BIOS code detected a bad or failed battery-backup write cache.

**Action:** Press **F9** to remove the battery-backup write cache from the configuration, or press **F10** to exit without change.

---

**Battery-Backup Write Cache Replacement**

**Explanation:** The ServeRAID controller detects that the battery-backup write cache is defective.

**Action:** Press **F8** if you replaced the battery-backup write cache, or press **F10** if you have not replaced the battery-backup write cache.

---

**Configured drives are missing.**

**Explanation:** When the ServeRAID controller detects that a previously configured drive is missing, the following message appears:
*x* online drives not responding
where *x* is the number of drives not responding. Example of a possible message: Online Drive on Channel 3 SCSI ID 3 is not responding.

**Action:** Press one of the following keys:
**F2** – Detailed description. Press this key for a detailed description of the problem, such as the example message above.
**F4** – Retry. Press this key after correcting a problem. For example, press F4 after you turn on the external storage enclosure that contains the physical drive.
**F5** – Change the configuration and set the drives to defunct. Press this key to accept the new state that the ServeRAID controller will assign to the drive. For example, the ServeRAID controller will assign the drive a state of defunct or empty. 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 controller will assign the drive a state of defunct, but the server can complete startup. However, the array will remain in critical mode and the potential for data loss will exist until you replace and rebuild the defunct drive. To prevent the loss of data, replace and rebuild the defunct drive in a timely manner.

**Note:** A physical 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 and to the physical 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. Try rebuilding the drive if you have not already done so. See "Rebuilding a defunct drive" on page 23 for more information.

After you perform these steps, if the physical drive does not function properly, replace the drive.
**F10** – Continue booting without changing the configuration. Press this key to continue without change to the configuration.

**Configured drives are not in the configured location.**

**Explanation:** When the ServeRAID controller detects that a previously configured drive is present, but the drive is in a new location, the following message appears:
*x* online drive has been rearranged
where *x* is the number of drives that have been rearranged.   Examples of possible messages are:
Online Drive on Channel 3 SCSI ID 4 moved to Channel 3 SCSI ID 3
Online Drive on Channel 3 SCSI ID 3 moved to Channel 3 SCSI ID 4

**Action:**  Press one of the following keys:
**F2** – Detailed description.  Press this key for a detailed description of the problem, such as the example messages above.
**F4** – Retry.  Press this key after correcting a problem.  For example, press F4 after you move the physical drive to its previously assigned location.
**F5** – Change the configuration and set the drive to defunct.  Press this key to accept the new state that the ServeRAID controller will assign to the drive.  For example, the ServeRAID controller will assign the drive a state of defunct or empty.

**Note:**   A physical 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 and to the physical 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.  See "Rebuilding a defunct drive" on page 23 for more information.

After you perform these steps, if the physical drive does not function properly, replace the drive.
**F6** – Change the configuration and accept the rearrangement.  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 controller will update the configuration.
**F10** – Continue startup without changing the configuration.  Press this key to continue without change to the configuration.

**Controller is not responding to commands.   No logical drives are installed.**

**Explanation:**  The ServeRAID controller is not operational.

**Action:**  Run the *IBM ServeRAID Support CD* and reseat the adapter.  If the problem persists, replace the adapter.

**Error:  Cannot disable this controller BIOS.**

**Explanation:**  The ServeRAID 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.

**Action:**  This is an information message.  No action is required.

**Installation stopped.**

**Explanation:**  The server cannot access the ServeRAID controller.

**Action:**  This is a follow-on message to a preceding message.  Follow the Action instructions for the preceding message to resolve the problem.

**New controller installed in a configured server or drives are imported.**

**Explanation:** When the ServeRAID controller detects that the identifiers of the drives do not match the controller configuration information, the following message appears: *x* online drive(s) found with mismatch configuration   Examples of possible messages:
Configuration mismatch Channel 1 SCSI ID 0 with Host ID
Configuration mismatch Channel 2 SCSI ID 0 with Host ID

**Action:**  Press one of the following keys:
**F2** – Detailed description.   Press this key for a detailed description of the problem, such as the example messages above.
**F4** – Retry.   Press this key after correcting the problem.  For example, press F4 after you move the physical drive to its previously assigned location, or after you install the original physical drives back in the server.
**F5** – Change the configuration and set the drive to defunct.  Press this key to accept the new state that the ServeRAID controller will assign to the drive.  For example, the ServeRAID controller will assign the drive a state of defunct or empty.
**Note:**  A physical 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 processor or I/O board, and to the physical 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.  See "Rebuilding a defunct drive" on page 23 for more information.

After you perform these steps, if the physical drive does not function properly, replace the drive.
**F7** – Import configuration information from drive.  Press this key to restart the server.  Press this key to import the configuration information from the drive and to update the configuration information for the ServeRAID controller.  This choice is useful when you replace the ServeRAID 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 controller.  When you install drives in a server that has no logical drives defined, the F7 choice will not appear.  The ServeRAID 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 (see "Using the ServeRAID Mini-Configuration program" on page 130).

2.   Select **Advanced Functions**.

3.   Select **Copy the Configuration from Drives to the Controller** and follow the instructions on the screen.

**Recoverable configuration error.**

**Explanation:** The configuration data stored in NVRAM does not match the configuration data stored in the EEPROM.

**Action:**

1.   Press Ctrl+I to access the ServeRAID Mini-Configuration menu.

2.   Select **Advanced Functions** from the Main Menu.

3.   Select **Copy the Configuration from Drives to the Controller**.

| |
|---|
| **Unrecoverable configuration error.** |
| **Explanation:** The configuration data stored in NVRAM does not match the configuration data stored in the EEPROM. |
| **Action:** |
| 1. Press Ctrl+I to access the ServeRAID Mini-Configuration menu. |
| 2. Select **Advanced Functions** from the Main Menu. |
| 3. Select **Restore to the Factory Default Settings**. |
| **WARNING: n logical drives are critical; n logical drives are offline.** |
| **Explanation:** One or more physical 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 blocked. A blocked logical drive cannot be accessed. |
| **Action:** Press **F4** to unblock the logical drive, or press **F5** to continue without unblocking. |

## ServeRAID ISPR, BCS, and ECS POST error codes

After the ServeRAID POST completes, register information appears on the screen in hexadecimal format, as follows:

```
Hardware:  ISPR=aaaa  BCS=bb  ECS=cc
```

ISPR displays the four-digit Interrupt Status Report Register code, BCS displays the Basic Configuration Status Register code, and ECS displays the Extended Configuration Status Register code.

For example:

```
Controller 1 Slot 5, Status:Not responding properly - Error Code=0B0
Controller 2 Slot 4, Logical Drive=0, Other=0, Firmware=2.88.10, Status=Ok
Controller 3 Slot 3, Logical Drive=0, Other=0, Firmware=3.60.13, Status=Ok
Controller 4 Slot 2, Logical Drive=1, Other=1, Firmware=1.00.09, Status=Ok
```

If no errors occur:

ISPR (*aaaa*) = EF10

BCS (*bb*) = 0F or 09

ECS (*cc*) = 00

If an error occurs, refer to: "ServeRAID POST (ISPR) error codes" on page 161 for the ISPR error codes and "Basic and Extended Configuration Status Register Codes" on page 20 for the BCS and ECS error codes.

**Basic and Extended Configuration Status Register Codes:**

| BCS | ECS | Explanation and possible recovery action |
|---|---|---|
| Code not in table | Code not in table | **Explanation:** The ServeRAID controller is not functioning properly.<br><br>**Action:** Replace the adapter or the I/O board with integrated controller. |
| 00 | 01 | **Explanation:** Invalid flash configuration.<br><br>**Action:** Start the *IBM ServeRAID Support CD* and follow the instructions that appear on the screen. |
| 00 | 02 | **Explanation:** Invalid NVRAM configuration.<br><br>**Action:** Start the *IBM ServeRAID Support CD* and follow the instructions that appear on the screen. |
| 00 | 03 | **Explanation:** Invalid flash and NVRAM configuration.<br><br>**Action:** Start the *IBM ServeRAID Support CD* and follow the instructions that appear on the screen. |
| 01 | 08 | **Explanation:** No configuration was found in drives, or online/rebuild drives are not responding.<br><br>**Action:** Press F4, F5, F7, or F10. |
| 01 | 18 | **Explanation:** No configuration was found in drives, or online/rebuild and hot-spare/standby hot-spare drives are not responding.<br><br>**Action:** Press F4, F5, F7, or F10. |
| 01 | 28 | **Explanation:** No configuration was found in drives, or online/rebuild and ready/standby drives are not responding.<br><br>**Action:** Press F4, F5, F7, or F10. |
| 01 | 38 | **Explanation:** No configuration was found in drives, or online/rebuild, hot-spare/standby hot-spare, and ready/standby drives are not responding.<br><br>**Action:** Press F4, F5, F7, or F10. |
| 01 | 48 | **Explanation:** No configuration was found in drives, or online/rebuild drives are not responding and unidentified drives were found.<br><br>**Action:** Press F4, F5, F7, or F10. |
| 01 | 58 | **Explanation:** No configuration was found in drives, or online/rebuild and hot-spare/standby hot-spare drives are not responding and unidentified drives were found.<br><br>**Action:** Press F4, F5, F7, or F10. |
| 01 | 68 | **Explanation:** No configuration was found in drives, or online/rebuild and ready/standby drives are not responding and unidentified drives were found.<br><br>**Action:** Press F4, F5, F7, or F10. |

| BCS | ECS | Explanation and possible recovery action |
|---|---|---|
| 01 | 78 | **Explanation:** No configuration was found in drives, or online/rebuild, hot-spare/standby hot-spare, and ready/standby drives are not responding and unidentified drives were found. <br><br> **Action:** Press F4, F5, F7, or F10. |
| 03 | 88 | **Explanation:** A drive was imported from another system and it has valid configuration, and online/rebuild drives are not responding. <br><br> **Action:** Press F4, F5, F7, or F10. |
| 03 | 98 | **Explanation:** A drive was imported from another system and it has valid configuration, and online/rebuild and hot spare/standby hot-spare drives are not responding. <br><br> **Action:** Press F4, F5, F7, or F10. |
| 03 | A8 | **Explanation:** A drive was imported from another system and it has valid configuration, and online/rebuild and ready/standby drives are not responding. <br><br> **Action:** Press F4, F5, F7, or F10. |
| 03 | B8 | **Explanation:** A drive was imported from another system and it has valid configuration, and online/rebuild, hot-spare/standby hot-spare, and ready/standby drives are not responding. <br><br> **Action:** Press F4, F5, F7, or F10. |
| 03 | C8 | **Explanation:** A drive was imported from another system and it has valid configuration, and online/rebuild drives are not responding and unidentified drives were found. <br><br> **Action:** Press F4, F5, F7, or F10. |
| 03 | D8 | **Explanation:** A drive was imported from another system and it has valid configuration, and online/rebuild and hot-spare/standby hot-spare drives are not responding and unidentified drives were found. <br><br> **Action:** Press F4, F5, F7, or F10. |
| 03 | E8 | **Explanation:** A drive was imported from another system and it has valid configuration, and online/rebuild and ready/standby drives are not responding and unidentified drives were found. <br><br> **Action:** Press F4, F5, F7, or F10. |
| 03 | F8 | **Explanation:** A drive was imported from another system and it has valid configuration, and online/rebuild, hot-spare/standby hot-spare, and ready/standby drives are not responding and unidentified drives were found. <br><br> **Action:** Press F4, F5, F7, or F10. |
| 07 | 08 | **Explanation:** Online/rebuild drives are not responding. <br><br> **Action:** Press F4, F5, or F10. |

| BCS | ECS | Explanation and possible recovery action |
|---|---|---|
| 07 | 0C | **Explanation:** Online/rebuild drives are not responding, and a drive was found at the incorrect SCSI ID. <br><br>**Action:** Press F4, F5, F6, or F10. |
| 07 | 18 | **Explanation:** Online/rebuild and hot-spare/standby hot-spare drives are not responding. <br><br>**Action:** Press F4, F5, or F10. |
| 07 | 1C | **Explanation:** Online/rebuild and hot spare/standby hot-spare drives are not responding, and a drive was found at the incorrect SCSI ID. <br><br>**Action:** Press F4, F5, F6, or F10. |
| 07 | 28 | **Explanation:** Online/rebuild and ready/standby drives are not responding. <br><br>**Action:** Press F4, F5, or F10. |
| 07 | 2C | **Explanation:** Online/rebuild and ready/standby drives are not responding, and a drive was found at the incorrect SCSI ID. <br><br>**Action:** Press F4, F5, F6, or F10. |
| 07 | 38 | **Explanation:** Online/rebuild, ready/standby, and hot-spare/standby hot-spare drives are not responding. <br><br>**Action:** Press F4, F5, or F10. |
| 07 | 3C | **Explanation:** Online/rebuild, ready/standby, and hot-spare/standby hot-spare drives are not responding, and a drive was found at the incorrect SCSI ID. <br><br>**Action:** Press F4, F5, F6, or F10. |
| 07 | 48 | **Explanation:** Online/rebuild drives are not responding, and unidentified drives were found. <br><br>**Action:** Press F4, F5, or F10. |
| 07 | 4C | **Explanation:** Online/rebuild drives are not responding, and a drive was found at the incorrect SCSI ID, and unidentified drives were found. <br><br>**Action:** Press F4, F5, F6, or F10. |
| 07 | 58 | **Explanation:** Online/rebuild and hot spare/standby hot-spare drives are not responding, and unidentified drives were found. <br><br>**Action:** Press F4, F5, or F10. |
| 07 | 5C | **Explanation:** Online/rebuild and hot spare/standby hot-spare drives are not responding, a drive was found at the incorrect SCSI ID, and unidentified drives were found. <br><br>**Action:** Press F4, F5, F6, or F10. |
| 07 | 68 | **Explanation:** Online/rebuild and ready/standby drives are not responding, and unidentified drives were found. <br><br>**Action:** Press F4, F5, or F10. |

| BCS | ECS | Explanation and possible recovery action |
|-----|-----|------------------------------------------|
| 07 | 6C | **Explanation:** Online/rebuild and ready/standby drives are not responding, a drive was found at the incorrect SCSI ID, and unidentified drives were found. <br><br>**Action:** Press F4, F5, F6, or F10. |
| 07 | 78 | **Explanation:** Online/rebuild, ready/standby, and hot-spare/standby hot-spare drives are not responding, and unidentified drives were found. <br><br>**Action:** Press F4, F5, or F10. |
| 07 | 7C | **Explanation:** Online/rebuild, ready/standby, and hot-spare/standby hot-spare drives are not responding, a drive was found at the incorrect SCSI ID, and unidentified drives were found. <br><br>**Action:** Press F4, F5, F6, or F10. |
| 09 | 00 | **Explanation:** No error occurred. <br><br>**Action:** No action is required. |
| 09 | 10 | **Explanation:** Hot-spare/standby hot-spare drives are not responding. <br><br>**Action:** Press F4, F5, or F10. |
| 09 | 20 | **Explanation:** Ready/standby drives are not responding. <br><br>**Action:** Press F4, F5, or F10. |
| 09 | 30 | **Explanation:** Hot-spare/standby hot-spare and ready/standby drives are not responding. <br><br>**Action:** Press F4, F5, or F10. |
| 0F | 00 | **Explanation:** No error occurred. <br><br>**Action:** No action is required. |
| 0F | 10 | **Explanation:** Hot-spare/standby hot-spare drives are not responding. <br><br>**Action:** Press F4, F5, or F10. |
| 0F | 20 | **Explanation:** Ready/standby drives are not responding. <br><br>**Action:** Press F4, F5, or F10. |
| 0F | 30 | **Explanation:** Hot-spare/standby hot-spare and ready/standby drives are not responding. <br><br>**Action:** Press F4, F5, or F10. |

## Rebuilding a defunct drive

A physical drive is defunct when there is a loss of communication between the controller and the physical drive.  This can be caused by any of the following:

- An improperly connected cable, physical drive, or controller

- A loss of power to a drive

- A defective cable, backplane, physical drive or controller

In each case, the communication problem needs to be resolved, and then a rebuild operation is required to reconstruct the data for the device in its disk array. The ServeRAID 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 controllers sets 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. Remember, however, that the logical drive might contain damaged data.

### Steps for recovering from defunct drives

If the defunct drives are part of an array, do the following:

- If more than one physical drive in an array is defunct, replace DDD drives and restore from backup.
- If a rebuild operation is in progress, wait until the rebuild is complete.
- If a rebuild is not in progress and only one physical drive in the array is defunct, replace the drive.

### Rebuilding a hot-swap drive

A hot-swap rebuild refers to a rebuild operation that is started by the ServeRAID controller when it detects that a drive that is part of a RAID-I or RAID-J array and in the defunct state has been removed and reinserted on the SCSI backplane. The reinsertion of the physical drive, whether it is the same drive or a new drive, will trigger the ServeRAID controller to start the rebuild operation. During the rebuild operation, the drive being rebuilt is in the rebuild state, and the logical drive remains critical until the rebuild operation has been successfully completed.

On IBM servers, when a hot-spare drive is available, the rebuild operation will begin automatically without the requirement to replace the failed drive.

To start a hot-swap rebuild, do the following:

1. Without removing the drive completely, gently remove the physical drive from the server, using the handle of the hot-swap tray. If necessary, refer to the documentation that comes with your server on removing a physical drive.
2. Wait 20 seconds to allow the physical drive to completely spin down.

   **Note:** When power is removed from a hot-swap drive, the drive immediately parks the heads, locks the actuator in the "landing zone", and begins spinning down. However, the spinning down of the disk might require up to 20 seconds after power is removed. Do not move the drive while it is spinning down. Moving the drive while it is spinning down may damage the drive.

3. Gently replace into the server the physical drive that you removed. Make sure the drive is completely installed in the backplane connector.

## Recovering from an incomplete format of a physical drive

During formatting of a physical drive, if the format process is stopped by a system reset, system shut down, power outage, or by some other means, the physical drive becomes inoperable.

To enable the physical drive to communicate with the ServeRAID controller again, do the following:

1. Note the channel of the ServeRAID controller to which the physical drive is connected.

2. Note the SCSI ID of the physical drive.

3. Use **ipssend format** to restart the format of the physical drive. The syntax is:

   **ipssend format** *controller channel sid*

   where:

   - *controller* is the ServeRAID controller number (1–12)
   - *channel* is the channel number for the device (1, 2, or 3)
   - *sid* is the SCSI ID for the device (0–15)

   After the **format** is complete, the ServeRAID controller will be able to recognize the drive again.

## Recovering from a failure in a failover-environment

In a failover environment, when the ServeRAID device driver is unable to send a command to the primary controller and the primary controller does not respond to a reset command, the device driver attempts to failover to the secondary controller.

**Note:** Loose cables or defective physical drives will not cause a failover to occur.

## Replacing a non-hot-plug controller in a failover pair

If a failed controller is not in a hot-plug PCI slot, do the following to replace it:

1. Shutdown the server.

2. Replace the failed controller.

3. Reconfigure the new controller.

**Notes:**

1. Be sure the firmware level of the new controller is the same as the controller you are replacing. Be sure to use the same controller name, partner name, and SCSI initiator ID for the controller you are replacing.

2. For detailed instructions, refer to the Hardware Maintenance Manual for the ServeRAID controller being serviced.

If the failed controller is in a hot-plug slot, refer to the documentation that comes with the server for instructions for replacing the controller.

## Diagnostic programs and error messages

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.

Diagnostic 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 that are indicated by error messages should be performed by trained service personnel.

Sometimes the first error to occur causes additional errors. In this case, the server displays more than one error message. Always follow the suggested action instructions for the *first* error message that appears.

The following sections contain the error codes that might appear in the detailed test log and summary log when running the diagnostic programs.

The error code format is as follows:

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

where:

**fff**      is the three-digit function code that indicates the function being tested when the error occurred. For example, function code 089 is for the microprocessor.

**ttt**      is the three-digit failure code that indicates the exact test failure that was encountered.

**iii**      is the three-digit device ID.

**date**      is the date that the diagnostic test was run and the error recorded.

**cc**      is the check digit that is used to verify the validity of the information.

**text message**      is the diagnostic message that indicates the reason for the problem.

## Text messages

The diagnostic text message format is as follows:

```
Function Name: Result (test specific string)
```

where:

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

**Result**  can be one of the following:

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

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

**User Aborted**
This result occurs when you stop the diagnostic test before it is complete.

**Not Applicable**
This result occurs when you specify a diagnostic test for a device that is not present.

**Aborted**  This result occurs when the test could not proceed because of the system configuration.

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

**Test Specific String**
This is additional information that you can use to analyze the problem.

## Starting the diagnostic programs

You can press F1 while running the diagnostic programs to obtain `Help` information. You also can press F1 from within a help screen to obtain online documentation from which you can select different categories. To exit `Help` and return to where you left off, press Esc.

To start the diagnostic programs:

1. Turn on the server and watch the screen.

   **Note:** To run the diagnostic programs, you must start the server with the highest level password that is set. That is, if an administrator password is set, you must enter the administrator password, not the power-on password, to run the diagnostic programs.

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

3. Type in the appropriate password when prompted; then, press Enter.

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

5. When the Diagnostic Programs screen appears, select the test you want to run from the list that appears; then, follow the instructions on the screen.

   **Notes:**

   a. If the server stops during testing and you cannot continue, restart the server and try running the diagnostic programs again. If the problem persists, flash server with the latest diagnostics code and run the test again.

   b. The keyboard and mouse (pointing device) tests assume that a keyboard and mouse are attached to the server.

   c. If you run the diagnostic programs with no mouse attached to the server, you will not be able to navigate between test categories using the **Next Cat** and **Prev Cat** buttons. All other functions provided by mouse-selectable buttons are also available using the function keys.

   d. You can run the USB interface test and the USB external loopback test only if there are no USB devices attached.

   e. 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.

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

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

## Viewing the test log

The test log will not contain any information until after the diagnostic program has run.

**Note:** If you already are running the diagnostic programs, begin with step 3..

To view the test log:

1. Turn on the server and watch the screen.

   If the server is on, 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. When the Diagnostic Programs screen appears, select **Utility** from the top of the screen.

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

The system maintains the test-log data while the server is powered on. When you turn off the power to the server, the test log is cleared.

## Diagnostic error message tables

For descriptions of the error messages that might appear when you run the diagnostic programs, see "Diagnostic error codes" on page 148. If diagnostic error messages appear that are not listed in those tables, make sure that the server has the latest levels of BIOS, Advanced System Management Processor, ServeRAID, and diagnostics microcode installed.

# Light path diagnostics

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

## Power supply LEDs

The AC and DC power LEDs on the power supply provide status information about the power supply. See "Installing a hot-swap power supply" on page 88 for the location of these LEDs. See "Power checkout" on page 32 for more information on power problems.



Handle

DC power light          AC power light          Filler panel
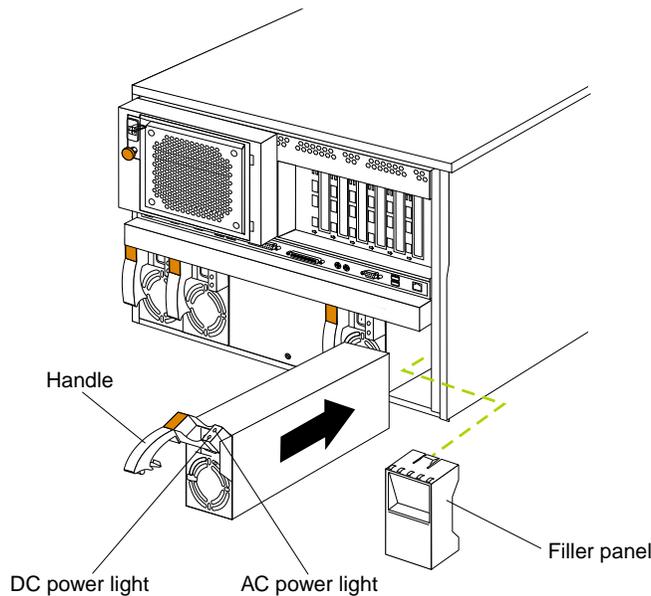
The following table describes the AC and DC power LEDs.

| AC power LED | DC power LED | Description and action |
|---|---|---|
| On | On | The power supply is on and operating correctly. |

| AC power LED | DC power LED | Description and action |
|---|---|---|
| On | Off | There is a dc power problem.<br><br>Possible causes:<br><br>1. The server is not turned on (the power LED is blinking on the front of the server).<br><br>   **Action:** Press the power-control button to start the server.<br><br>2. The power supply has failed.<br><br>   **Action:** Replace the power supply. |
| Off | Off | There is an ac power problem.<br><br>Possible causes:<br><br>1. There is no ac power to the power supply.<br><br>   **Actions:** Verify that:<br><br>   • The electrical cord is properly connected to the server.<br><br>   • The electrical outlet functions properly.<br><br>2. The power supply has failed.<br><br>   **Action:** Replace the power supply. |

## Diagnostic panel LEDs

The following illustration shows the LEDs on the diagnostics panel inside the server. See Table 1 on page 31 for information on identifying problems using these LEDs.
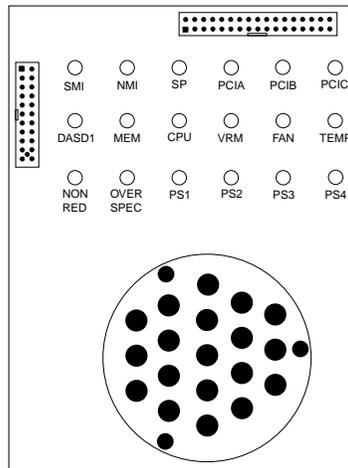


## Light path diagnostics

You can use the light path diagnostics built into the server to quickly identify the type of system error that occurred. The server is designed so that LEDs remain illuminated when the server shuts down, as long as the power supplies are operating properly. This feature helps you to isolate the problem if an error causes the server to shut down.

If the system error LED (on the information LED panel) is not lit and no diagnostics panel LEDs are lit, it means that the light path diagnostics have not detected a system error.

If the system error LED (on the information LED panel) is lit, it means that a system error was detected.  Check to see which of the LEDs on the diagnostics panel inside the server are lit and refer to the following table:

| LED | Cause | Action |
|---|---|---|
| None | The system error log is 75% or more full; a PFA alert was logged; or a failure occurred on the I2C bus. | Check the system error log and correct any problems. See "Choices available from the Configuration/Setup main menu" on page 46 for information about clearing the error log. Disconnecting the server from all power sources for at least 20 seconds will turn off the system error LED. |
| SMI | A systems management event occurred. | Restart the server. |
| NMI | A nonmaskable interrupt occurred. The PCIA, PCIB, or PCIC LED will probably also be on. | 1. If the PCIA, PCIB, or PCIC LED is not on, restart the server.<br><br>If the problem persists, try to determine the failing adapter by removing one adapter at a time and restarting the server after each adapter is removed. |
| SP | The service processor has failed. | 1. Run service processor diagnostics.<br>2. Replace Legacy I/O board. |
| PCIA | An error occurred on PCI bus A. An adapter in PCI slot 1 or 2, or the processor board caused the error. | 1. Check the error log for additional information.<br>2. If you cannot correct the problem from the information in the error log, try to determine the failing adapter by removing one adapter at a time from PCI bus A (PCI slots 1–2) and restarting the server after each adapter is removed. |
| PCIB | An error occurred on PCI bus B. An adapter in PCI slot 3, 4, 5, or 6 or the processor board caused the error. | 1. Check the error log for additional information.<br>2. If you cannot correct the problem from the information in the error log, try to determine the failing adapter by removing one adapter at a time from PCI bus B (PCI slots 3–6) and restarting the server after each adapter is removed. |
| PCIC | An error occurred on PCI bus C. An error on the processor or I/O board caused the problem. | Check the error log for additional information. If the error log indicates a problem with the integrated SCSI controller, the Ethernet controller or video controller, see "Starting the diagnostic programs" on page 26. |
| DASD | A hot-swap hard disk drive has failed on SCSI channel B. | 1. If the TEMP LED is also on, take the actions listed for that LED.<br>2. If the amber status LED on one of the hot-swap hard disk drives is on, replace the drive. |
| MEM | A memory error occurred. | 1. Check the DIMM error LEDs on the memory board.<br>2. Replace the DIMM indicated by the lit DIMM error LEDs. |
| CPU | One of the microprocessors has failed or a microprocessor is installed in the wrong connector. | 1. Check the microprocessor error LEDs on the memory board. If a microprocessor error LED is on for a microprocessor connector that has a terminator card installed instead of a microprocessor, the microprocessors are not installed in the correct order. See "Installing a microprocessor kit" on page 86 for information about the correct order for installing microprocessors and VRMs. Otherwise, continue with the next step.<br>2. Turn off the server, reseat the microprocessor indicated by the lit microprocessor error LED, and restart the server.<br>3. If the problem persists, replace the microprocessor. |
| VRM | One of the voltage regulator modules on the processor board has failed. | 1. Check the VRM error LEDs on the processor board.<br>2. Turn off the server, reseat the VRM indicated by the lit VRM error LED, and restart the server.<br>3. If the problem persists, replace the VRM. |
| FAN | One of the fan assemblies has failed or is operating too slowly.<br><br>**Note:** A failing fan can also cause the TEMP and DASD LEDs to be on. | The LED on the failing fan assembly will be lit. Replace the fan assembly. |

*Table 1. Light path diagnostics.*

| LED | Cause | Action |
|---|---|---|
| TEMP | The system temperature has exceeded the maximum rating. | 1. Check to see if a fan has failed. If it has, replace the fan. 2. Make sure the room temperature is not too high. (See "Features and specifications" on page 3.) If the problem persists, see "Temperature checkout". |
| NON RED | Server drawing too much power to operate in a redundant power mode. | System can continue to operate in a nonredundant power mode. To operate in a redundant mode, add a power supply or remove most recently installed options. |
| OVER SPEC | The server is drawing more power than the power supplies are rated for. | Either add a power supply or remove a device from the server. |
| PS1 | The first power supply has failed. | Replace the first power supply. |
| PS2 | The second power supply has failed. | Replace the second power supply. |
| PS3 | The third power supply has failed. | Replace the third power supply. |
| PS4 | The fourth power supply has failed. | Replace the fourth power supply. |

*Table 1. Light path diagnostics.*

# Power checkout

Power problems can be difficult to troubleshoot. For instance, a short circuit can exist anywhere on any of the power distribution busses. Usually a short circuit will cause the power subsystem to shut down because of an overcurrent condition.

A general procedure for troubleshooting power problems is as follows:

1. Power off the system and disconnect the AC cord(s).

2. Check for loose cables in the power subsystem. Also check for short circuits, for instance if there is a loose screw causing a short circuit on a circuit board.

3. Remove adapters and disconnect the cables and power connectors to all internal and external devices until system is at minimum configuration required for power on (see "Minimum operating requirements" on page 154).

4. Reconnect the AC cord and power on the system. If the system powers up successfully, replace adapters and devices one at a time until the problem is isolated. If system does not power up from minimal configuration, replace FRUs of minimal configuration one at a time until the problem is isolated.

To use this method it is important to know the minimum configuration required for a system to power up (see page 154). For specific problems, see "Power error messages" on page 167.

# Temperature checkout

Proper cooling of the system is important for proper operation and system reliability. For a typical server, you should make sure:

• Each of the drive bays has either a drive or a filler panel installed

• Each of the power supply bays has either a power supply or a filler panel installed

• The top cover is in place during normal operation

• There is at least 50 mm (2 inches) of ventilated space at the sides of the server and 100 mm (4 inches) at the rear of the server

- The top cover is removed for no longer than 30 minutes while the server is operating

- The processor housing cover covering the processor and memory area is removed for no longer that ten minutes while the server is operating

- A removed hot-swap drive is replaced within two minutes of removal

- Cables for optional adapters are routed according to the instructions provided with the adapters (ensure that cables are not restricting air flow)

- The fans are operating correctly and the air flow is good

- A failed fan is replaced within 48 hours

In addition, ensure that the environmental specifications for the system are met. See "Features and specifications" on page 3.

For more information on specific temperature error messages, see "Temperature error messages" on page 166.

# Recovering BIOS

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

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

- Use the ServerGuide program to make a BIOS flash diskette.

- Download a BIOS flash diskette from the World Wide Web. Go to http://www.pc.ibm.com/support/, select IBM Server Support, and make the selections for the server.

The flash memory of the server consists of a primary page and a backup page. The J56 jumper controls which page is used to start the server. If the BIOS in the primary page is corrupted, you can use the backup page to start the server; then boot the BIOS Flash Diskette to restore the BIOS to the primary page.

To recover the BIOS:

1. Turn off the server and peripheral devices and disconnect all external cables and power cords; then, remove the cover.

2. Locate jumper J56 on the processor board (see "Processor board jumpers" on page 57).

3. Move J56 to pins 1 and 2 to enable secondary boot block page.

4. Insert the BIOS flash diskette into the diskette drive.

5. Restart the server.

6. The system begins the power-on self-test (POST). Select 1 – Update POST/BIOS from the menu that contains various flash (update) options.

7. When you are asked if you would like to move the current POST/BIOS image to the backup ROM location, type **N**.

   **Attention:** Typing Y will copy the corrupted BIOS into the secondary page.

8. When you are asked if you would like to save the current code to a diskette, select **N**.

9. You will be asked to choose which language you wish to use. Select your language (0-7) and press **Enter** to accept your choice. You will be prompted to remove the diskette and press **Enter** to restart the system. Remove the flash diskette from the diskette drive.

> **Attention:** Do not press **Enter** to reboot the system at this time.

10. Power-off the server.

11. Move jumper J56 back to pins 2 and 3 to return to normal startup mode.

12. Restart the server. The system should start up normally.

# Replacing the battery

IBM has designed this product with your safety in mind. The lithium battery must be handled correctly to avoid possible danger. If you replace the battery, you must adhere to the following instructions.

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

*Do not:*

• **Throw or immerse into water**

• **Heat to more than 100° C (212° F)**

• **Repair or disassemble**

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

**Note:** In the U.S., 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.

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

To replace the battery:

1. Read the information in "Before you begin" on page 58.

2. Follow any special handling and installation instructions supplied with the battery.

3. Turn off the server and all attached devices and disconnect all external cables and power cords (see "Safety information" on page 180); then remove the top cover.

4. Locate the battery on the processor board (see "Processor board component locations" on page 55).

5. Remove adapters as necessary so you can access the battery. (See "Working with adapters" on page 61.)

6. Lift and remove the plastic dividers by pressing the latches on the top ends of the dividers toward the dividers and lifting the dividers from the server.

7. 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.
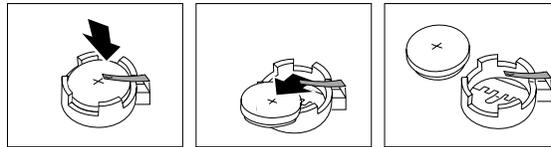
8. Insert the new battery:

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.
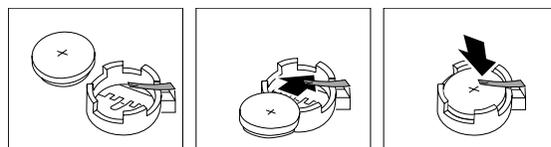
9. Reinstall any adapters that you removed.

10. Insert the plastic dividers into the divider guides.

11. Reinstall the top cover.

   **Note:** You must wait approximately 20 seconds after you plug the power cord of your server into an electrical outlet before the power control button becomes active.

12. Start the Configuration/Setup Utility program and set configuration parameters as needed. Refer to "Using the Configuration/Setup Utility program" on page 45.

# Diagnosing errors

To find solutions to problems that have definite symptoms, see "Error symptoms" on page 153.

If you cannot find the problem there, go to "Starting the diagnostic programs" on page 26 to test the server.

If you have just added new software or a new option and the server is not working, do the following before using the error symptoms table:

• Remove the software or device that you just added.

• Run the diagnostic tests to determine if the server is running correctly.

• Reinstall the new software or new device.

## Troubleshooting the Ethernet controller

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

## Network connection problems

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

- Make sure that the cable is installed correctly.

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

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

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

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

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

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

    — The Ethernet Link Status light illuminates when the Ethernet controller receives a LINK pulse from the hub. If the light is off, there might be a defective connector or cable, or a problem with the hub.

    — The Ethernet Transmit/Receive Activity light illuminates when the Ethernet controller sends or receives data over the Ethernet Network. If the Ethernet Transmit/Receive Activity light is off, make sure that the hub and network are operating and that the correct device drivers are loaded.

    — The Ethernet Speed 100 Mbps light illuminates when the Ethernet controller LAN speed is 100 Mbps.

- Make sure that you are using the correct device drivers, supplied with the server.
- Check for operating system-specific causes for the problem.
- Make sure that the device drivers on the client and server are using the same protocol.
- Test the Ethernet controller.

    How you test the Ethernet controller depends on which operating system you are using (see the Ethernet controller device driver README file).

## Ethernet controller troubleshooting chart

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

*Table 2. Ethernet troubleshooting chart.*

| Ethernet controller problem | Suggested Action |
|---|---|
| The server stops running when loading device drivers. | The PCI BIOS interrupt settings are incorrect.<br><br>Check the following:<br><br>• Determine if the interrupt (IRQ) setting assigned to the Ethernet controller is also assigned to another device in the Configuration/Setup Utility program.<br><br>Although interrupt sharing is allowed for PCI devices, some devices do not function well when they share an interrupt with a dissimilar PCI device. Try changing the IRQ assigned to the Ethernet controller or the other device. For example, for NetWare Versions 3 and 4 it is recommended that disk controllers not share interrupts with LAN controllers.<br><br>• Make sure that you are using the most recent device driver available from the World Wide Web.<br><br>• Run the network diagnostic program. |
| Ethernet Link Status light does not light. | Check the following:<br><br>• Make sure that the hub is turned on.<br><br>• Check all connections at the Ethernet controller and the hub.<br><br>• Check the cable. A crossover cable is required unless the hub has an *X* designation.<br><br>• Use another port on the hub.<br><br>• If the hub does not support auto-negotiation, manually configure the Ethernet controller to match the hub.<br><br>• If you manually configured the duplex mode, make sure that you also manually configure the speed.<br><br>• Run diagnostics on the LEDs. |
| The Ethernet Transmit/ Receive Activity light does not light. | Check the following:<br><br>**Note:** The Ethernet Transmit/Receive Activity LED illuminates only when data is sent to or by this Ethernet controller.<br><br>• Make sure that you have loaded the network device drivers.<br><br>• The network might be idle. Try sending data from this workstation.<br><br>• Run diagnostics on the LEDs.<br><br>• The function of this LED can be changed by device driver load parameters. If necessary, remove any LED parameter settings when you load the device drivers. |
| Data is incorrect or sporadic. | Check the following:<br><br>• Make sure that you are using Category 5 cabling when operating the server at 100 Mbps.<br><br>• Make sure that the cables do not run close to noise-inducing sources like fluorescent lights. |
| The Ethernet controller stopped working when another adapter was added to the server. | Check the following:<br><br>• Make sure that the cable is connected to the Ethernet controller.<br><br>• Make sure that the PCI system BIOS is current.<br><br>• Reseat the adapter.<br><br>• Determine if the interrupt (IRQ) setting assigned to the Ethernet adapter is also assigned to another device in the Configuration/Setup Utility program.<br><br>Although interrupt sharing is allowed for PCI devices, some devices do not function well when they share an interrupt with a dissimilar PCI device. Try changing the IRQ assigned to the Ethernet adapter or the other device. |

*Table 2. Ethernet troubleshooting chart.*

| Ethernet controller problem | Suggested Action |
|---|---|
| The Ethernet controller stopped working without apparent cause. | Check the following:<br><br>• Run diagnostics for the Ethernet controller.<br><br>• Try a different connector on the hub.<br><br>• Reinstall the device drivers.  Refer to the operating-system documentation and to the ServerGuide information. |

# Ethernet controller messages

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

• Novell™ NetWare™ or IntraNetWare Server ODI
• NDIS Adapter for level 4.0 (Windows NT)
• SCO™ UNIX LLI

## Novell NetWare or IntraNetWare server ODI driver messages

This section provides explanations of the error messages for the Novell NetWare or IntraNetWare server ODI driver, and suggested actions to resolve each problem.

| | |
|---|---|
| PCNTNW-NW-026 | **The MSM is unable to parse a required custom keyword.**<br><br>**Explanation:** The user entered an incorrect parameter keyword.<br>**Action:**  Reload the driver using the correct keyword. |
| PCNTNW-NW-054 | **The adapter did not respond to the initialization command.**<br><br>**Explanation:** The adapter did not respond when the driver tried to initialize it.<br>**Action:**  Verify that the Ethernet controller is enabled.  If the Ethernet controller is enabled, go to "Starting the diagnostic programs" on page 26 to run the diagnostic programs. |
| PCNTNW-NW-058 | **The adapter did not respond to the initialization command.**<br><br>**Explanation:** The interrupt request (IRQ) setting might not be valid or the EEPROM information might be incorrect.<br>**Action:**  Make sure the IRQ settings are correct in the Configuration/Setup Utility program. for information on setting the interrupt requests.  If the IRQ settings are correct, go to "Starting the diagnostic programs" on page 26 to run the diagnostic programs. |
| PCNTNW-NW-066 | **The cable might be disconnected from the adapter.**<br><br>**Explanation:** The cable might be disconnected from the server Ethernet port.<br>**Action:**  Verify that a cable is connected to the Ethernet port. |

*Table 3. Novell NetWare or IntraNetWare ODI driver messages for the Ethernet controller.*

| | |
|---|---|
| **PCNTNW-NW-071** | **The matching virtual adapter could not be found.**<br><br>**Explanation:** You tried to load another instance of the driver with a different I/O address. This new adapter could not be found.<br>**Action:** Verify that you installed an IBM 10/100 Fault Tolerant Adapter and make sure that the adapter is seated correctly.  If the adapter is seated correctly, go to "Starting the diagnostic programs" on page 26 to run the diagnostic programs. |
| **PCNTNW-NW-072** | **A resource tag is unavailable**.<br><br>**Explanation:** The driver tried to allocate some resources that were not available.<br>**Action:** Add more memory, or free some memory resources in the server. Then, restart the server. |
| **PCNTNW-NW-073** | **Unable to allocate memory**<br><br>**Explanation:**  The driver failed to allocate the memory needed for normal operation.<br>**Action:** Add more memory, or free some memory resources in the server. Then, restart the server. |
| **PCNTNW-NW-074** | **The hardware interrupt cannot be set.**<br><br>**Explanation:** An attempt was made to initialize a given hardware interrupt. The attempt was not successful.<br>**Action:**  Verify that the Ethernet controller is enabled. If the Ethernet controller is enabled, go to "Starting the diagnostic programs" on page 26 to run the diagnostic programs.<br><br>If you have an Ethernet adapter installed, make sure that the adapter does not share an IRQ with any other device. |
| **PCNTNW-NW-075** | **The Multiple Link Interface Driver (MLID) cannot be registered with the Link Support Layer (LSL).**<br><br>**Explanation:** An error occurred while the driver was trying to register with the LSL.<br>**Action:** Check the version of the NetWare or IntraNetWare Operating System. Make sure that this driver is correct for the version of NetWare or IntraNetWare that you are using. Restart the server. |
| **PCNTNW-NW-079** | **The Multiple Link Interface Driver (MLID) did not initialize MSMTx Free Count.**<br><br>**Explanation:** The MSMTx Free Count is not initialized correctly.<br>**Action:** Restart the server. If the problem persists, go to "Starting the diagnostic programs" on page 26 to run the diagnostic programs. |
| **PCNTNW-NW-086** | The driver parameter block is too small.<br><br>**Explanation:**  The driver parameter block is too small.<br>**Action:** Restart the server. If the problem persists, go to "Starting the diagnostic programs" on page 26 to run the diagnostic programs. |
| **PCNTNW-NW-087** | The media parameter block is too small.<br><br>**Explanation:** The driver media parameter block is too small.<br>**Action:** Restart the server. If the problem persists, go to "Starting the diagnostic programs" on page 26 to run the diagnostic programs. |

*Table 3. Novell NetWare or IntraNetWare ODI driver messages for the Ethernet controller.*

| | |
|---|---|
| **PCNTNW-NW-091** | The hardware configuration conflicts. |
| | **Explanation:** You tried to load a new frame type for the existing controller. The hardware assumptions made in doing so are incorrect. This error can also occur if you try to specify a mode (such as, redundancy) that conflicts with another specified mode. |
| | **Action:** Make sure that your hardware configuration matches the software settings. |
| **PCNTNW-NW-126** | The group bit in the node address override was cleared. |
| | **Explanation:** The IEEE address has a group bit that indicates that an address belongs to a group of stations. This bit is used only as a destination address; it cannot be used as a source address. You tried to enter a source address with this bit set. The driver cleared the group bit of the source address. |
| | **Action:** None necessary, message is for information only. |
| **PCNTNW-NW-127** | The local bit in the node address override was set. |
| | **Explanation:** The local bit in the IEEE address format indicates that the addresses are being managed locally. If you use the node address override capabilities of this driver to enter a new address, the local bit must be set. You entered an address without the local bit set. The driver has set the local bit. |
| | **Action:** None necessary, message is for information only. |
| **PCNTNW-NW-164** | The device was not found. |
| | **Explanation:** The driver cannot find an Ethernet controller in the server. |
| | **Action:** Verify that the Ethernet controller is enabled. If the Ethernet controller is enabled, go to "Starting the diagnostic programs" on page 26 to run the diagnostic programs. |
| **PCNTNW-NW-165** | The device was not found at IOADDRESS. |
| | **Explanation:** The Ethernet controller cannot be found at the I/O address specified. |
| | **Action:** The Ethernet controller does not require a parameter for the I/O address. Remove the I/O address parameter. |
| **PCNTNW-NW-167** | PCI scan specified, device not found. |
| | **Explanation:** The driver cannot locate the Ethernet controller on the PCI bus. |
| | **Action:** Verify that the Ethernet controller is enabled. If the problem persists, go to "Starting the diagnostic programs" on page 26 to run the diagnostic programs. |
| **PCNTNW-NW-180** | The DMA parameter is not necessary for PCI device. |
| | **Explanation:** The Ethernet controller does not require a DMA setting. |
| | **Action:** None necessary, message is for information only. |

*Table 3. Novell NetWare or IntraNetWare ODI driver messages for the Ethernet controller.*

## NDIS 4.0 (Windows NT) driver messages

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

*Table 4. NDIS (Windows NT) driver messages for the Ethernet controller.*

| PermaNet™ Server: | **No Secondary Adapter Found.  Grouping Mode is disabled.**<br><br>**Explanation:** The failover option requires an adapter that is compatible with the device driver of the Ethernet controller on the system board.  No such adapter was found.<br>**Action:** Make sure the correct adapter is installed. |
|---|---|
| PermaNet Server: | **Problem Occurs on the Primary Adapter.  Switching over to the Secondary Adapter.**<br><br>**Explanation:** The system detected a problem with the primary Ethernet connection and has transferred all network traffic to the secondary Ethernet controller.<br>**Action:** identify the cause of the failure on the primary Ethernet connection.  Restoring the operational state of the primary connection will cause the network traffic to automatically transfer to the primary Ethernet controller. |
| PermaNet Server: | **Switching back to Primary Adapter.**<br><br>**Explanation:** The primary Ethernet connection is now operating correctly.  Network traffic will automatically transfer to the primary Ethernet controller.<br>**Action:** None needed, message is for information only. |

## UNIX messages

This section provides descriptions of the Ethernet error messages for the SCO UNIX LLI driver, and suggested actions to resolve each problem.

*Table 5. UNIX LLI driver messages for the Ethernet controller.*

| pnt0-2 | **PCI search specified, PCI device not found!**<br><br>**Explanation:** The driver cannot locate the Ethernet controller on the PCI bus.<br>**Action:**<br><br>• Run the NETCONFIG program to search for another Ethernet controller<br><br>• Verify that the Ethernet controller is enabled.  If the Ethernet controller is enabled, run the diagnostic programs. |
|---|---|
| pnt0-6 | **Cannot allocate memory for the adapter during an interrupt.  Please check the Streams parameters.**<br><br>**Explanation:** On a SunSoft Solaris system, this message indicates that the system is out of Streams memory blocks.<br>**Action:** Use the CRASH utility to increase the number of Streams memory blocks.  Modify the interrupt request (IRQ) settings in the Configuration/Setup Utility program, or run the NETCONFIG program to match the hardware settings. |
| pnt0-7 | **Cannot allocate memory for the adapter during reset.  Please check the Streams parameters.**<br><br>**Explanation:** The system is out of Streams memory blocks.<br>**Action:** Use the CRASH utility to increase the number of Streams memory blocks. |
| pnt0-11 | **Device not found!**<br><br>**Explanation:** The driver cannot find an Ethernet controller.<br>**Action:** Verify that the Ethernet controller is enabled.  If the Ethernet controller is enabled, run the diagnostic programs. |

*Table 5. UNIX LLI driver messages for the Ethernet controller.*

| pnt0-12 | **Device failed checksum test!** |
|---|---|
| | **Explanation:** The driver cannot find an Ethernet controller. |
| | **Action:** Verify that the Ethernet controller is enabled.  If the Ethernet controller is enabled, run the diagnostic programs. |
| pnt0-13 | **add_intr_handler failed!  Interrupts already enabled.** |
| | **Explanation:** The interrupt request (IRQ) that was specified, or the IRQ that was found, conflicts with other devices in the server. |
| | **Action:** Modify the hardware settings. |
| pnt0-14 | **Cannot locate hardware.** |
| | **Explanation:** The SunSoft Solaris driver cannot find any Ethernet controller. |
| | **Action:** Verify that the Ethernet controller is enabled.  If the Ethernet controller is enabled, run the diagnostic programs. |
| pnt0-15 | **No more devices to open.** |
| | **Explanation:** The SunSoft Solaris driver cannot find any more Ethernet controllers.   **Action:** Verify that additional IBM 10/100 Fault Tolerant Adapters are present or replace the Ethernet adapter that fails to respond.  If the problem persists, run the diagnostic programs. |
| pnt0-17 | **Device fault...Reset initiated!** |
| | **Explanation:** The SunSoft Solaris driver has been reset due to a device fault. |
| | **Action:** Verify that additional IBM 10/100 Fault Tolerant Adapters are present or replace the Ethernet adapter that fails to respond.  If the problem persists, run the diagnostic programs. |
| pnt0-19 | **IRQ found for PCnet hardware does not match space.c (or pnt.conf)!** |
| | **Explanation:** This is a warning message referring to the interrupt request (IRQ) that the SunSoft Solaris driver found in the system. |
| | **Action:** Ignore this message if you are sure that this is what you want to do.  Otherwise, run the NETCONFIG program to match the hardware settings |
| pnt0-20 | **add_intr_handler failed!  Unknown interrupt type.** |
| | **Explanation:** The interrupt request (IRQ) that was specified, or the IRQ that was found, conflicts with other devices in the server.  **Action:** |
| | • Modify the hardware settings. |
| | • Run the NETCONFIG program to search for another Ethernet controller. |
| pnt0-21 | **add_intr_handler failed!  Out of range interrupt number.** |
| | **Explanation:** The interrupt request (IRQ) that was specified, or the IRQ that was found, conflicts with other devices in the server.  **Action:** |
| | • Modify the hardware settings. |
| | • Run the NETCONFIG program to search for another Ethernet controller. |
| pnt0-22 | **add_intr_handler failed!  Out of range IPL.** |
| | **Explanation:** The interrupt request (IRQ) that was specified, or the IRQ that was found, conflicts with other devices in the server. |
| | **Action:** Modify the hardware settings.  Run the NETCONFIG program to search for another Ethernet controller. |

*Table 5. UNIX LLI driver messages for the Ethernet controller.*

| | |
|---|---|
| **pnt0-23** | **add_intr_handler failed!  Vector already occupied.**<br><br>**Explanation:**  The interrupt request (IRQ) that was specified, or the IRQ that was found, conflicts with other devices in the server.<br>**Action:**  Modify the hardware settings. |
| **pnt0-24** | **add_intr_handler failed! Vector already shared at different IPL.**<br><br>**Explanation:**  The interrupt request (IRQ) that was specified, or the IRQ that was found, conflicts with other devices in the server.  **Action:**<br><br>•    Modify the hardware settings.<br><br>•    Run the NETCONFIG program to search for another Ethernet controller. |
| **pnt0-26** | **The DMA number is not necessary for PCI device.**<br><br>**Explanation:**  The IBM 10/100 Fault Tolerant Adapter does not require a DMA setting.<br>**Action:**  Edit the SPACE.C file to delete the DMA parameter. |
| **pnt0-29** | **The IRQ number is already in use.**<br><br>**Explanation:**  The specified I/O address is already in use.<br>**Action:**  Run the NETCONFIG program to modify the hardware settings. |
| **pnt0-31** | **I/O address is not necessary for the PCI device.**<br><br>**Explanation:**  The I/O address specified is not required.<br>**Action:**  Remove the assigned I/O address specified for the Ethernet controller. |

# Configuring the server

The following configuration programs are provided with the server:

- **Configuration/Setup Utility**

  This program is part of the *basic input/output system* (*BIOS*) code that comes with the server. You can use this program to configure serial and parallel port assignments, change interrupt request (IRQ) settings, change the drive startup sequence, set the date and time, and set passwords. See "Using the Configuration/Setup Utility program" for more information.

- **SCSISelect Utility**

  With the built-in SCSISelect Utility program, you can configure the devices attached to the integrated SCSI controller. See "Using the SCSISelect utility program" on page 51 for more information.

- **ServeRAID programs**

  The ServeRAID programs come with the optional ServeRAID adapters and with server models that have a ServeRAID adapter preinstalled. If the server has a ServeRAID adapter installed, you must use the ServeRAID Configuration program to define and configure the disk-array subsystem *before* you install the operating system. See "Using IBM ServeRAID" on page 117 for more detailed information.

- **ServerGuide CDs**

  The ServerGuide CDs include software setup and installation tools specifically designed for IBM xSeries servers. You can use these CDs during the initial installation of the server to configure the server hardware and simplify the network operating system installation. The ServerGuide CDs also contain a collection of application programs, which you can install after the server is up and running.

## Using the  Configuration/Setup Utility program

This section provides the instructions needed to start the Configuration/Setup Utility program and descriptions of the menu choices available.

### Starting the Configuration/Setup Utility program

To start the Configuration/Setup Utility program:

1. Turn on the server and watch the monitor screen.

2. When the message `Press F1 for Configuration/Setup` appears, press F1.

   **Note:** If you have set both levels of passwords (user and administrator), you must enter the administrator password to access the full Configuration/Setup menu.

3. Follow the instructions that appear on the screen.

# Choices available from the Configuration/Setup 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:

```
IBM Server Setup - © IBM Corporation  2001

        Configuration/Setup Utility
            System Summary
            System Information
            Devices and I/O Ports
            Date and Time
            System Security
            Start Options
            Advanced Setup
            Error Logs

            Save Settings
            Restore Settings
            Load Default Settings

            Exit Setup


        <F1>  Help              <  > <  > Move
        <Esc> Exit               <Enter> Select
```
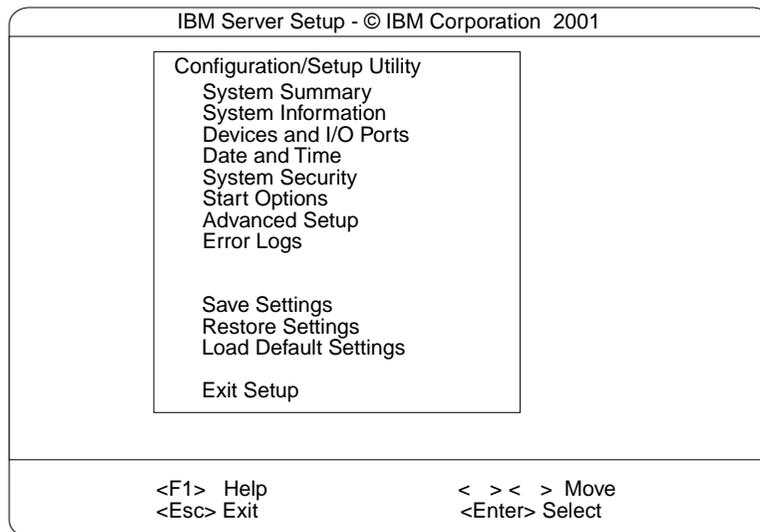
**Notes:**

1. You can press F1 to display Help information for a selected menu item.

2. The choices on some menus might differ slightly, depending on the BIOS version in the server.

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

- **System Summary**

  Select this choice to display configuration information. This includes the type and speed of the microprocessors and the amount of memory installed.

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

  This choice appears on both the full and limited Configuration/Setup Utility menus.

- **System Information**

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

  — **Product Data**

    Select this choice to view system information, such as the machine type and model, the server serial number, and the revision level or issue date of the BIOS stored in the flash electronically erasable programmable ROM (EEPROM).

  — **System Card Data**

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

- **Devices and I/O Ports**

  Select this choice to view or change the assignments for devices and input/output ports. This choice appears only on the full Configuration/Setup Utility main menu.

- **Date and Time**

  Select this choice to set the system date and time and to change the system time sent to the Advanced System Management Processor (service processor) when the server is started. This choice appears only on the full Configuration/Setup Utility main menu.

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

  You can set a time delta to be added or subtracted from the system time that is sent to the service processor (Advanced System Management Processor) each time the server is started. Use the number keys to enter the hours and minutes and + or −to add or subtract from the system time. If you want the system clock time to be the same as the Advanced System Management Processor clock time, leave the value set at its default of 0.

- **System Security**

  Select this choice to set passwords or a system owner's name. This choice appears only on the full Configuration/Setup Utility main menu.

  You can implement two levels of password protection:

  — **Power-on Password**

    Select this choice to set or change a power-on password. See "Using passwords" on page 49 for more information.

  — **Administrator Password**

    Select this choice to set or change an administrator password.

    **Attention:**

    If an administrator password is set and then forgotten, it cannot be overridden or removed. You must replace the I/O Legacy board.

    The administrator password provides access to all choices on the Configuration/Setup Utility main menu. You can set, change, or delete both the administrator and power-on passwords, and allow a power-on password to be changed by the user.

    See"Using passwords" on page 49 for more information.

  — **System Owner's Name**

    Select this choice to specify a system owner's name, which will display during POST. You can remove or change the name only from the System Security menu. You can use any combination of up to 16 characters for the system owner's name.

- **Start Options**

  Select this choice to view or change the start options. This choice appears only on the full Configuration/Setup Utility main menu. 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 without a diskette drive, monitor, or keyboard.

  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 also can select which PCI SCSI adapter is given boot precedence. The first drive that is attached to the selected adapter will be assigned drive number 80L and the operating system will start from that drive. The default for boot precedence is Disabled. The range of choices depends upon the number of PCI SCSI adapters installed in the server.

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.

- **Advanced Setup**

  Select this choice to change values for advanced hardware features, such as cache control, and PCI configuration. This choice appears only on the full Configuration/Setup Utility main menu.

  A warning message appears 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.

  — **Processor Serial Number Access**

    Select this choice to identify if the microprocessor serial number in the microprocessor is readable.

  — **Core Chipset Control**

    Select this choice to modify settings that control features of the core chip set.

    **Attention:** Changes here must only be made by an IBM authorized service representative.

  — **Cache Control**

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

  — **PCI Slot/Device Information**

    Select this choice to view and identify system resources used by PCI devices. PCI devices automatically communicate with the server configuration information. This usually results in automatic configuration of a PCI device.

    **Attention:** You must use the menu selections to save custom settings for the PCI Slot/Device Information choice. The save, restore and load default settings choices on the main menu of the Configuration/Setup Utility do not save the PCI Slot/Device Information settings.

    After making changes, select:

    – **Save and exit the PCI Utility** to save the changes and return to the Advanced Setup choice.

    – **Exit the PCI Utility without saving changes** to ignore the changes, restore the previous settings, and return to the Advanced Setup choice.

  — **PCI Device Control** allows you to enable or disable the integrated SCSI, video, and Ethernet controllers. You can also enable or disable PCI slots from this menu.

    – The default setting is Enable for all the controllers and PCI slots. If you select Disable, the system will not configure the disabled device and the operating system will not see the device. (This is equivalent to unplugging the device.)

    – If the on-board SCSI controller is disabled and no other controller and mass storage device are installed, operating system startup cannot occur.

- If the video controller is disabled and no video adapter is installed, the server will have no video capability. However, turning the server off and on three times without completing POST results in a default startup that enables video again.

— **Memory Settings**

Select this choice to manually disable or enable a bank of memory.

If a memory error is detected during POST or memory configuration, the server can automatically disable the failing memory bank and continue operating with reduced memory capacity. If this occurs, you must manually enable the memory bank after the problem is corrected. Select **Memory Settings** from the Advanced Setup menu, use the arrow keys to highlight the bank that you want to enable; then, use the arrow keys to select **Enable**.

• **System Service Processor Settings**

Select this choice to enable or disable power supply redundancy monitoring.

• **Event/Error Logs**

Select this choice to view or clear error logs.

— Select **Clear error logs** to clear the error or event log.

— Select **POST Error Log** to view the three most recent error codes and messages that the system generated during POST.

— Select **System Event/Error Log** to view the system event/error log. The system event/error log contains all the system error and warning messages that the system has generated. You can use the arrow keys to move between pages in the system event/error log.

• **Save Settings**

Select this choice to save the customized settings.

• **Restore Settings**

Select this choice to delete the changes and restore the previous settings.

• **Load Default Settings**

Select this choice to cancel the changes and restore the factory settings.

• **Exit Setup**

If you have made any changes, the program will prompt you to save the changes or exit without saving the changes.

# Using passwords

The **System Security** choice appears only on the full Configuration/Setup Utility menu. After you select this choice, you can implement two levels of protection: power-on password and administrator password.

## Power-on password

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

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. If you forget the power-on password, you can regain access to the server through one of the following methods:

- If an administrator password is set, enter the administrator password at the power-on prompt. Start the Configuration/Setup Utility program and change the power-on password.

- Change the position of the password override switch as described in "Setting the password override switch:".

- Remove the battery and then install the battery.

**Setting the password override switch::**  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. Start the Configuration/Setup Utility program and change the power-on password.  See "Power-on password" on page 49

- Change the position of the jumper on J48 to bypass the power-on password check. You can then start the Configuration/Setup Utility program and change the power-on password.  See "Processor board component locations" on page 55 for the location of J48.

## Administrator password

Select this choice to set an administrator password.  The administrator password provides access to all choices on the Configuration/Setup Utility main menu.  You can set, change, or delete both the administrator and power-on passwords, and allow a power-on password to be changed by the user.

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

The following table provides a summary of the password features.

*Table 6. Power-on and administrator password features.*

| Type of password | Results |
|---|---|
| Power-on password | • Enter the password to complete the system startup.<br><br>• All choices are available on the Configuration/Setup Utility main menu. |
| Administrator password | • No password is required to start the system.<br><br>• Enter the password to access the Configuration/Setup Utility program.<br><br>• All choices are available on the Configuration/Setup Utility main menu. |
| Administrator *and* power-on password | • You can enter either password to complete the system startup.<br><br>• The administrator password provides access to all choices on the Configuration/Setup Utility main menu.  You can set, change, or delete both the administrator and power-on passwords, and allow a power-on password to be changed by the user.<br><br>• The power-on password provides access to a limited set of choices on the Configuration/Setup Utility main menu.  This limited access might include changing or deleting the power-on password. |

# Using the SCSISelect utility program

SCSISelect is a built-in, menu-driven configuration utility program that you can use to:

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

The following sections provide the instructions needed to start the SCSISelect Utility and descriptions of the menu choices available.

**Note:** If the server has a RAID adapter installed, use the configuration method supplied with the RAID adapter to view or change SCSI settings for RAID attached devices.

## Starting the SCSISelect utility program

To start the SCSISelect utility program:

1. Turn on the server.
2. When the `<<< Press <CTRL><A> for SCSISelect™ Utility! >>>` prompt appears, press Ctrl+A.

   **Note:** If an administrator password has been set, a prompt appears asking you to enter the password to start the SCSISelect Utility program.

3. When prompted, select either channel A (external) or channel B (internal).
4. Use the arrow keys to select a choice from the menu.

   - Press Esc to return to the previous menu.
   - Press the F5 key to switch between color and monochrome modes (if the monitor permits).

5. Follow the instructions on the screen to change the settings of the selected items; then, press Enter.

## Choices available from the SCSISelect menu

The following choices appear on the SCSISelect Utility menu:

- **Configure/View Host Adapter Settings**

  Select this choice to view or change the SCSI controller settings.  To reset the SCSI controller to its default values, press F6; then, follow the instructions that appear on the screen.

  You can view or change the following controller settings:

  — **Host Adapter SCSI ID**

    Select this choice to view the SCSI controller ID, normally 7.

  — **SCSI Parity Checking**

    Select this choice to view the assigned value of *Enabled.*

  — **Host Adapter SCSI Termination**

    Select this choice to view the assigned value of *Automatic.*

  — **Boot Device Options**

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

— **SCSI Device Configuration**

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

**Note:** The Maximum Sync Transfer Rate represents the transfer rate for Ultra SCSI devices.

- The transfer rate for Ultra-3 SCSI LVD devices is 160.0

- The transfer rate for Ultra-2 SCSI LVD devices is 80.0

- The transfer rate for Fast SCSI devices is 20.0

— **Advanced Configuration Options**

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

• **SCSI Disk Utilities**

Select this choice to view the SCSI IDs that are assigned to each device or to format a SCSI device.

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

**Note:** If you press Ctrl+A before the selected drives are ready, an Unexpected SCSI Command Failure screen might appear. Restart the server and watch the SCSISelect messages as each drive spins up. After the drive that you want to view or format spins up, press Ctrl+A.

• **Format Disk**

**Attention:** The Low-Level Format program erases *all* data and programs.

Select this choice to perform a low-level format on a hard disk drive. Depending on the hard disk drive capacity, the Low-Level Format program could take up to two hours.

Use the Low-Level Format program:

— When you are installing software that requires a low-level format

— When you get recurring messages from the diagnostic tests directing you to run the Low-Level Format program on the hard disk drive

— As a last resort before replacing a failing hard disk drive

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

To start the Low-Level Format program:

1. If the hard disk is working, make a backup copy of all the files and programs on the hard disk drive. (See the operating system information for instructions.)

2. Select **Format Disk**; then, follow the instructions on the screen.

   **Note:** Hard disks normally contain more tracks than their stated capacity (to allow for defective tracks). A message appears on the screen if the defect limit is reached. If this happens, replace the hard disk drive.

# Installing options

This chapter provides instructions to help you add options to the server.

**Note:** The illustrations in this book are similar to the server; details might vary.

## Major components of the xSeries 250

The orange color on components and labels in your server identifies hot-swap or hot-plug components. This means that you can install or remove the components while the system is running, provided that your system is configured to support this function. For complete information about installing or removing a hot-swap or hot-plug component, see the information provided in the detailed procedures in this document.

The blue color on components and labels indicates touch points where a component can be gripped, a latch moved, and so on.

Power backplane

Shuttle

SCSI backplane

Media-bay bezel

Power supply

Removable-media drive

Hot-swap drive

Filler Panel

Fan assembly #1

Shuttle cover — Memory module — Memory board — Fan assembly #2 — Shuttle — I/O board — Terminator card — VRM — Fan assembly #3 — Microprocessor — Fan assembly #4

---
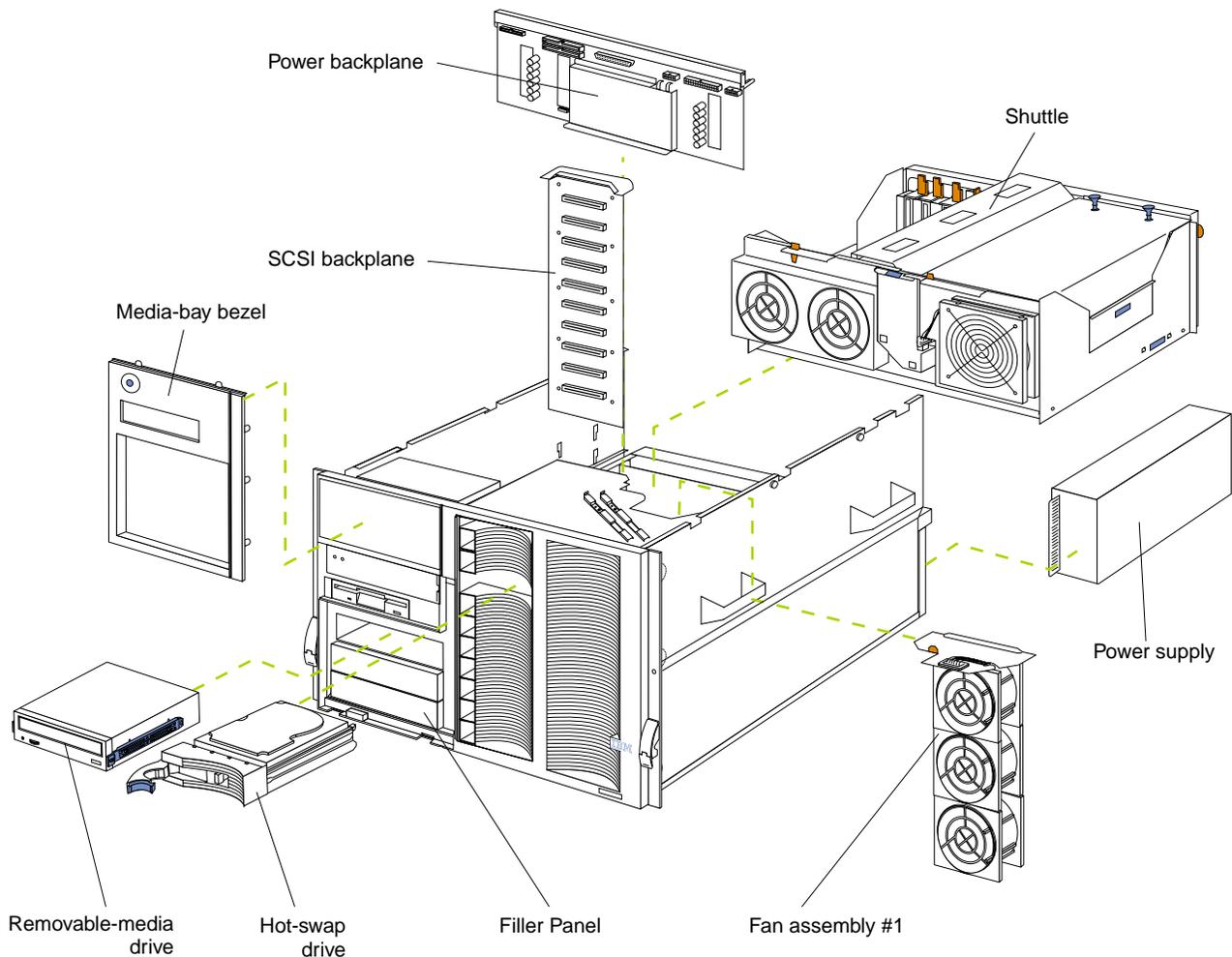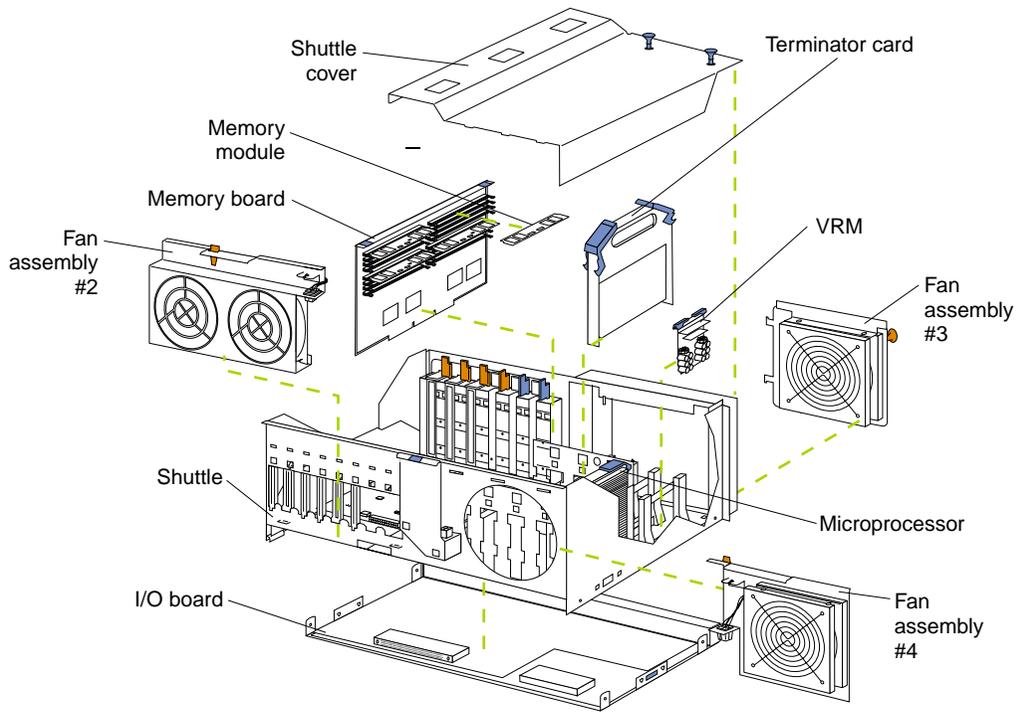
# Component locations

This section provides illustrations of the I/O board, processor board, and memory board component locations.

## I/O board component locations

The following illustration shows the location of the input/output (I/O) connectors on the I/O board.

**Note:** The illustrations in this document might differ slightly from your hardware.
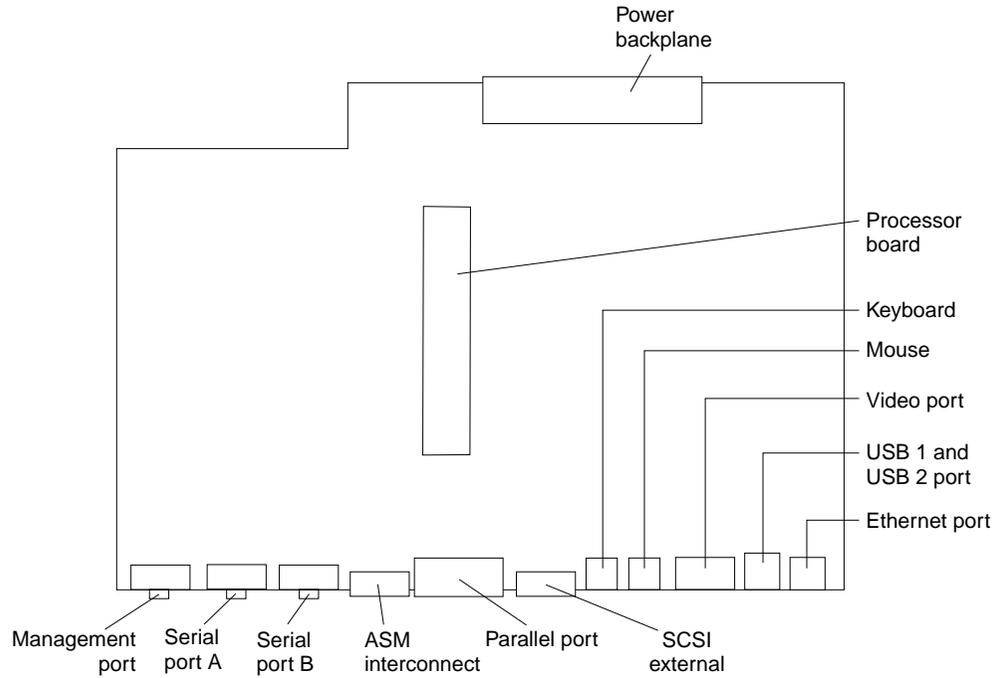
## Processor board component locations

The following illustration shows the location of the LEDs, connectors, and jumpers on the processor board.

### Processor board LEDs

The following illustration shows the location of the LEDs.

VRM 1 error LED
(CR6)

VRM 2 error LED
(CR7)

VRM 3 error LED
(CR5)

VRM 4 error LED
(CR10)

Microprocessor 1
error LED (CR9)

Microprocessor 2
error LED (CR3)

Microprocessor 3
error LED (CR8)

Microprocessor 4
error LED (CR4)

PCI slot LEDs

Battery
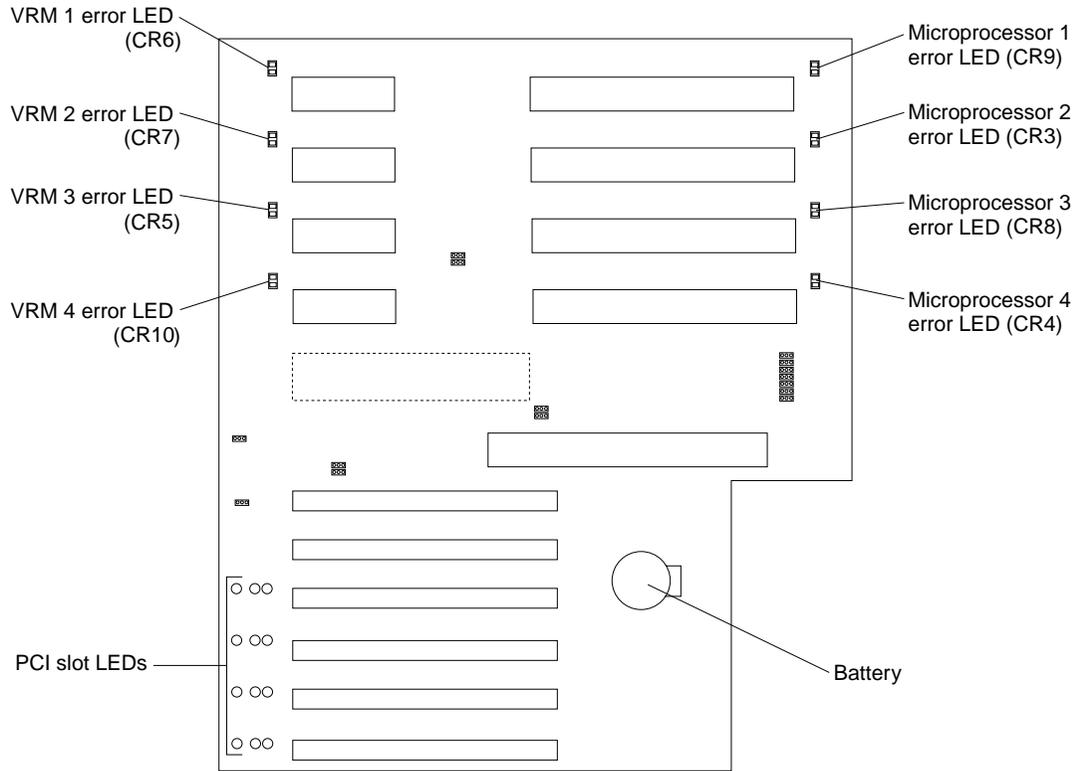
## Processor board connectors

The following illustration shows the connectors.

VRM 1 Connector

VRM 2 Connector

VRM 3 Connector
Reserved (J8 and J9)

VRM 4 Connector

Microprocessor 1
Connector (J2)

Microprocessor 2
Connector (J3)

Microprocessor 3
Connector (J4)

Microprocessor 4
Connector (J5)

Memory board
Connector

PCI Slot 1 and 2
(on PCI bus A)

PCI Slot 3-6
(on PCI bus B)

Battery
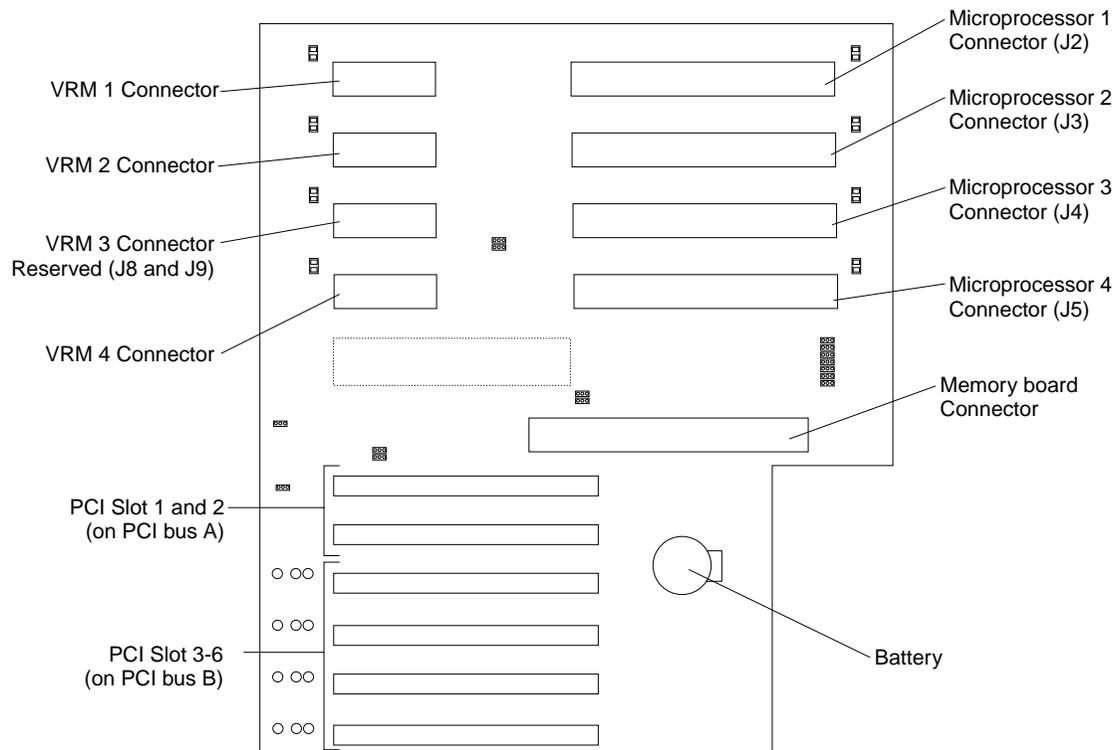
## Processor board jumpers

The following illustration shows the jumpers.

3.3 V standby power for slot 2 (J20)

Advanced System Management Processor reset jumper block (J59)

Power-on control jumper block (J23)

3.3 V standby power for slot 1 (J47)

Jumper block (J10-J16)

Flash ROM page-swap jumper block (J56)

Power-on password override jumper block (J48)

Battery

Microprocessor core-frequency selection jumper block (J13-J16)

Reserved (J10)

Reserved (J12)

Reserved (J11)
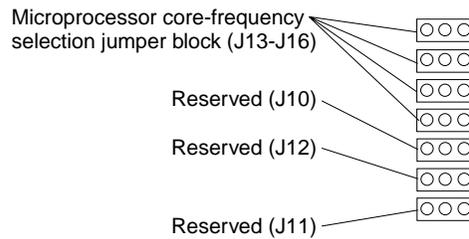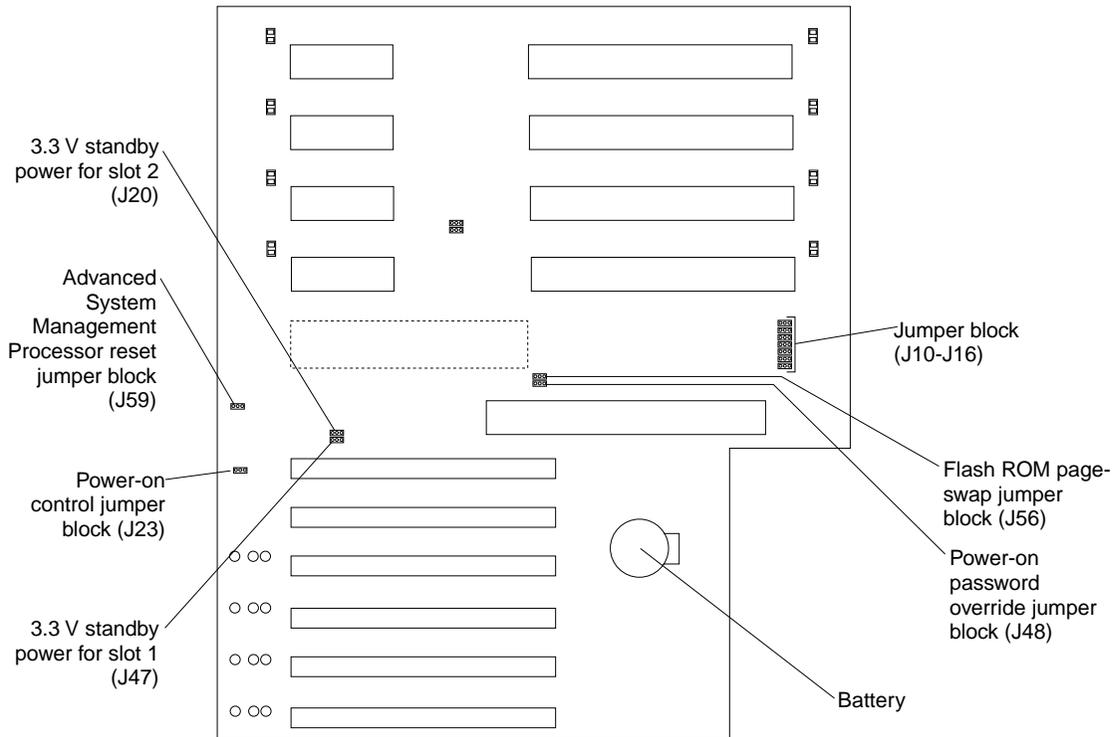
# Memory board component locations

The illustrations in this section show certain locations on the memory board.

### Memory board connectors

The following illustration shows the location of the DIMM connectors on the memory board.

Connector 1(J1)
Connector 2 (J2)
Connector 3 (J3)
Connector 4 (J4)
Connector 5 (J5)
Connector 6 (J6)
Connector 7 (J7)
Connector 8 (J8)

Connector 9 (J9)
Connector 10 (J10)
Connector 11 (J11)
Connector 12 (J12)
Connector 13 (J13)
Connector 14 (J14)
Connector 15 (J15)
Connector 16 (J16)

### Memory board LED locations

The following illustration shows the location of the error LEDs on the memory board.

DIMM 1 error LED (CR4)
DIMM 2 error LED (CR5)
DIMM 3 error LED (CR2)
DIMM 4 error LED (CR1)
DIMM 5 error LED (CR6)
DIMM 6 error LED (CR3)
DIMM 7 error LED (CR7)
DIMM 8 error LED (CR8)

DIMM 9 error LED (CR13)
DIMM 10 error LED (CR12)
DIMM 11 error LED (CR15)
DIMM 12 error LED (CR16)
DIMM 13 error LED (CR11)
DIMM 14 error LED (CR14)
DIMM 15 error LED (CR10)
DIMM 16 error LED (CR9)
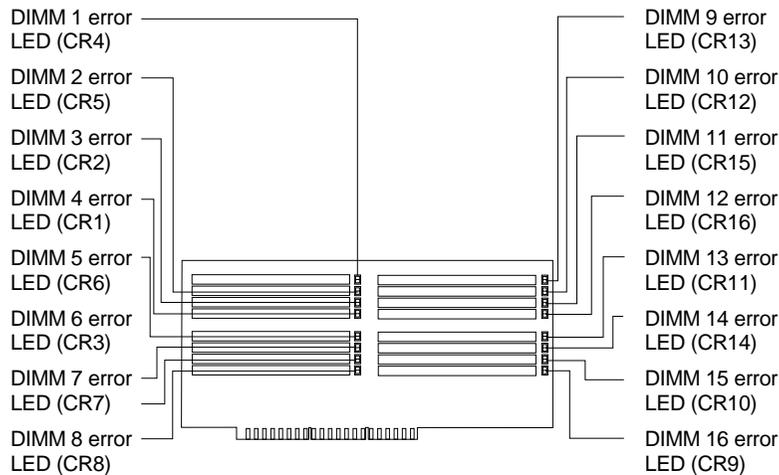
# Before you begin

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

- Become familiar with the safety and handling guidelines provided in "Safety information" on page 180, and "Handling electrostatic discharge-sensitive devices" on page 183. These guidelines will help you work safely while working with the server or options.

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

- The orange color on components and labels in the server identifies hot-swap or hot-plug components. This means that you can install or remove the component while the system is running, provided that the system is configured to support this function.

- The blue color on components and labels identifies touch points where you can grip a component, move a latch, and so on.
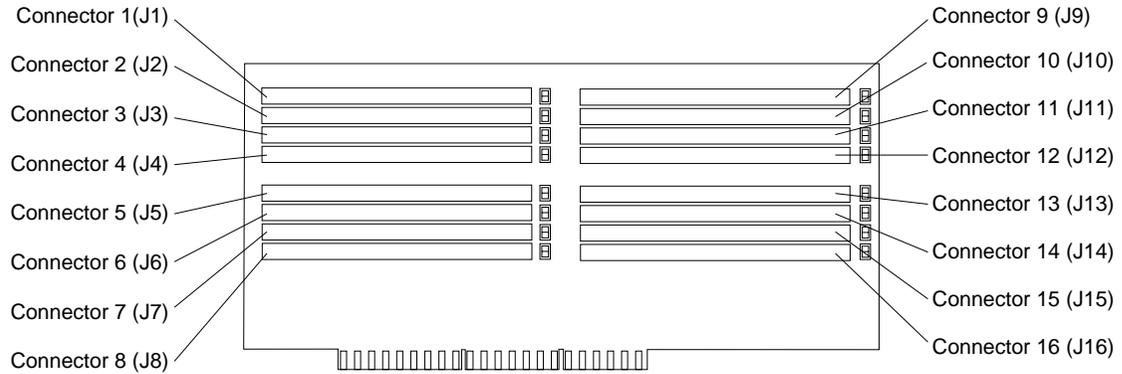
- Make sure that you have an adequate number of properly grounded electrical outlets for the server, monitor, and any other options that you intend to install.

- Back up all important data before you make changes to disk drives.

- For a list of supported options for the Netfinity 7600, refer to http://www.ibm.com/pc/us/compat on the World Wide Web.

## Working inside the server with the power on

The server is designed with features that make it highly available. These features are hot-add and hot-plug devices. Hot-plug devices allow you to replace the device without turning off the server. Hot-add devices allow you to add an identical device without turning off the server. In the past you would need to turn off the server and disconnect power to perform these operations. With the hot-plug features, you can remove the top cover of the server with the power on.

The server supports hot plug, hot add, and hot swap devices and is designed to operate safely while turned on with the top cover removed. The server is designed to protect you and the server. Follow these guidelines when you work inside a server that is turned on:

- Avoid loose-fitting clothing on your forearms. Button long-sleeved shirts before working inside the server; do not wear cuff links while you are working inside the server.
- Do not allow your necktie to hang inside the server.
- Remove jewelry, such as bracelets, necklaces, rings, and loose-fitting wrist watches.
- Remove items from your shirt pocket (such as pens or pencils) that could fall into the server as you lean over it.
- Take care to avoid dropping any metallic objects, such as paper clips, hair pins, or screws, into the server.

## Removing the server top cover and bezel

**Before you begin:**
- Read "Safety information" on page 180.
- Review the information in "Before you begin" on page 58.

## Removing the top cover
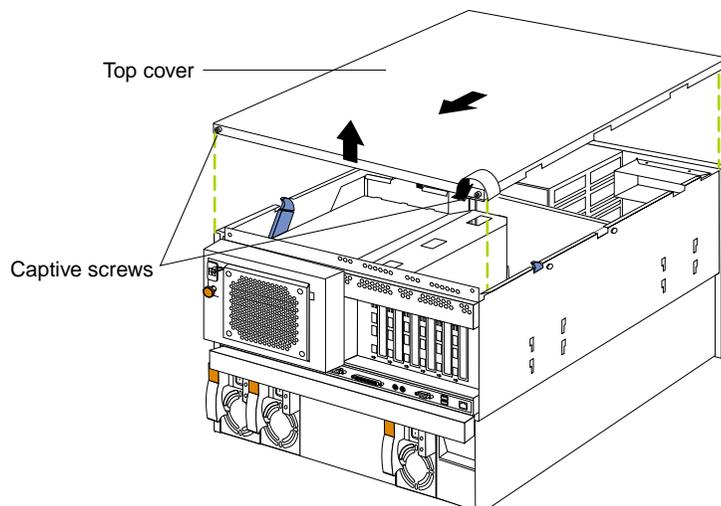
To remove the server top cover:

1. Loosen the two thumbscrews on the back edge of the top cover.

2. Slide the top cover slightly toward the rear of the server. 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.

## Removing the media-bay bezel
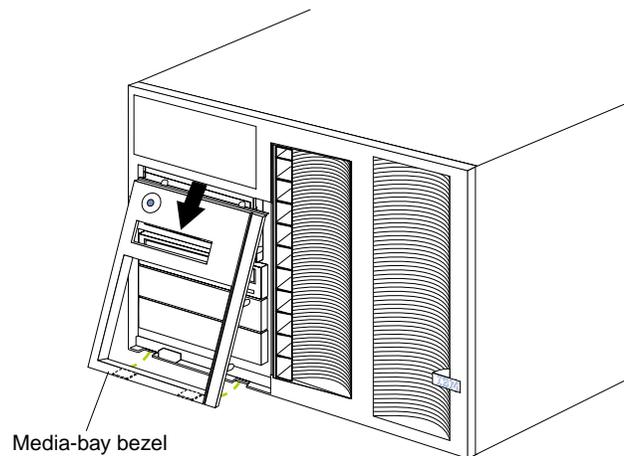


Media-bay bezel

To remove the media-bay bezel:

1. Release the two tabs at the bottom edge of the media-bay bezel and pull the bottom of the bezel slightly away from the server.

2. Pull the media-bay bezel down to release the two tabs at the top edge of the bezel. Store the bezel in a safe place.

## Removing the front trim bezel
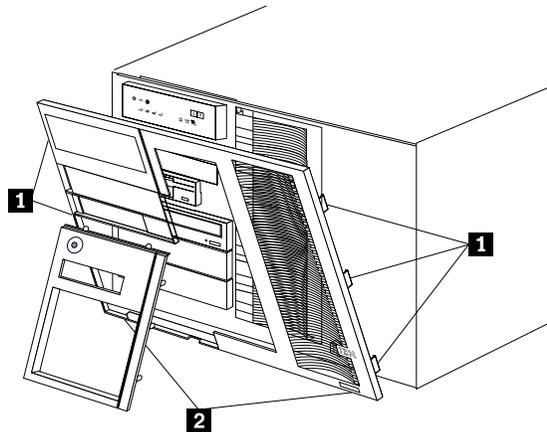


**1**    Side tabs

~2~    Bottom tabs

1.  Release the three tabs on the right side of the front trim bezel and release the two tabs on the left side of the bezel.

2.  Gently separate the bezel partly from the server.

3.  Release the two bottom tabs on the bezel and lift the bezel away from the server.

# Working with adapters

You can install up to six PCI adapters in the expansion connectors on the processor board.  All six of the slots are peripheral component interconnect (PCI) expansion slots.

The server comes with an integrated super video graphics array (SVGA) video controller, which 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.

**Note:**   Video adapters are supported in all six PCI slots.

The following illustration shows the location of the 64-bit PCI expansion slots on the processor board.

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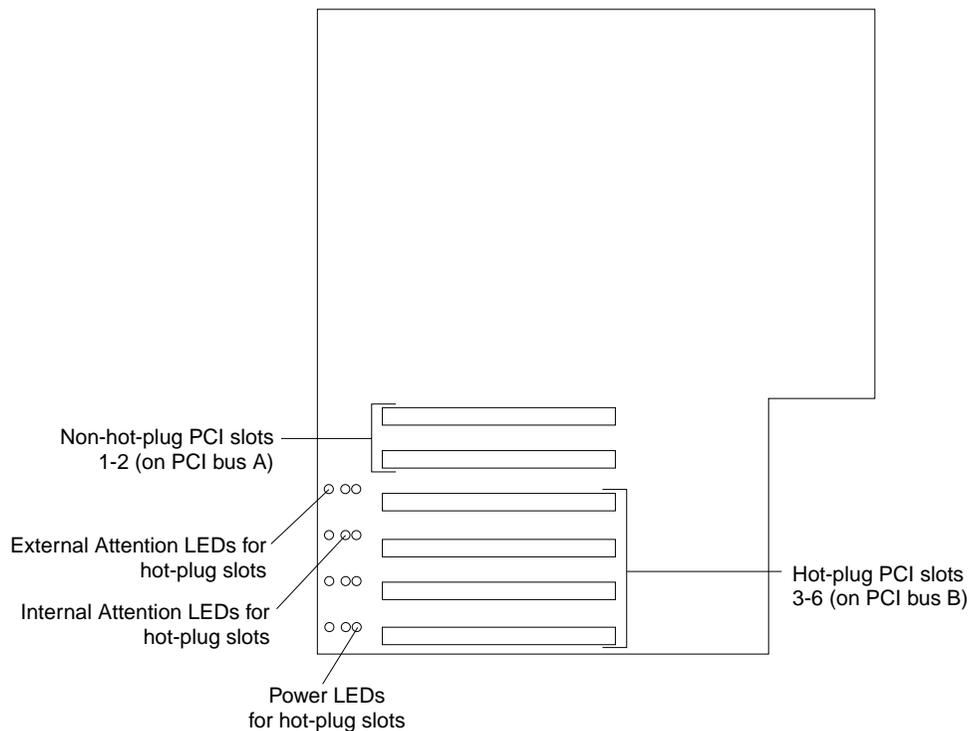


## Adapter considerations

Before you continue with the adapter-installation procedure:

- Review the documentation that comes with the adapter and follow those instructions in addition to the instructions given in this chapter. If you need to change the switch or jumper settings on the adapter, follow the instructions that come with the adapter documentation.
- Slots 3 through 6 support 5.0V, 3.3V, and universal PCI adapters.

  **Note:** Universal PCI adapters support both 3.3V and 5.0V operation.
- Slots 1 and 2 support 3.3 V and universal non-hot-swap PCI adapters only.
- 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.
- The system scans PCI slots 1 through 6 to assign system resources; then the system starts (boots) the PCI devices in the following order: processor board devices, slots 1 and 2, and then slots 3 through 6.
- The performance of the PCI adapters depends on the types of adapters in the system.

## Installing a hot-plug adapter (slots 3 through 6)
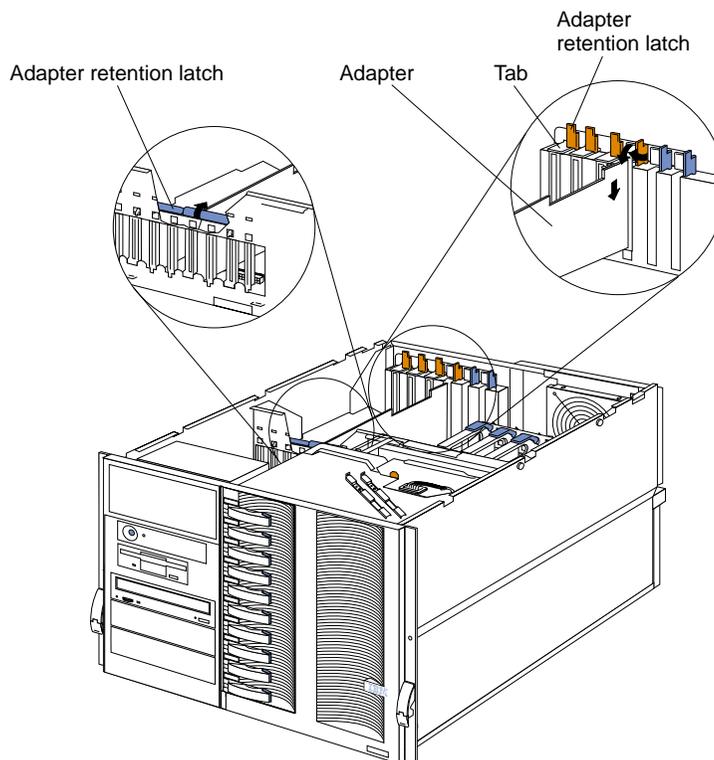
Refer to the following illustration to install a hot-plug PCI adapter.

**Note:** The illustrations in this book may be slightly different from your server.

**Before you begin:**
- Read "Safety information" on page 180.
- Review the information in "Before you begin" on page 58.
- Read the documentation that comes with the option.



To install a hot-plug PCI adapter:

**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.

1. Remove the top cover (see "Removing the top cover" on page 59).

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

   **Note:** You can install hot-plug PCI adapters in PCI slots 3-6 only.

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 for the hot-plug PCI slot is off before you continue with the next step.

4. Remove the expansion-slot cover:

   a. Rotate the adapter retention latch counterclockwise.

   b. Lift the tab covering the top of the expansion-slot cover and then remove the expansion-slot cover from the server. Store it in a safe place for future use.

   c. Press on the rear adapter retention latch (near the hard disk drives) as indicated by the arrow on the latch and lift it to the open position.

      **Attention:** You must install expansion-slot covers on all empty 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.

   **Attention:** Avoid touching the components and gold-edge connectors on the adapter. If you need to put down the adapter, place the adapter, component-side up, on a flat, static-protective surface.

7. Install the adapter:

   a. Carefully grasp the adapter by its top edge or upper corners, and align it with the expansion slot on the processor 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 processor-board connector. Incomplete insertion might cause damage to the processor board or the adapter.

   c. Lower the tab over the top corner of the adapter. Rotate the adapter retention latch clockwise until it snaps into place.

   d. Lower the rear adapter retention latch (near the hard disk drives) over the top of the adapter and press on the indentation on the latch until the latch snaps into place.

8. Connect any needed cables to the adapter.

9. 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 for the hot-plug PCI slot is on.

10. If you have other options to install or remove, do so now; otherwise, go to "Completing the installation" on page 91.

# Installing a non-hot-plug PCI adapter (slots 1 and 2)

The following illustration shows how to install a non-hot-plug PCI adapter.

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

**Before you begin:**

- Read "Safety information" on page 180.
- Review the information in "Before you begin" on page 58.
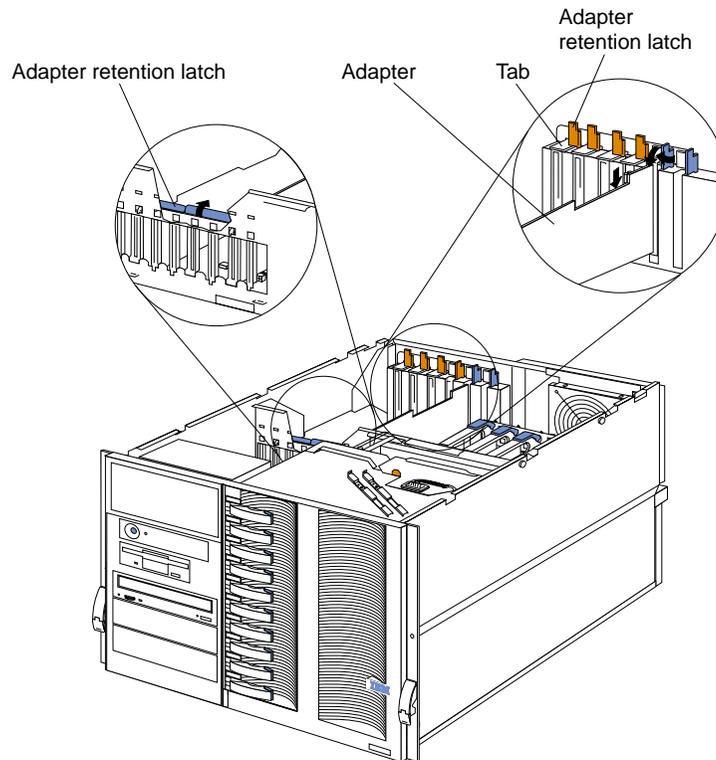


To install a non-hot-plug PCI adapter:

**Attention:** When you handle static-sensitive devices, take precautions to avoid damage from static electricity.

1. Turn off the server; then, disconnect the power cords.
2. Remove the top cover (see "Removing the top cover" on page 59).
3. Determine which expansion slot you will use for the adapter.

   **Note:** PCI slots 1 and 2 support non-hot-plug PCI adapters only.

4. Remove the expansion-slot cover:

   a. Rotate the adapter retention latch counterclockwise.

   b. Lift the tab covering the top of the expansion-slot cover and then remove the expansion-slot cover from the server. Store it in a safe place for future use.

   c. Press on the rear adapter retention latch (near the hard disk drives) as indicated by the arrow on the latch and lift it to the open position.

   **Attention:** You must install expansion-slot covers on all empty slots. This maintains the electromagnetic emissions characteristics of the system and ensures proper cooling of system components.

5. Refer to the documentation that comes with your adapter for any cabling instructions. It might be easier for you to route any cables before you install the adapter.

6. Remove the adapter from the static-protective package.

   **Attention:** Avoid touching the components and gold-edge connectors on the adapter. If you need to put down the adapter, place the adapter, component-side up, on a flat, static-protective surface.

7. Install the adapter:

   a. Carefully grasp the adapter by its top edge or upper corners, and align it with the expansion slot on the processor 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 expansion slot. Incomplete insertion might cause damage to the processor board or the adapter.

   c. Lower the tab over the top corner of the adapter. Rotate the adapter retention latch clockwise until it snaps into place.

   d. Lower the rear adapter retention latch (near the hard disk drives) over the top of the adapter and press on the indentation on the latch until the latch snaps into place.

8. Connect any needed cables to the adapter and reconnect the power cords that you disconnected in step 1 on page 64.

9. If you have other options to install or remove, do so now; otherwise, go to "Completing the installation" on page 91.

# Cabling example for the ServeRAID adapter

You can install an optional IBM ServeRAID™ adapter in your server to control the internal hot-swap hard-disk drives; that is, to enable you to configure the internal hot-swap hard disk drives into disk arrays. Refer to your ServeRAID adapter option documentation for additional information on:

- Installing a ServeRAID adapter in your server
- Connecting the SCSI cable to a ServeRAID adapter
- ServeRAID adapters and controllers

Select the PCI slot where you want to install the ServeRAID adapter. Before you install the ServeRAID adapter, verify that it is compatible with the PCI slot that you selected. Some ServeRAID adapters are not compatible with PCI slots 1 and 2. See "Adapter considerations" on page 61 for additional information on PCI slots.

The following procedure describes the cable routing that is necessary when you install a ServeRAID adapter. You can also cable a ServeRAID adapter to external hard disk drives.

**Notes:**

1. The illustrations in this document might differ slightly from your hardware.
2. Refer to the documentation that comes with your adapter for any cabling instructions.
3. Cable identifiers are printed on the cables that come with your server and options. Use these identifiers to connect the cables to the correct connectors. For example, the hard disk drive cables are labeled "HDD".

To cable the ServeRAID adapter:

**Before you begin:**

- Read "Safety information" on page 180.
- Review the information in "Before you begin" on page 58.

1. Determine the number of SCSI channels that you want to use on the ServeRAID adapter. If you are connecting to more than two SCSI channels, you might need to purchase additional SCSI cables. Consult your IBM marketing representative or reseller for additional information on the number and types of cables that your server configuration requires.

   As shipped, your server comes with two SCSI cables attached to the SCSI backplane (see "LVD SCSI backplane" on page 72 for details):

   - One end of the first SCSI cable is attached to the SCSI channel A connector on the SCSI backplane, and the other end is attached to the power backplane.
   - One end of the second SCSI cable is attached to the SCSI channel B connector on the SCSI backplane. The other end of this cable is folded and restrained with a clamp.

   If you want to connect all of the hot-swap hard disk drives to one channel, you must install an optional SCSI repeater card as described in "SCSI repeater card installation" on page 75.

2. Turn off the server; then, disconnect the power cords.
3. Remove the top cover (see "Removing the top cover" on page 59).
4. If you have not yet installed the ServeRAID adapter, install it now. Depending on your server configuration, see the beginning of this section for instructions on installing a hot-plug or non-hot-plug adapter; then, return here. Otherwise, continue with the next step.

5. Disconnect the shuttle:
    a. Disengage the retaining levers by pressing inward.
    b. Move the retaining levers back to the unlocked position.



Retaining lever
(unlocked position)
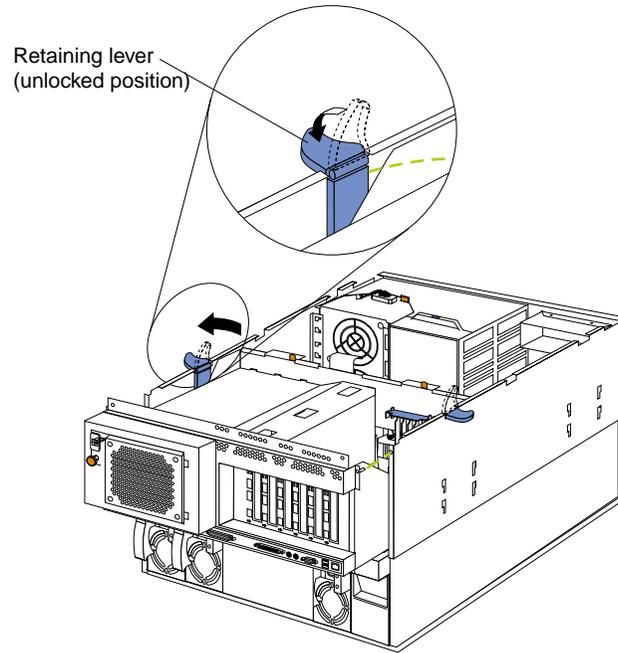
    c. Slide the shuttle toward the rear of the server until it stops.
       **Note:** It is not necessary to remove the shuttle from the server.
6. Disconnect the SCSI cable from the SCSI connector on the power backplane.



SCSI connector on
power backplane
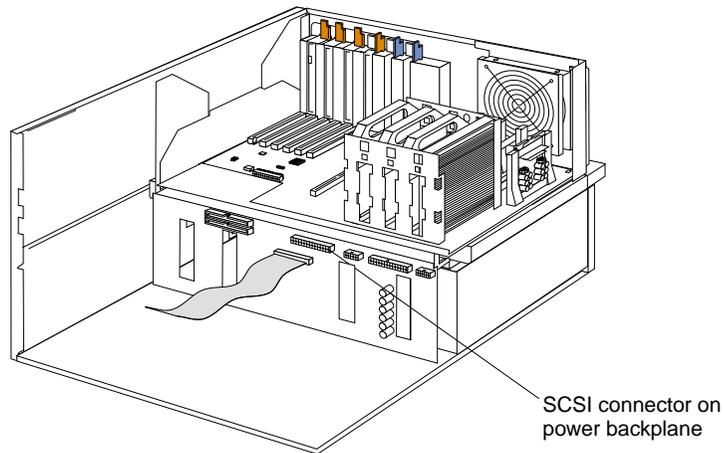
7.  Route one end of the SCSI cable through the cable retaining clips on the SCSI backplane.

Handle

Cable retaining clips

Backplane

Retention clips

Guides

SCSI channel A connector

Power cable connector

SCSI channel B connector

Retention clips
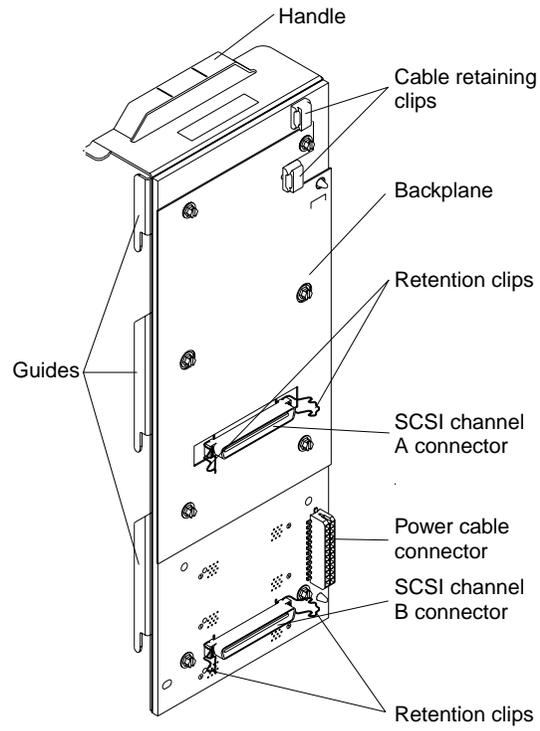
8.  Attach one end of the SCSI cable to the selected internal SCSI channel connector on the ServeRAID adapter. Make sure that the other end of the SCSI cable is attached to the appropriate channel connector on the SCSI backplane.

    **Attention:** When you route the SCSI cable, do the following:

    - Do not block the ventilated space in front of the fan assembly.
    - Do not place the SCSI cable fold on top of the fan assembly.
    - Do not route the SCSI cable over the memory board assembly.

    The following illustration shows how to route one SCSI cable to the ServeRAID adapter.
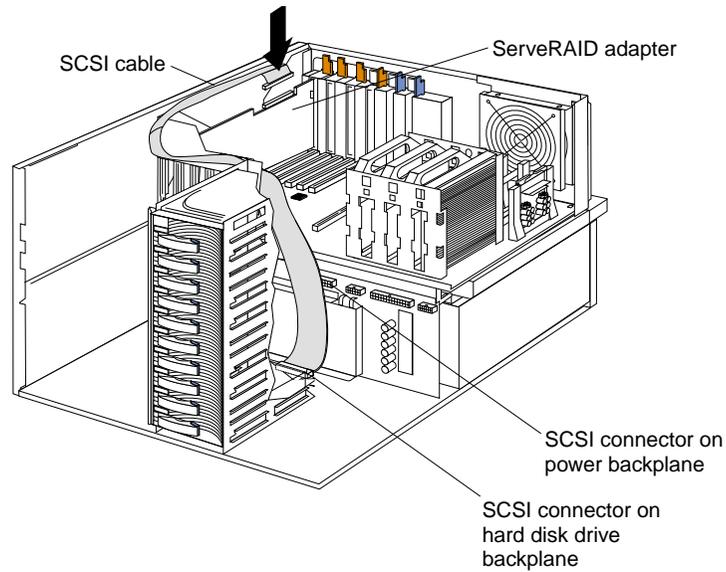
9. If you are connecting to two SCSI channels, repeat step 7 on page 68 and step 8 on page 69 for the second channel on the SCSI backplane. The following illustration is a top-down view that shows how to route two SCSI cables to the ServeRAID adapter in PCI slot 1.
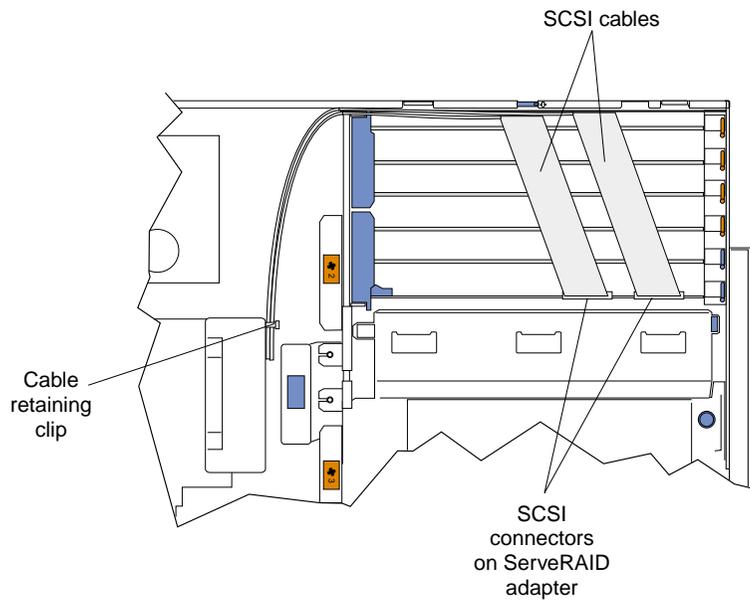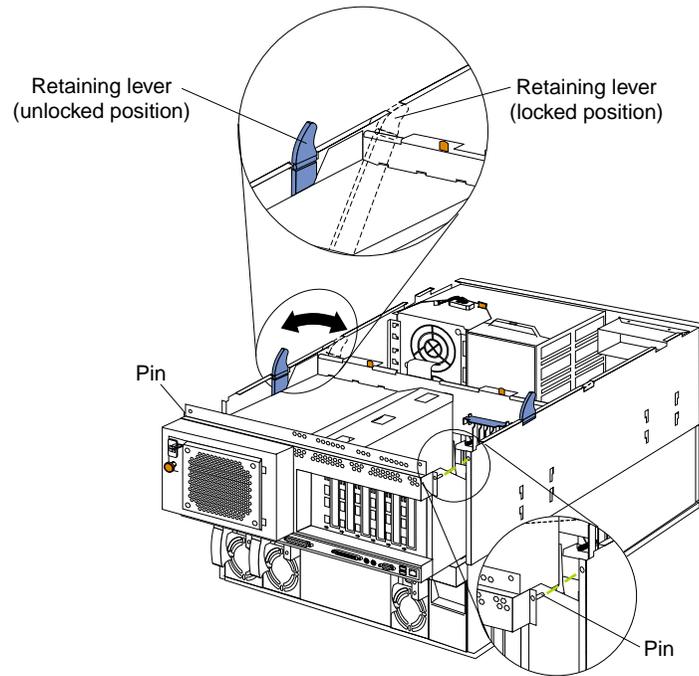
SCSI cables

Cable retaining clip

SCSI connectors on ServeRAID adapter

10. Connect the shuttle.



Retaining lever (unlocked position)
Retaining lever (locked position)
Pin
Pin

a. Align the two shuttle pins with the holes on each side of the rear of the chassis, and disengage the retaining levers from the notches on the chassis.

b. Move the retaining levers toward the front of the server and secure the retaining levers in the horizontal (locked) position.

11. If you have other options to install or remove, do so now; otherwise, go to "Completing the installation" on page 91.

# LVD SCSI backplane

The server contains hardware that enables you to replace a failed hard disk drive without turning off the server. Therefore, you have the advantage of continuing to operate your system while a hard disk drive is removed or installed. These drives are known as *hot-swap* drives. The hot-swap drives are attached to a hot-swap hard disk drive *backplane*. The backplane is a printed circuit board behind the drive bays. For more information on drive bays and drive installation, see "Installing internal drives" on page 79.

As shipped, the LVD SCSI hot-swap hard disk drive backplane supports a split, dual-channel configuration. You can install a maximum of 10 slim-high, hot-swap hard disk drives. You can attach five drives to each half of the backplane. These drives must be low voltage differential (LVD) hard disk drives that operate at 160 MB per second or lower.

You can configure the channels on the SCSI backplane in one of two ways:

- You can configure each SCSI channel (bus) independently. This is the standard backplane configuration. In this configuration:
    - The hard disk drives in the upper half of the backplane are attached to channel A through a SCSI cable that comes attached to the SCSI backplane.
    - The hard disk drives in the lower half of the backplane are attached to channel B through a second optional SCSI cable. One end of this second SCSI cable comes attached to the SCSI channel B connector on the backplane. The other end of this cable is folded and restrained with a clamp.

    When you are installing hot-swap hard disk drives in the standard backplane configuration, attach the first five to channel A; then, attach the remainder to channel B. Refer to the illustration in this section for the SCSI channel connector locations.

- You can choose to configure the SCSI backplane as a single 10-drive SCSI channel. To do this, you must install an optional SCSI repeater card as described in "SCSI repeater card installation" on page 75.

**Notes:**

1. The LVD SCSI backplane is also known as the SCSI backplane or the hot-swap hard disk drive backplane.

2. Table 14 on page 98 lists the SCSI identifiers (IDs) for the LVD SCSI backplane and the hot-swap hard disk drives that are attached to SCSI channels A and B.

3. Carefully route all cables so that they do not become damaged.

4. Cable identifiers are printed on the cables that come with your server and options. Use these identifiers to attach the cables to the correct connectors. For example, the hard disk drive cables are labeled "HDD".

5. For information on cabling options and using the LVD SCSI backplane, refer to the documentation that comes with the option kit.

6. For additional information on cabling the ServeRAID adapter, see "Cabling example for the ServeRAID adapter" on page 66.

7. The illustrations in this document might differ slightly from your hardware.

## LVD SCSI backplane removal

The following illustration shows the main SCSI backplane component locations.
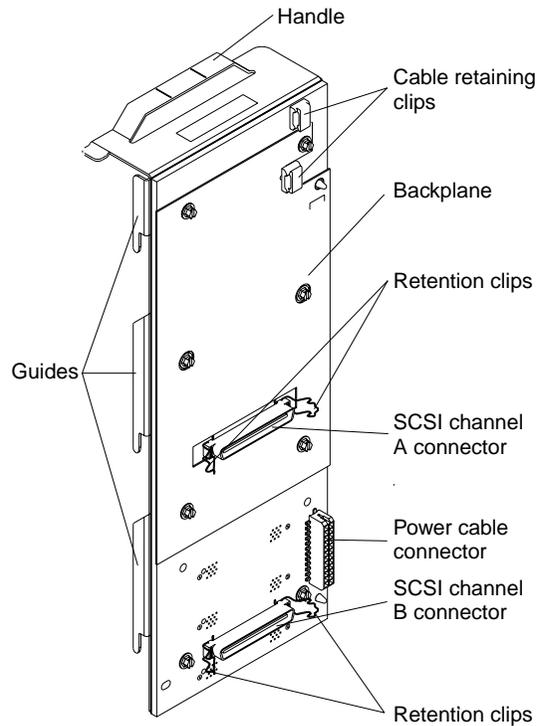


**Before you begin:**

• Read "Safety information" on page 180.

• Review the information in "Before you begin" on page 58.

To remove the LVD SCSI backplane, perform the following actions:

1. Turn off the server and peripheral devices, and disconnect all power cords and external cables; then, remove the top cover (see "Removing the top cover" on page 59).

2. If a ServeRAID adapter is installed in the server, disconnect the SCSI cable from the adapter (see "Cabling example for the ServeRAID adapter" on page 66).

3. Disconnect the shuttle:

   a. Disengage the retaining levers by pressing inward.

   b. Move the retaining levers back to the unlocked position.

Retaining lever
(unlocked position)
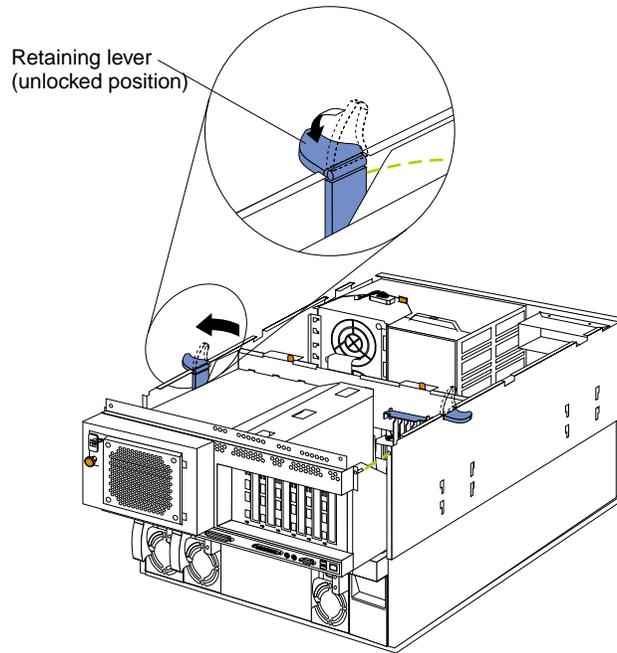
    c.  Slide the shuttle toward the rear of the server until it stops.

        **Note:**  It is not necessary to remove the shuttle from the server.

4.  Remove fan assembly 1 from the server (see "Replacing a hot-swap fan" on page 90).

5.  Disconnect the hot-swap hard disk drives from the corresponding SCSI backplane connectors; then, slide the drives forward.

    **Note:**  It is not necessary to remove the drives from the server.

6. Remove the SCSI backplane from the server:

    a. Lift the SCSI backplane guides from the corresponding slots on the server; then, slide the SCSI backplane upward.

    b. Disconnect the power cable from the SCSI backplane.

    c. Disconnect the SCSI cables from the channel A and B connectors on the SCSI backplane.

    d. Lift the SCSI backplane from the server.

7. To install the SCSI backplane, reverse the above steps, making sure that the SCSI backplane guides are aligned with the corresponding slots on the server.

8. If you have other options to install or remove, do so now; otherwise, go to "Completing the installation" on page 91.

## SCSI repeater card installation

You must install an optional SCSI repeater card to connect all of your internal hot-swap hard disk drives to the same SCSI channel.

The following illustration shows the rear connectors on the optional SCSI repeater card, as viewed from the rear of the server.

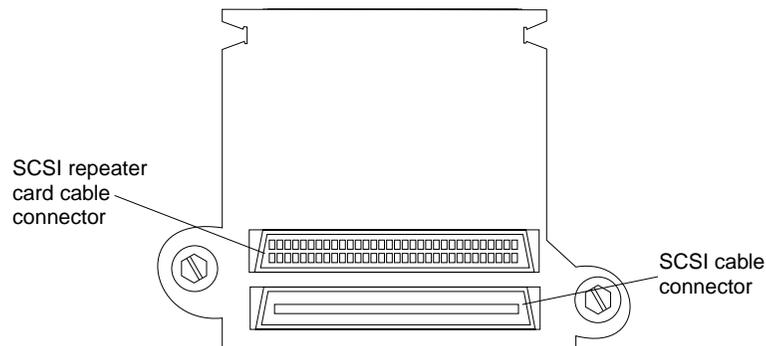**Before you begin:**

- Read "Safety information" on page 180.
- Review the information in "Before you begin" on page 58.

To install a SCSI repeater card:

**Attention:** When you handle static-sensitive devices, take precautions to avoid damage from static electricity.

1. Remove the LVD SCSI backplane (see "LVD SCSI backplane removal" on page 72).

2. Touch the static-protective package that contains the repeater card option to any unpainted metal surface on the server; then, remove the repeater card option from the package.

   **Note:** If necessary, refer to the documentation that comes with the repeater card option kit to assemble the repeater card option.

3. Connect the repeater card option to the SCSI backplane:

   a. Align the corresponding connectors on the repeater card and the SCSI backplane. The corresponding screw holes on the repeater card and the SCSI backplane will automatically align.



4. A short SCSI cable comes with the repeater card option kit.
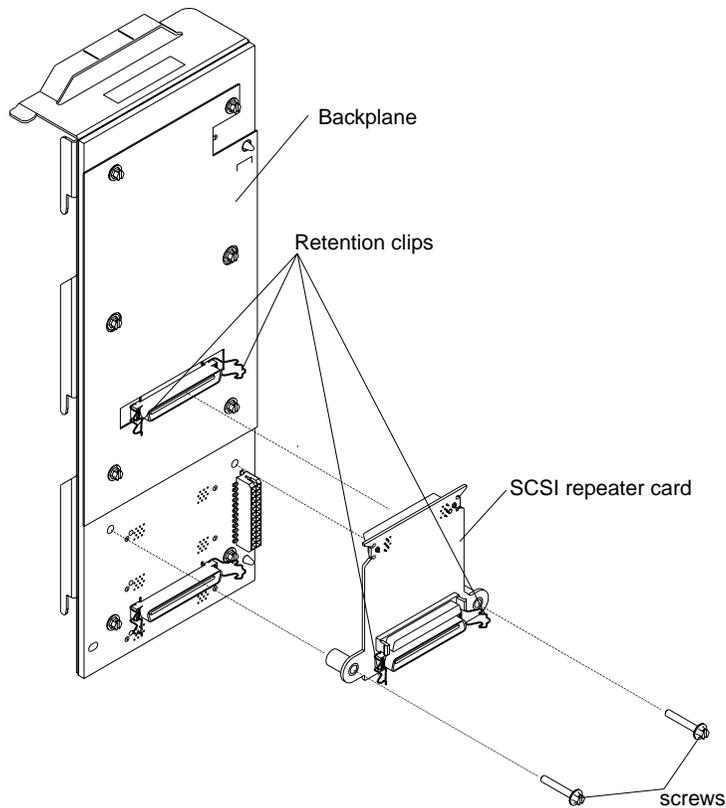
   b. Use a small, flat-blade screwdriver to connect the repeater card to the SCSI backplane with the two screws from the repeater card option kit.

   c. Secure the repeater card with the retention clips on the SCSI channel A connector on the SCSI backplane.

4. A short SCSI cable comes with the repeater card option kit.

   a. Connect one end of this cable to the repeater card.

   b. Connect the other end of the cable to the SCSI channel B connector on the SCSI backplane.

   c. Secure both cable ends with the retention clips on the SCSI connectors.

SCSI backplane

SCSI repeater card

SCSI cable to
power backplane

SCSI repeater
card cable
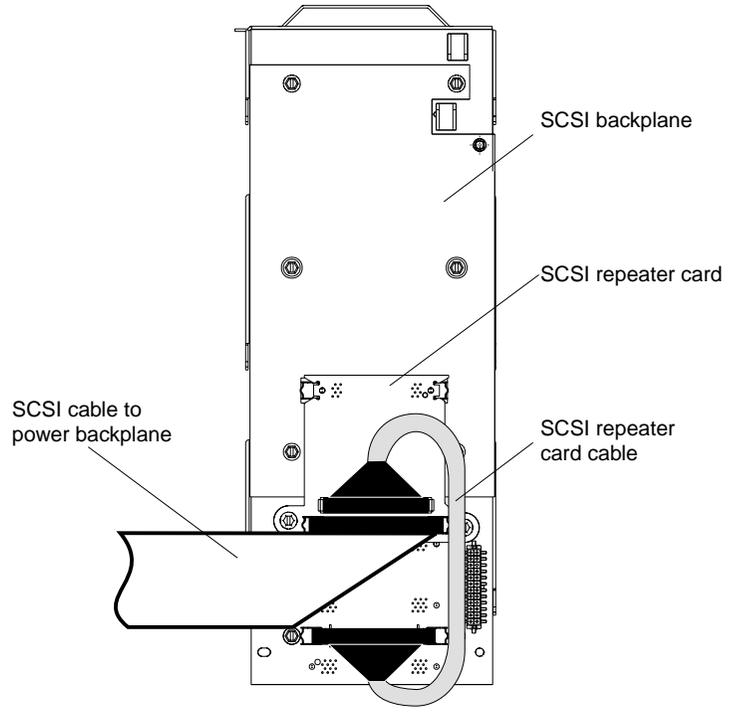
5. Reinstall the SCSI backplane in the server:
   a. Reconnect the power cable to the SCSI backplane.
   b. Align the SCSI backplane guides with the corresponding slots on the server.
   c. Slide the SCSI backplane into the server.
   d. Connect one end of the SCSI cable to the repeater card.
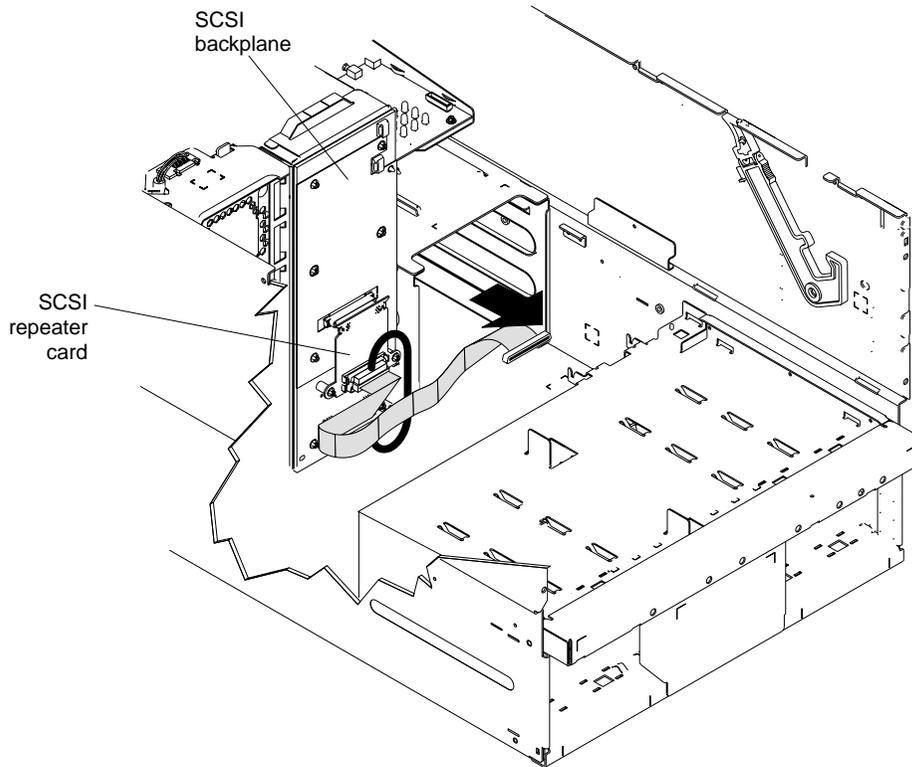


   e. Make sure that the other end of the SCSI cable is attached to the power backplane located on the rear of the shuttle.
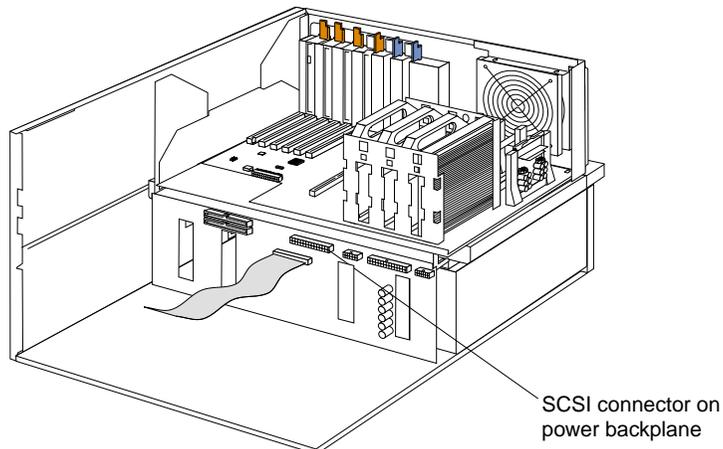
6. Slide the hot-swap hard disk drives back into place in the drive bays. If you need to install additional hot-swap drives, do so now (see "Installing a hot-swap hard disk drive" on page 81). You can connect a maximum of 10 hard disk drives to the SCSI backplane.

   Note: After you connect these hard disk drives to the SCSI backplane, the backplane sets the SCSI IDs for the backplane and the hard disk drives. See "Setting SCSI IDs" on page 97 for additional information.

7. Reinstall fan assembly 1 in the server.

8. Reconnect the shuttle.
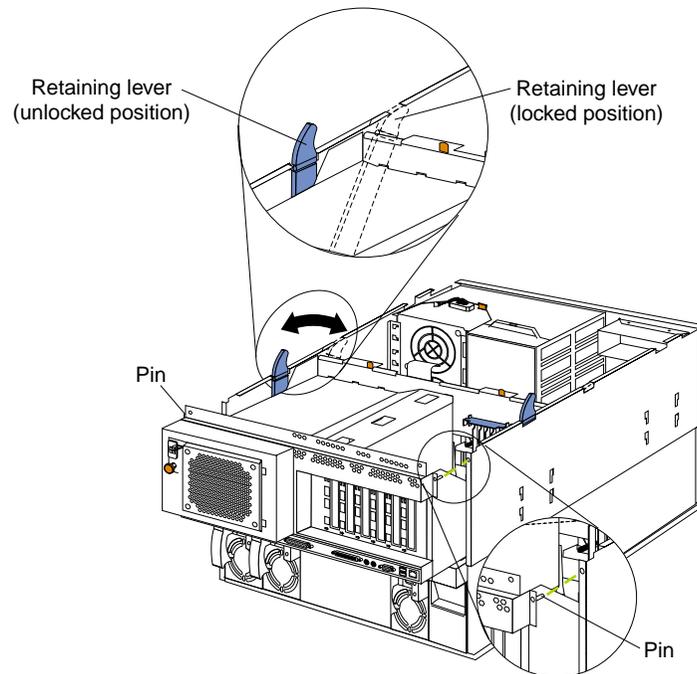
Retaining lever
(unlocked position)

Retaining lever
(locked position)

Pin

Pin

   a. Align the two shuttle pins with the holes on each side of the rear of the chassis, and disengage the retaining levers from the notches on the chassis.

   b. Move the retaining levers toward the front of the server, and secure the retaining levers in the horizontal (locked) position.

9. If you disconnected the SCSI cable from the ServeRAID adapter in step 2 on page 73, reconnect the SCSI cable to the adapter.

10. If you have other options to install or remove, do so now; otherwise, go to "Completing the installation" on page 91.

## Installing internal drives

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

- Diskette
- Hard disk
- CD-ROM
- Tape

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

3.5-inch diskette drive

CD-ROM drive

Media bays 1 and 2

Hot-swap hard
disk drive bay

Your server contains hardware that enables you to 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-swap* drives.

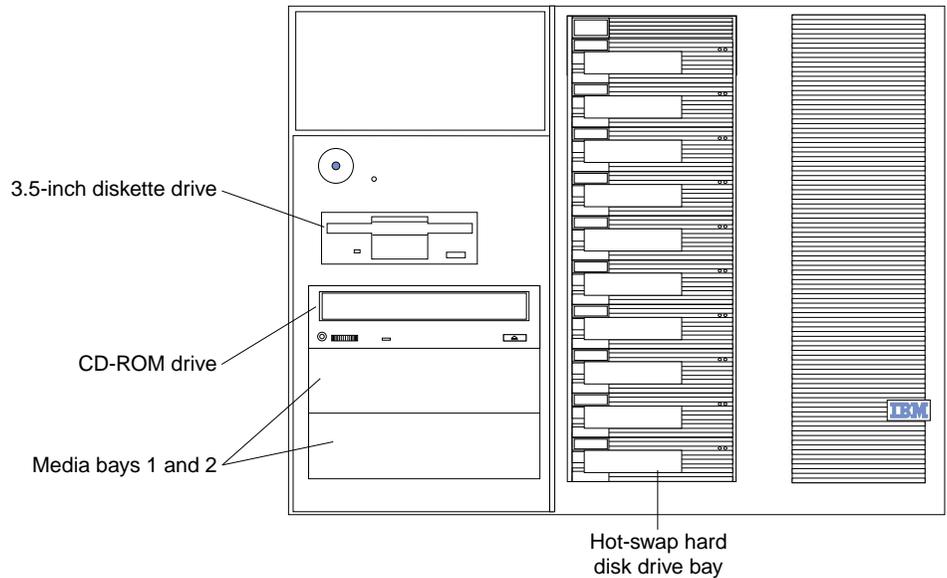Each hot-swap drive has two indicator lights on the front of the server. If the amber hard-disk status light for a drive is lit continuously, that individual drive is faulty and needs to be replaced. When the hard-disk status light indicates a drive fault, you can replace a hot-swap drive without turning off the server.

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

## Internal drive bays

Internal drives are installed in *bays*.

- Your server comes with one CD-ROM drive and one 3.5-inch, 1.44 MB diskette drive.
- The left front bays support 5.25-inch, half-high, removable-media drives. Any two adjacent 5.25-inch, half-high bays can be converted to a single full-high bay.

  **Note:** The server 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.

- You cannot install hard disk drives in the left front bays. You can install hot-swap hard disk drives only in the hot-swap hard disk drive bays on the right front side of the server.
- If you are installing a device with a 50-pin connector in one of the left front bays, you will need a 68-to-50-pin converter (option number 32G3925).
- Your server supports ten 1-inch (26 mm) slim-high, 3.5-inch hot-swap hard disk drives in the hot-swap bays.

- The hot-swap bays connect to the LVD SCSI backplane. Your server comes with two SCSI channels on this backplane. For more information, see "LVD SCSI backplane" on page 72.

Some drives have a special interface called *small computer system interface*, or SCSI. Using this interface, you can attach multiple drives to a single SCSI controller.

**Notes:**

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

2. If you plan to install both internal and external SCSI devices, you must follow the instructions in "Connecting external options" on page 93, in addition to the instructions in this section.

A 16-bit (wide) low voltage differential (LVD) SCSI cable connects the hard disk drive backplane to the ServeRaid adapter located in a PCI slot on the processor board. An additional 16-bit, two-drop SCSI cable comes with the server. It is located in the bottom of the server media bay and is restrained with a cable clamp.

If you want to install SCSI devices in the removable media bays:

1. Locate the internal SCSI connector on the power backplane.

2. Use the 16-bit two-drop SCSI cable located in the bottom of the server media bay.

3. Connect the SCSI device(s) in the removable media bay to the internal SCSI connector on the power backplane.

## Installing a hot-swap hard disk drive

Refer to the following illustration when installing a hot-swap drive.

**Before you begin:**

- Read "Safety information" on page 180.
- Review the information in "Before you begin" on page 58.
- Read the documentation that comes with the option.
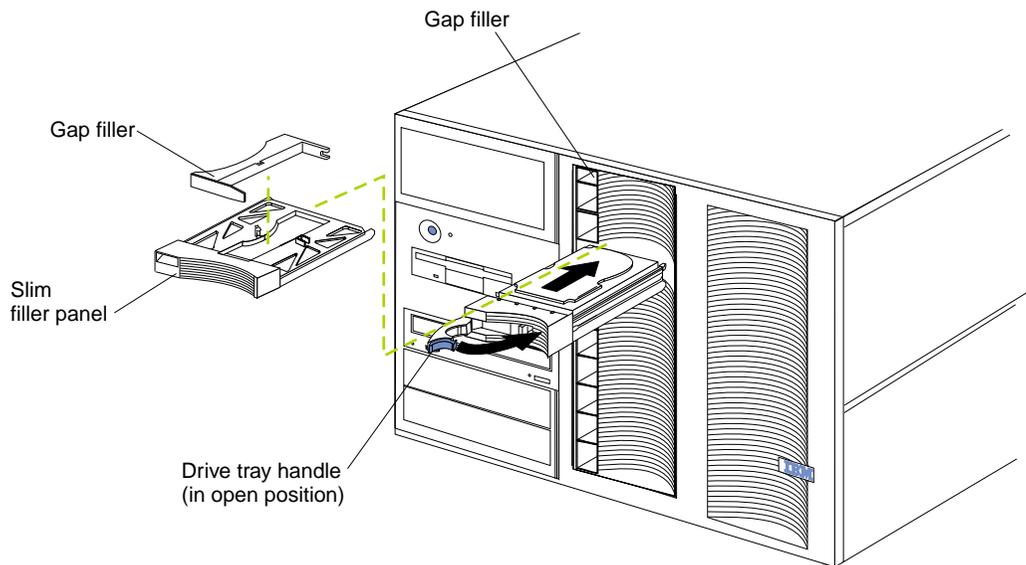


**Note:** You do not have to turn off the server to install hot-swap drives in these bays.

To install a drive in a hot-swap bay:

1. Remove the filler panel 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.

   **Attention:** To maintain proper system cooling, do not operate the server for more than 10 minutes without either a drive or a filler panel installed for each bay.

2. Install the hard disk drive in the hot-swap bay:

   a. If there is a small gap above or below the drive, separate the slim filler from the filler panel, and insert it in the gap.

      **Note:** A drive placement guide is located on the inside edge of the bezel. The drive placement guide indicates the placement for slim-high drives. The guide also shows the SCSI ID assigned to the drive.

   b. Ensure the tray handle is open (that is, perpendicular to the drive).

   c. Align the drive assembly with the guide rails in the bay.

   d. Gently push the drive assembly into the bay until the drive stops.

   e. Push the tray handle to the closed (locked) position.

   f. Check the hard disk drive status indicators to verify that the hard disk drive is operating properly.

      If the amber hard-disk status light for a drive is lit continuously, that individual drive is faulty and needs to be replaced. If the green hard-disk activity light is flashing, the drive is being accessed.

   **Note:** If the server has an optional RAID controller installed, you must configure the disk arrays after installing hard disk drives. Refer to "Using IBM ServeRAID" on page 117 for information.

## Installing a 5.25-inch removable-media drive

Refer to the following illustrations when installing a 5.25-inch removable media drive.

**Before you begin:**

- Read "Safety information" on page 180.
- Review the information in "Before you begin" on page 58.
- Read the documentation that comes with the option.
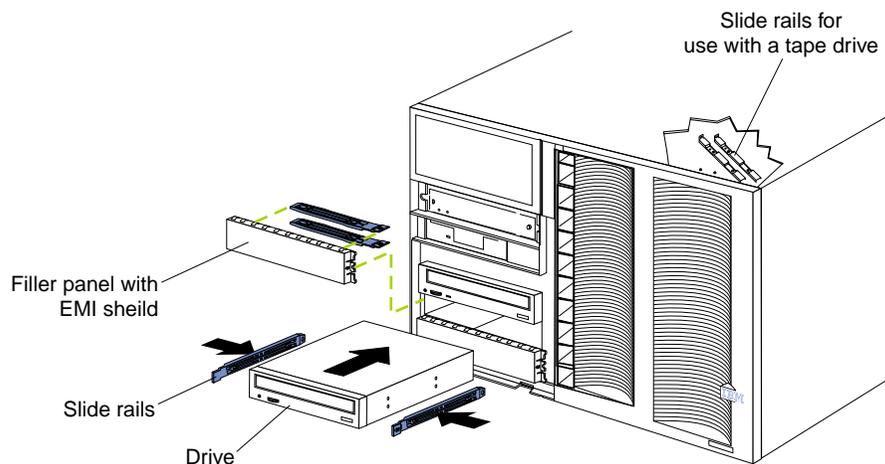
Choose the bay in which you want to install the drive. Also, check the instructions that come with the drive to see if you need to set any switches or jumpers on the drive.

To install a removable-media drive in one of the left front bays:

1. Turn off the server and all attached devices. Disconnect all external cables and remove the top cover.

2. Remove the media-bay bezel.

3. Remove the filler panel from the bay opening. Keep the filler panel nearby.

   **Note:** The server 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.

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. Remove the snap-on slide rails from the filler panel and snap the rails on the drive. Store the filler panel for later use.

   **Note:** Slide rails for installing a tape drive are attached with screws. Use the screws to attach the rails to the side of the tape drive.

6. Align the slide rails on the drive with the guide rails in the bay; then, slide the drive into the bay until it snaps into place.

   **Note:** If you are installing a tape drive, use the screws that are shipped next to the tape drive rails to attach the tape drive to the front of the chassis.

7. Disconnect the shuttle (see "Disconnecting the shuttle" on page 108).

8. If you are installing a SCSI device, go to step 9.. If you are installing an IDE device, go to step 10..

9. Install the two-drop SCSI cable:

   a. Locate the two-drop SCSI cable. The two-drop SCSI cable is located in the bottom of the server between the open bays and the power supply area. It is folded and restrained with a cable clamp.

   b. Connect one of the connectors on the two-drop SCSI cable to the back of the drive. Go to step 11..

   c. Connect the other end of the two-drop SCSI cable to the SCSI connector on the power backplane.

   d. Go to step 11..

10. To install an IDE device, such as a CD-ROM or a DVD-ROM, use the two-drop IDE cable that comes with the option.

    a. Remove the cable that connects the CD-ROM to the IDE connector on the power backplane.

    b. Using the two-drop cable that came with the IDE option, connect the CD-ROM and IDE device you are installing to the IDE connector on the power backplane.

    c. Set the jumper on the back of the new IDE option as secondary.

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 are installing another 5.25-inch drive, do so now. Otherwise, continue with step 13 on page 84.

13. Connect the shuttle.

    a.  Slide the shuttle back into the server

    b.  Disengage the retaining levers from the notches on the chassis.

    c.  Move the retaining levers toward the front of the server.

    d.  Secure the retaining levers in the horizontal position.

14. If you have other options to install or remove, do so now; otherwise, go to "Completing the installation" on page 91.

## Installing memory-module kits

Before you continue with the memory-installation procedure, review the following:

- Review the information in "Before you begin" on page 58.

- All the DIMMs installed in each set must be the same size and speed, but all the sets do not have to contain DIMMs of the same size and speed.

- The memory board contains 16 DIMM connectors and supports 4-way memory interleaving.

- Install only 3.3 V, 168-pin, 8-byte, registered DIMMs. Only 100 MHz, 72-bit, registered, synchronous, error correcting code (ECC), SDRAM configuration DIMM memory is supported for the 128 MB, 256 MB, 512 MB and 1 GB (when available) DIMMs.

- If you install 4 GB of memory, some of the memory is reserved for system resources. The amount reserved for system resources depends on the configuration of the server.

- If you install 16 GB of memory, the Configuration/Setup Utility will display the memory that is usable by the network operating system. This amount of memory might differ from the amount of memory you have installed.

- Installing or removing DIMMs 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. Refer to "Using the Configuration/Setup Utility program" on page 45 for more information.

- Install the DIMMs in the order provided in Table 7.

- For the locations of the DIMM connectors, see "Memory board component locations" on page 57.

| Set of 4 DIMMs | Install DIMMs in these connectors: |
|---|---|
| First set (shipped as standard) | J1, J5, J9, J13 |
| 2nd set | J2, J6, J10, J14 |
| 3rd set | J3, J7, J11, J15 |
| 4th set | J4, J8, J12, J16 |

*Table 7. DIMM installation order.*

Refer to the following illustration when installing memory.

Pop rivets

Processor housing cover

DIMM

Memory board
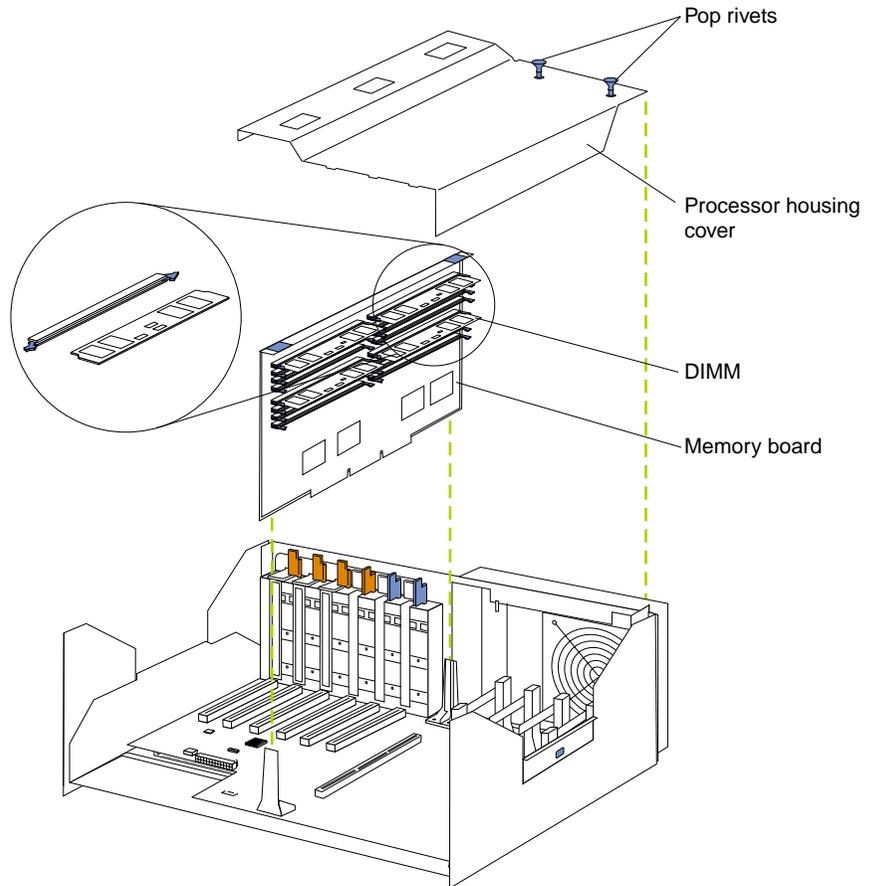
To install a memory module:

**Before you begin:**

- Read "Safety information" on page 180.
- Read the documentation that comes with your option.

1. Review "Before you begin" on page 58.
2. Turn off the server and all attached devices. Disconnect external cables and power cords and remove the top cover.
3. Pull up the two pop rivets on the processor housing cover and remove the cover from the processor housing.
4. Remove the memory board assembly:
   a. Lift up on the memory board assembly and remove it from the server.
   b. Place the memory board assembly on a static-protective surface, such as the static-protective package in which the option came.
5. Locate the DIMM connectors on the memory board. Determine the DIMM connectors into which you will install the DIMMs. (See the notes at the beginning of this procedure.)
6. Touch the static-protective package containing the DIMM option to any unpainted metal surface on the server. Then, remove the DIMM from the package.

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

7. To install the DIMMs, repeat the following steps for each DIMM that you install.

   a. Turn the DIMM so that the pins align correctly with the DIMM connector.

   b. Insert the DIMM by pressing the DIMM straight into the connector. Be sure that the retaining clips snap into the closed position.

8. Install the memory board assembly:

   a. Hold the memory board assembly and align it over the memory board connector.

   b. Insert the memory board assembly into the connector.

9. Install the processor housing cover and push the two pop rivets down to secure the cover.

10. If you have other options to install or remove, do so now; otherwise, go to "Completing the installation" on page 91.

## Installing a microprocessor kit

The server comes with one microprocessor installed on the processor board. If you install an additional microprocessor kit, the server can operate as a symmetric multiprocessing (SMP) server. With SMP, certain operating systems and application programs can distribute the processing load among the microprocessors.

| Microprocessor speed (MHz) | Core/bus fraction | J13 Jumper | J14 Jumper | J15 Jumper | J16 Jumper |
|---|---|---|---|---|---|
| 700 | 7.0 | Pins 2 and 3 | Pins 1 and 2 | Pins 1 and 2 | Pins 2 and 3 |
| 900 | Automatic setting | Due to the automatic speed setting, no jumper settings are required. | | | |

*Table 8. Microprocessor core frequency selection.*

**Notes:**

1. 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) code. The latest level of BIOS code for the server is available through the World Wide Web. Go to http://www.ibm.com/pc/support/, select IBM Servers, and make the selections for your server.

2. Obtain an SMP-capable operating system (optional). For a list of supported operating systems, see http://www.ibm.com/pc/us/compat/ on the World Wide Web.

   **Attention:** To avoid damage and ensure proper server operation when you install a new or an additional microprocessor, use microprocessors that have the same cache size and type, and the same clock speed. Microprocessor internal and external clock frequencies must be identical.

3. To order additional microprocessor options, contact your IBM reseller or IBM marketing representative.

4. 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 Table 8.

5. Your server comes standard with one microprocessor installed. The microprocessor is installed in microprocessor connector J2 and is the startup (boot) processor. A microprocessor installed in microprocessor connector J3 is processor 2; a microprocessor installed in microprocessor connector J4 is

processor 3; a microprocessor installed in microprocessor connector J5 is processor 4. If more than one microprocessor is installed, the highest numbered processor is the one the server will start from. The lower numbered microprocessors are used as application processors.

The following table and the label on the inside of the top cover of the server show the order in which additional microprocessors and voltage regulator modules (VRMs) must be installed.

*Table 9. Microprocessor and VRM installation order.*

| Note: "T" indicates an installed terminator card; "X" 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 | | | | | | | |
| J2 (P1) | J3 (P2) | J4 (P3) | J5 (P4) | J37 | (VRM 1) | J38 | (VRM 2) | J39 | (VRM 3) | J41 | (VRM 4) |
| X | T | T | T | X | | | | | | | |
| Two microprocessors installed | | | | | | | | | | | |
| Microprocessor connectors | | | | VRM connectors | | | | | | | |
| J2 (P1) | J3 (P2) | J4 (P3) | J5 (P4) | J37 | (VRM 1) | J38 | (VRM 2) | J39 | (VRM 3) | J41 | (VRM 4) |
| X | X | T | T | X | | X | | | | | |
| Three microprocessors installed | | | | | | | | | | | |
| Microprocessor connectors | | | | VRM connectors | | | | | | | |
| J2 (P1) | J3 (P2) | J4 (P3) | J5 (P4) | J37 | (VRM 1) | J38 | (VRM 2) | J39 | (VRM 3) | J41 | (VRM 4) |
| X | X | X | T | X | | X | | X | | | |
| Four microprocessors installed | | | | | | | | | | | |
| Microprocessor connectors | | | | VRM connectors | | | | | | | |
| J2 (P1) | J3 (P2) | J4 (P3) | J5 (P4) | J37 | (VRM 1) | J38 | (VRM 2) | J39 | (VRM 3) | J41 | (VRM 4) |
| X | X | X | X | X | | X | | X | | X | |

To install an additional microprocessor kit:

1. Review "Before you begin" on page 58.

2. Turn off the server and all attached devices. Disconnect all external cables and power cords and remove the top cover.
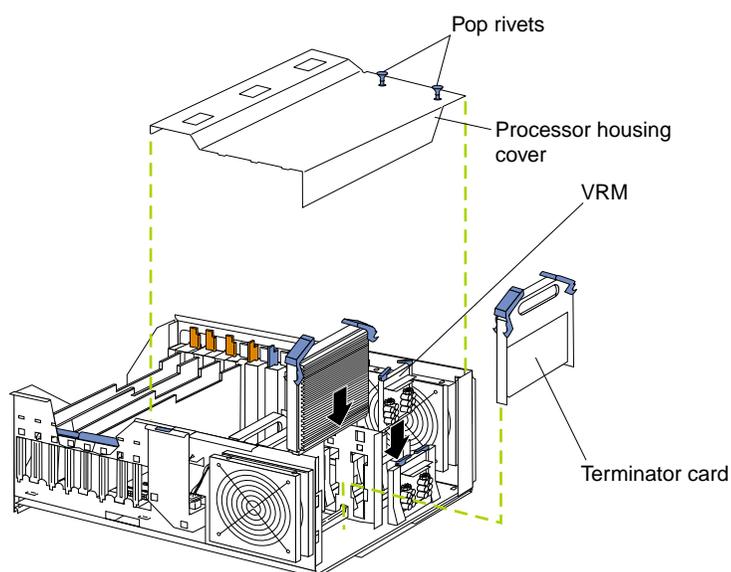
3. Pull up the two pop rivets on the processor housing cover and remove the cover from the processor housing.

4. Determine the slots where you will install the microprocessor and VRM.

5. Remove the terminator card from the microprocessor connector.

6. 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 by the open latches, and center the microprocessor over the microprocessor connector.

      **Attention:** Make sure the microprocessor is oriented and aligned correctly before you try to close the latches.

   c. Carefully close the latches to seat the microprocessor in the connector.

   d.  Store the terminator card in a safe place in the static-protective package that the new microprocessor comes in; you will need to install it again if you ever remove the microprocessor.

7. Install the voltage regulator module (VRM):

   a. Center the VRM over the connector.  Make sure that the VRM is oriented and aligned correctly.

      **Note:** If you remove the microprocessor later, remember to install the terminator card in the appropriate microprocessor connector and to remove the VRM for that microprocessor.

   b. Carefully close the latches to seat the VRM in the connector.

8. Install the processor housing cover and push down on the two pop rivets.

9. If you have other options to install or remove, do so now; otherwise, go to "Completing the installation" on page 91.

## Installing 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. If you suspect a problem with one of these parts, contact a service technician.**

Before you continue with the power supply-installation procedure, review the following.

**Notes:**

1. During normal operation, each power supply bay must have either a power supply or filler panel installed for proper cooling.

2. Before you install a power supply in the right-most power supply bay, you must disconnect the cable-management arm. You can connect the cable-management arm after installing the power supply.

**Before you begin:**

- Read "Safety information" on page 180.

- Review the information in "Before you begin" on page 58.

- Read the documentation that comes with the option.

Refer to the following illustration to install a hot-swap power supply.
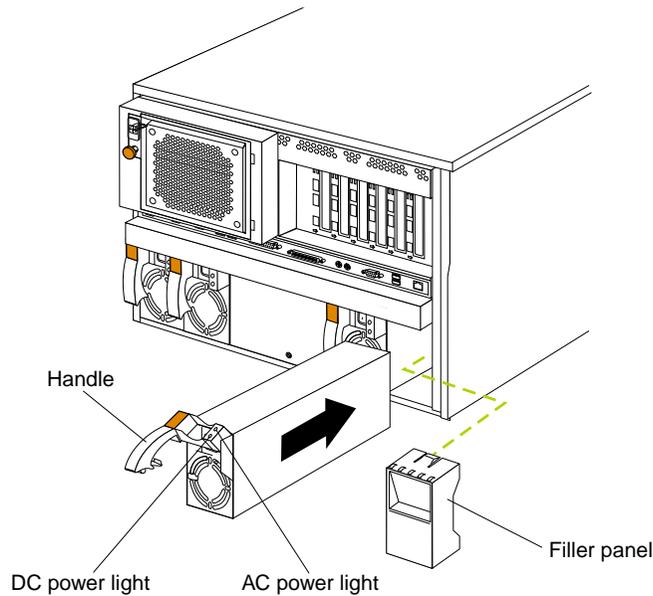


To install an additional power supply:

1. Remove the filler panel.

2. Place the handle on the power supply in the open position.

3. Slide the power supply into the chassis and close the handle.

4. Plug one end of the power cord into the power supply; then, plug the other end of the cord into a properly grounded electrical outlet.

5. Verify that the DC Power light and the AC Power light on the power supply are lit, indicating that the power supply is operating properly.

**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.**
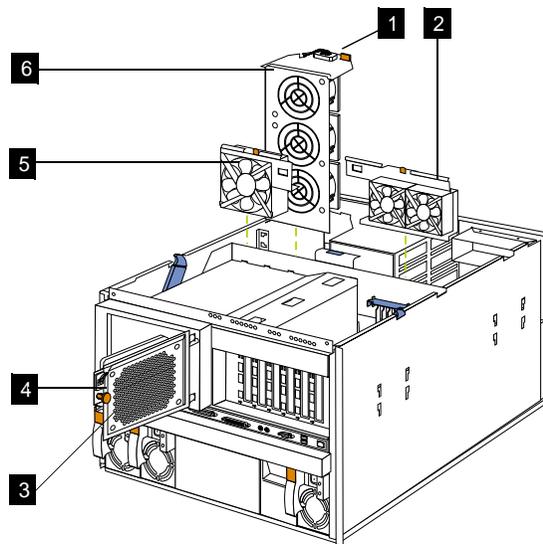
## Replacing a hot-swap fan

**Before you begin:**
- Read "Safety information" on page 180.
- Review the information in "Before you begin" on page 58.
- Read the documentation that comes with the option.

Refer to the following illustration to replace a hot-swap fan.



| | |
|---|---|
| ~1~ | Latch |
| ~2~ | Hot-swap fan assembly 2 |
| ~3~ | Hot-swap fan assembly 4 |
| ~4~ | Pop rivet |
| ~5~ | Hot-swap fan assembly 3 |
| ~6~ | Hot-swap fan assembly 1 |

To replace a hot-swap fan assembly:

1. If you are replacing fan assembly 1, 2, or 3:

    a. Remove the top cover.

    **Attention:** To ensure proper system cooling, keep the cover removed for no more than 30 minutes during this procedure.

    b. Press the fan release latch and lift the fan assembly out of the server.

c. Slide the replacement fan assembly into the server. The latch will snap into place and secure the fan in the server.

d. Replace the top cover

2. If you are replacing fan assembly 4:

a. Pull out on the orange pop rivet on the rear fan bracket; then, lift the fan assembly up and out of the hinge cutouts.

b. Slide the replacement fan assembly into the server. (Make sure the fan assembly fits correctly into the hinge cutouts on the rear of the shuttle.)

c. When you have the fan assembly properly seated, push on the pop rivet until it clicks into place.

# Completing the installation

To complete the installation, you must reinstall the front trim bezel, reinstall the media bay bezel, reinstall the top cover, reconnect all the cables that you disconnected, and for certain options, run the Configuration/Setup Utility program. Follow the instructions in this section.

**Attention:** For proper 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 front trim bezel
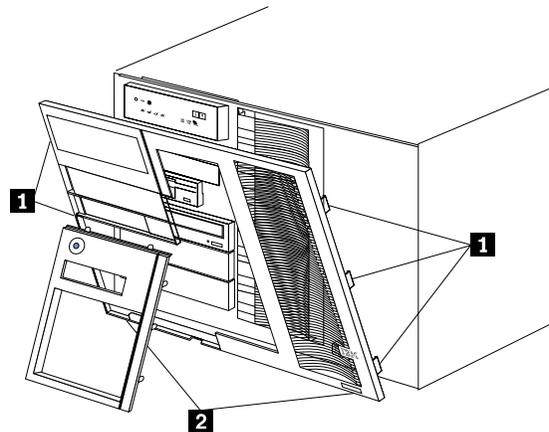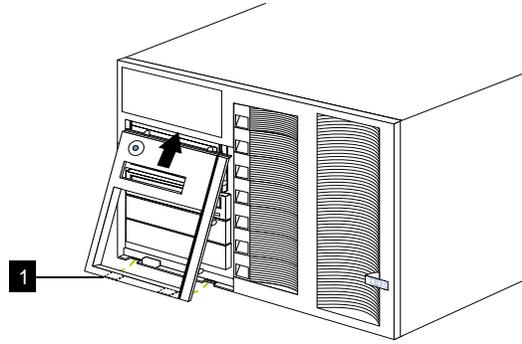


~1~    Side tabs

~2~    Bottom tabs

1. Align the two bottom tabs with the notches on the bottom front of the server.

2. Align the side tabs with the notches on the sides of the server.

3. Gently press the bezel into place.

## Installing the media-bay  bezel

Refer to the following illustration to install the media-bay bezel.

~1~    Media-bay bezel

To install the media-bay bezel:

1. Insert the two tabs on the top of the media-bay bezel into the matching holes on the server chassis.

2. Push the bottom of the media-bay bezel toward the server until the two tabs at the bottom of the bezel snap into place.

## Installing the top cover
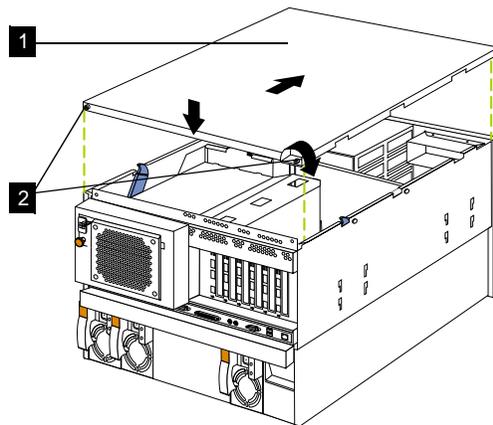


~1~    Top cover
~2~    Captive screws

To install the server top cover:

1. Before installing the 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 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 captive screws 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.

   **Note:** If necessary, see "Cabling the server" on page 104 for connector locations.

## 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. Run the Configuration/Setup Utility program to save the new configuration information. See "Configuring the server" on page 45.

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 installed a new microprocessor, you might want to upgrade the operating system to support symmetric multiprocessing (SMP).

Run the Configuration/Setup Utility program to save the new configuration information. See "Configuring the server" on page 45.

If you have installed or removed a hard disk drive, refer to "Using IBM ServeRAID" on page 117 for information about reconfiguring the disk arrays.

## Connecting external options

Review the information in "Before you begin" on page 58. Also, read the documentation that comes with the options.

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

This section provides information about the input/output (I/O) ports on the rear of the server. These ports include the following:

- One parallel port
- One video port
- One keyboard port
- One auxiliary-device port (mouse)
- One dual-channel Ultra-2 (LVD) SCSI port
- Two serial ports
- Two Universal Serial Bus (USB) ports
- One Ethernet port
- Three communication ports dedicated to the Advanced System Management processor

Refer to the following illustration for the location of input and output connectors.

Advanced Systems
Management Interconnect knockout

Parallel

Serial A

System management

Serial B

ASM Interconnect
port A

ASM Interconnect
port B

Ethernet

USB1

USB2

Video

Ultra2 SCSI   Keyboard   Mouse
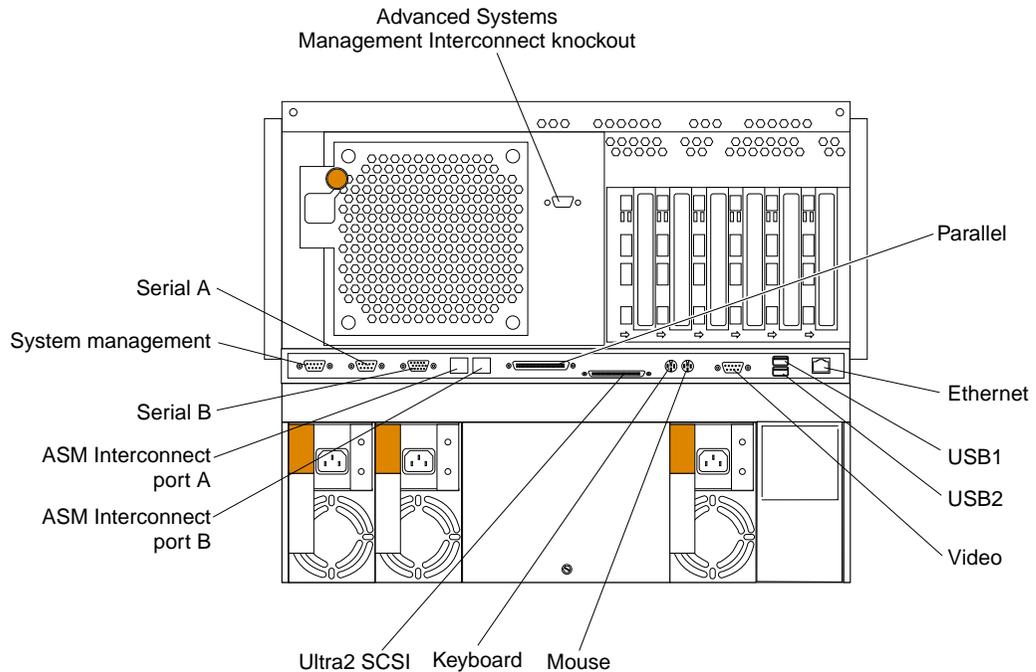
## Parallel port

The server has one parallel port.  This port supports three standard Institute of
Electrical and Electronics Engineers (IEEE) 1284 modes of operation: Standard Parallel
Port (SPP), Enhanced Parallel Port (EPP), and Extended Capability Port (ECP).

### Viewing or changing the parallel-port assignments

You can use the built-in Configuration/Setup Utility program to 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 the ECP and EPP modes.

To view or change the parallel-port assignment:

1.  Restart the server and watch the monitor screen.

2.  When the message `Press F1 for Configuration/Setup` appears, press F1.

    **Note:**  The Devices and I/O Ports choice appears only on the full configuration
    menu.  If you set two levels of passwords, you must enter the
    administrator password to access the full configuration menu.

3.  From the main menu, select **Devices and I/O Ports**; then, press Enter.

4.  Select the parallel port; then, use the arrow keys to advance through the settings
    available.

    **Note:**  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).

5.  Select **Save Settings**; then, select **Exit Setup** to exit from the Configuration/Setup
    Utility main menu.

### Parallel port connector

The following table shows the pin-number assignments for the 25-pin, female D-shell parallel-port connector on the rear of the server.
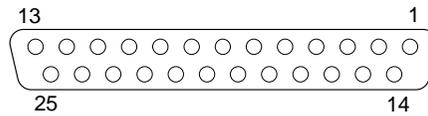


*Table 10. Parallel-port connector pin-number assignments.*

| Pin | I/O | SPP/ECP Signal | EPP Signal |
|-----|-----|----------------|------------|
| 1 | O | -STROBE | -WRITE |
| 2 | I/O | Data 0 | Data 0 |
| 3 | I/O | Data 1 | Data 1 |
| 4 | I/O | Data 2 | Data 2 |
| 5 | I/O | Data 3 | Data 3 |
| 6 | I/O | Data 4 | Data 4 |
| 7 | I/O | Data 5 | Data 5 |
| 8 | I/O | Data 6 | Data 6 |
| 9 | I/O | Data 7 | Data 7 |
| 10 | I | -ACK | -ACK |
| 11 | I | BUSY | -WAIT |
| 12 | I | PE (paper end) | PE (paper end) |
| 13 | I | SLCT (select) | SLCT (select) |
| 14 | O | -AUTO FD (feed) | -AUTO FD |
| 15 | I | -ERROR | -ERROR |
| 16 | O | -INIT | -INIT |
| 17 | O | -SLCT IN | -SLCT IN |
| 18 | — | Ground | Ground |
| 19 | — | Ground | Ground |
| 20 | — | Ground | Ground |
| 21 | — | Ground | Ground |
| 22 | — | Ground | Ground |
| 23 | — | Ground | Ground |
| 24 | — | Ground | Ground |
| 25 | — | Ground | Ground |

## Video port

Your server comes with an integrated super video graphics array (SVGA) video controller.  This controller is not removable, but you can disable it by installing a PCI video adapter.

**Note:**  If you install a PCI video adapter, the server BIOS will automatically disable the integrated video controller.

The following table shows the pin-number assignments for the 15-pin analog video connector on the rear of the server.
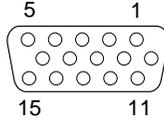
*Table 11. Video-port connector pin-number assignments.*

| Pin | Signal |
|---|---|
| 1 | Red |
| 2 | Green or monochrome |
| 3 | Blue |
| 4 | Monitor ID bit 2 |
| 5 | Ground |
| 6 | Ground |
| 7 | Ground |
| 8 | Ground |
| 9 | +5 V dc |
| 10 | Ground |
| 11 | Monitor ID bit 0 |
| 12 | DDC SDA |
| 13 | Horizontal synchronization (Hsynch) |
| 14 | Vertical synchronization (Vsynch) |
| 15 | DDC SCL |

## Keyboard port

There is one keyboard port connector on the rear of the server.

**Note:** If you attach a standard (non-USB) keyboard to the keyboard connector, the USB ports and devices will be disabled during the power-on self-test (POST).

The following table shows the pin-number assignments for the keyboard connector on the rear of the server.
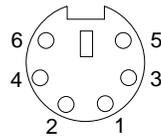


*Table 12. Keyboard connector pin-number assignments .*

| Pin | I/O | Signal |
|---|---|---|
| 1 | I/O | Data |
| 2 | N/A | Reserved |
| 3 | N/A | Ground |
| 4 | N/A | +5 V dc |
| 5 | I/O | Keyboard clock |
| 6 | N/A | Reserved |

## Auxiliary-device (pointing device) port

The I/O board has one auxiliary-device port that supports a mouse or other pointing device.

The following table shows the pin-number assignments for the auxiliary-device connector on the rear of the server.
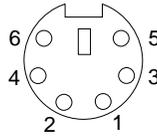


*Table 13. Auxiliary-device connector pin-number assignments .*

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

## Ultra2 (LVD) SCSI ports

The server supports an optional IBM ServeRAID controller.  This controller provides three independent SCSI channels.  A 16-bit (wide) LVD SCSI cable connects the hard disk drive backplane to one channel of the RAID controller.  Two 68-pin SCSI connectors for two additional channels are on the rear of the server.  Refer to "Using IBM ServeRAID" on page 117.

The server has a dual-channel Ultra-2 small computer system interface (SCSI) controller.  This controller supports two independent SCSI channels: one external and one internal.  Each of these channels supports up to 15 SCSI devices.  You can use the external LVD SCSI channel connector, on the rear of the server, to connect different types of SCSI devices, such as drives or printers.

### SCSI cabling requirements

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

For information about the maximum length of SCSI cable between the terminated ends of the cable, refer to the ANSI SCSI standards.  Adhering to these standards will help ensure that the server operates properly.

### Setting SCSI IDs

Each SCSI device connected to a SCSI controller must have a unique SCSI ID. This ID enables the SCSI controller to identify the device and ensure that different devices on the same SCSI channel do not attempt to transfer data simultaneously. SCSI devices that are connected to different SCSI channels can have duplicate SCSI IDs. SCSI IDs 6 and 7 are reserved for the SCSI controller on either SCSI channel A or B. The following table lists the SCSI IDs for devices that are connected to one channel.  In Table 14 on page 98, the hot-swap hard disk drive bays are in the standard (vertical) configuration.

| Standard (SCSI channel A) | Optional (SCSI channel B) |
|---|---|
| Drive bay 1: SCSI ID 0 | Drive bay 1: SCSI ID 11 |
| Drive bay 2: SCSI ID 1 | Drive bay 2: SCSI ID 12 |
| Drive bay 3: SCSI ID 2 | Drive bay 3: SCSI ID 13 |
| Drive bay 4: SCSI ID 3 | Drive bay 4: SCSI ID 14 |
| Drive bay 5: SCSI ID 4 | Drive bay 5: SCSI ID 15 |
| Backplane: SCSI ID 8 | Backplane: SCSI ID 9 |

*Table 14. SCSI IDs for hot-swap hard disk drives and backplanes (standard configuration).*

The hot-swap-drive backplane controls the SCSI IDs for the internal hot-swap drive bays. However, when you attach SCSI devices to the external SCSI connector, you must set a unique ID for the device. Refer to the information that is provided with the device for instructions to set its SCSI ID.

## SCSI connector pin-number assignments

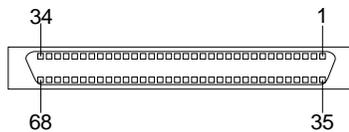The following table shows the pin-number assignments for the 68-pin SCSI connectors.



*Table 15. 68-pin SCSI connector pin-number assignments.*

| Pin | Signal | Pin | Signal |
|---|---|---|---|
| 1 | +Data 12 | 35 | -Data 12 |
| 2 | +Data 13 | 36 | -Data 13 |
| 3 | +Data 14 | 37 | -Data 14 |
| 4 | +Data 15 | 38 | -Data 15 |
| 5 | +Data P1 | 39 | -Data P1 |
| 6 | +Data 0 | 40 | -Data 0 |
| 7 | +Data1 | 41 | -Data 1 |
| 8 | +Data 2 | 42 | -Data 2 |
| 9 | +Data 3 | 43 | -Data 3 |
| 10 | +Data 4 | 44 | -Data 4 |
| 11 | +Data 5 | 45 | -Data 5 |
| 12 | +Data 6 | 46 | -Data 6 |
| 13 | +Data 7 | 47 | -Data 7 |
| 14 | +Data P | 48 | -Data P |
| 15 | Ground | 49 | Ground |
| 16 | DIFFSENS | 50 | Ground |
| 17 | Term power | 51 | Term power |
| 18 | Term power | 52 | Term power |
| 19 | Reserved | 53 | Reserved |
| 20 | Ground | 54 | Ground |
| 21 | +Attention | 55 | -Attention |
| 22 | Ground | 56 | Ground |
| 23 | +Busy | 57 | -Busy |
| 24 | +Acknowledge | 58 | -Acknowledge |
| 25 | +Reset | 59 | -Reset |
| 26 | +Message | 60 | -Message |
| 27 | +Select | 61 | -Select |

*Table 15. 68-pin SCSI connector pin-number assignments.*

| Pin | Signal | Pin | Signal |
|---|---|---|---|
| 28 | +Control/Data | 62 | -Control/Data |
| 29 | +Request | 63 | -Request |
| 30 | +Input/Output | 64 | -Input/Output |
| 31 | +Data 8 | 65 | -Data 8 |
| 32 | +Data 9 | 66 | -Data9 |
| 33 | +Data 10 | 67 | -Data 10 |
| 34 | +Data 11 | 68 | -Data 11 |

# Serial ports

The server has two standard serial ports: Serial port A and Serial port B. The operating system can use and share both serial ports; however, the integrated Advanced System Management Processor can use and share only Serial port A.

Some application programs require specific ports, and some modems function properly only at certain communication port addresses. You might need to use the Configuration/Setup Utility program to change communication port address assignments to prevent or resolve address conflicts.

## Viewing or changing the serial-port assignments

To view or change the serial-port assignments:

1. Restart the server and watch the monitor screen.

2. When the message `Press F1 for Configuration/Setup` appears, press F1.

3. From the main menu, select **Devices and I/O Ports**; then, press Enter.

   **Note:** The Devices and I/O Ports choice appears only on the full configuration menu. If you set two levels of passwords, you must enter the administrator password to access the full configuration menu.

4. Select the serial port; then, use the arrow keys to advance through the settings available.

5. Select **Save Settings**; then, select **Exit Setup** to exit from the Configuration/Setup Utility main menu.

## Serial-port connectors

The following table shows the pin-number assignments for the 9-pin, male D-shell serial-port connectors on the rear of the server. These pin-number assignments conform to the industry standard.
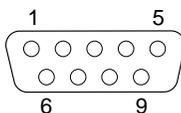


*Table 16. Serial-port connectors pin-number assignments.*

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

*Table 16. Serial-port connectors pin-number assignments.*

| Pin | Signal | Pin | Signal |
|-----|--------|-----|--------|
| 5 | Signal ground | | |

## Universal Serial Bus ports

The server has two Universal Serial Bus (USB) ports that configure automatically. USB is an emerging serial interface standard for telephony and multimedia devices. It uses Plug and Play technology to determine the type of device attached to the connector.

**Notes:**

1. If you attach a standard (non-USB) keyboard to the keyboard connector, the USB ports and devices will be disabled during the power-on self-test (POST).

2. 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 settings in the Configuration/Setup Utility program.

3. Check to make sure your NOS supports USB devices.

### USB cables and hubs

You need a 4-pin cable to connect devices to USB 1 or USB 2. If you plan to attach more than two USB devices to the machine, you must use a hub to connect the devices. The hub provides multiple connectors for attaching additional external USB devices with a maximum of 127 external devices.

USB technology provides up to 12 megabits-per-second (Mbps) speed with a maximum of 127 external devices and a maximum signal distance of five meters (16 ft.) per segment.

### USB-port connectors

Each USB port has an external connector on the rear of the server for attaching USB compatible devices.

The following table shows the pin-number assignments for the USB-port connectors on the rear of the server.

*Table 17. USB-port connector pin-number assignments.*

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

## Ethernet port

Your server comes with an integrated Ethernet controller. This controller provides an interface for connecting to 10-Mbps or 100-Mbps networks and provides full-duplex (FDX) capability, which enables simultaneous transmission and reception of data on the Ethernet local area network (LAN).

To access the Ethernet port, connect a Category 3, 4 or 5 unshielded twisted-pair (UTP) cable to the RJ-45 connector on the rear of the server.

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

## Configuring the Ethernet controller

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). The controller supports half-duplex (HDX) and full-duplex (FDX) modes at both speeds.

The Ethernet controller is a PCI Plug and Play device. You do not need to set any jumpers or configure the controller for the operating system before you use the Ethernet controller. However, you must install a device driver to enable the operating system to address the Ethernet controller. The device drivers are provided on the ServerGuide CDs.

## Failover for redundant Ethernet

The IBM 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 LAN 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. When the primary link is restored to an operational state, the Ethernet traffic switches back to the primary Ethernet controller. The switch back to the primary Ethernet controller can be automatic or manually controlled, depending on the setup and operating system.

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 10/100 Fault Tolerant Adapters that you can install in the server. See the documentation that comes with the adapter for more information.

**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 switch automatically to the secondary Ethernet controller. This can be very useful if a faulty adapter causes a network problem, or if you want to upgrade the primary adapter hardware.

**Note:** If you hot replace the primary adapter while the Ethernet traffic is 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. See "Configuring for failover".

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

*Windows NT Server:* IBM offers hot-plug support for Windows NT Server Version 4.0. Failover can work in conjunction with hot-plug support or independently. If you are not using hot-plug support, go to "Windows NT Server failover setup" on page 102.

*Windows NT Server hot-plug setup:*  IBM Hot Plug PCI for Windows NT Server 4.0 package is available for download from the IBM Web site at:

```
http://www.pc.ibm.com/support
```

Enter the brand type of **Server**, click on **Downloadable files** and look for **Hot Plug**. The IBM Hot Plug PCI for Windows NT Server 4.0 package uses the Intel Desktop Management Interface (DMI) to control hot-plug support for the Ethernet controllers. The Ethernet controller in the computer is DMI compliant.  Download and install the following software in the order listed:

1. IBM PCI Hotplug for Windows NT 4.0 Failover DMI Agent
2. IBM PCI Hot Plug for Windows NT 4.0 Solution
3. IBM 10/100 Fault Tolerant Adapter device drivers

**Note:**  The order of installation is important.  You must install the IBM Hot Plug for Windows NT Server 4.0 package before you install the IBM 10/100 Fault Tolerant Adapter driver.  If you install the adapter device driver before the PCI Hot Plug Solution package, the adapter device driver will not recognize the hot-plug code.  This happens because the adapter device driver only checks the NT registry for the Hot Plug package during installation.  If the PCI Hot Plug Solution package is added after the adapter device driver is installed, the adapter must be removed and added again in order for it to detect the PCI Hot-Plug Solution code.

To install the IBM PCI Hotplug for Windows NT 4.0 Failover DMI Agent:

1. Download the IBM PCI Hotplug for Windows NT 4.0 Failover DMI Agent DMI Agent file from the Support web page and extract the files onto a diskette.

2. Insert the diskette into the diskette drive.

3. From the Start menu, select the **Run** option.

4. Type A:\SETUP.EXE in the Open box.

5. Click **Ok**.  The setup wizard opens.

6. Follow the instructions that are given by the setup wizard until the program is installed.

7. Restart the server.

To install the IBM PCI Hot Plug for Windows NT 4.0 Solution package:

1. Download the IBM PCI Hot Plug for Windows NT 4.0 Solution file from the support web page and extract the files onto a diskette.

2. Log on to Windows NT Server as a user in the Administrator group.

3. Insert the diskette into the diskette drive.

4. From the Start menu, select the **Run** option.

5. Type A:\SETUP.EXE in the Open box.

6. Click **OK**.  The Setup wizard opens.

7. Follow the instructions given by the setup wizard until the program is installed.

*Windows NT Server failover setup:*  To install the IBM 10/100 Fault Tolerant Adapter device drivers:

1. Add the redundant NIC adapter according to the instructions that are provided with the adapter.

2. Use the ServerGuide CDs to install the AMD PCNet Ethernet Family adapter device driver.

3. Do not select the Grouping box at this point; you must first restart the machine.

4. From the Windows NT Server desktop, select **Control Panel**, then select the **Network** icon, then select the **Adapters** tab.

5. Highlight one of the adapters that will be in the redundant pair and then click the **Properties...** button.

6. Check the Grouping box. This will show the possible combinations for redundant pairs.

7. Select the adapter pair you want and then select **OK**. Note that the integrated Ethernet controller is located at PCI C.

   Two options are available for recovering from a failover condition. The options are determined by the Enable for DMI / Hot Swap Support checkbox. If the IBM Hot Plug PCI for Windows NT Server 4.0 package is installed, this checkbox will appear at the bottom of the Adapter Properties panel. If you do not have the IBM Hot Plug PCI for Windows NT Server 4.0 package installed on the server, you will not see the Enable for DMI / Hot Swap Support checkbox.

   If the Enable for DMI / Hot Swap Support checkbox is not checked or is not present, traffic will automatically switch back to the primary adapter when the primary link status is restored. In this mode, the adapter cannot be hot-swapped. Users with the IBM Hot Plug PCI for Windows NT Server 4.0 package installed should check the Enable for DMI / Hot Swap Support checkbox.

   If the Enable for DMI / Hot Swap Support checkbox is checked, traffic will remain on the secondary adapter until the user directs it to return to the primary adapter. This can be done after the hot-swap replacement of the primary adapter or by using the DMI interface.

8. 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. In addition, if the Enable for DMI / Hot Swap Support checkbox is checked, a DMI alert will also be generated.

*IntraNetWare:* The IBM PCI Hot Plug System Bus Driver Diskette for Novell Netware V4.41, V4.42, and V5.0 is available for download from the IBM Web site at:

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

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

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

**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.

## Ethernet port connector

The following table shows the pin-number assignments for the RJ-45 connector. These assignments apply to both 10BASE-T and 100BASE-TX devices.
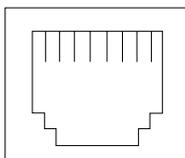
*Table 18. Ethernet RJ-45 connector pin-number assignments..*

| Pin | Signal | Pin | Signal |
|---|---|---|---|
| 1 | Transmit data+ | 5 | Not connected |
| 2 | Transmit data- | 6 | Receive data - |
| 3 | Receive data+ | 7 | Not connected |
| 4 | Not connected | 8 | Not connected |

## Advanced System Management ports

Your server has three communication ports dedicated to the Advanced System Management Processor.  One port uses a standard D-shell serial-port connector, connector C.  The other two ports, which are used for the ASM Interconnect function, use a dual RJ-45 connector.

You can attach a dedicated modem to the D-shell system-management connector on the rear of the server to communicate with the integrated Advanced System Management Processor.

The ASM Interconnect function uses the RJ-45 system-management connectors.  This function enables you to connect the Advanced System Management Processors of several rack-mounted servers so that they can communicate with each other in half-duplex mode.
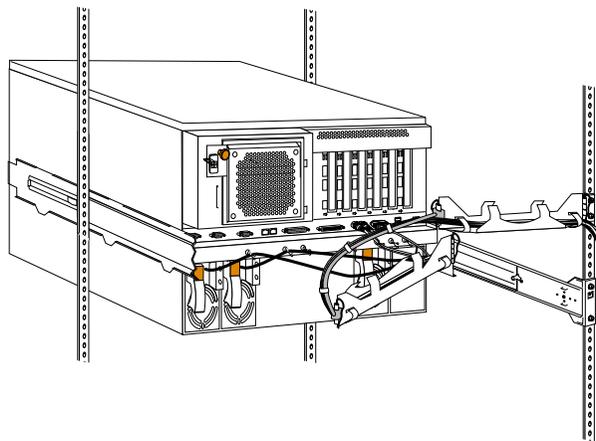
## Cabling the server

Refer to the following illustration for the location of input and output connectors.
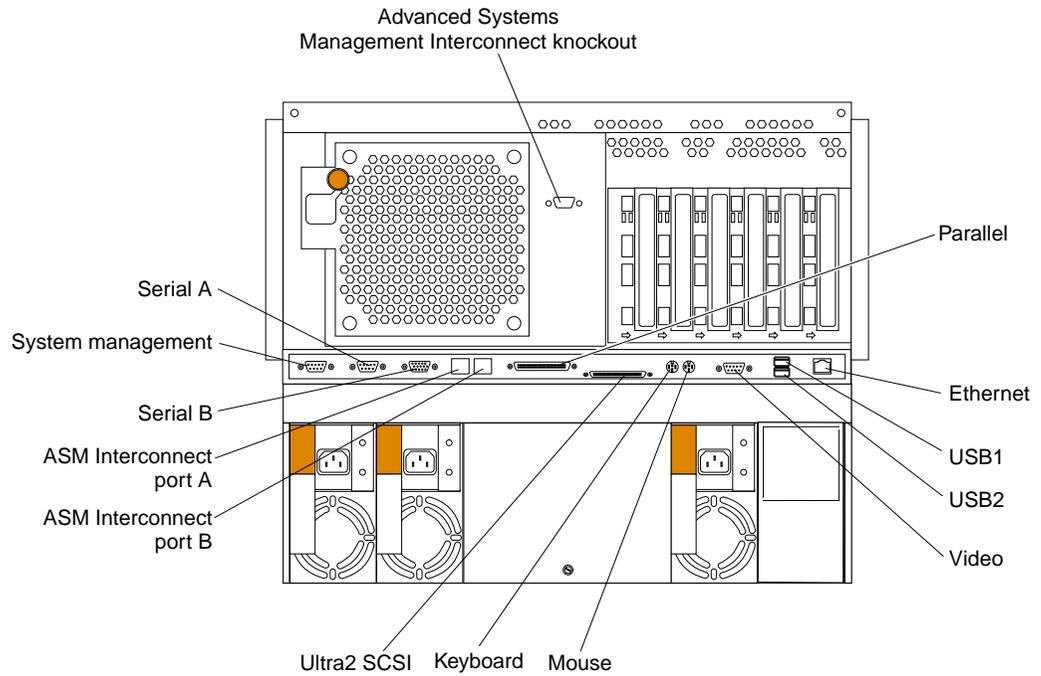
Refer to the following illustration for an example of proper cable routing.



## Installing the server in a rack

Refer to the *Rack Installation Instructions* for rack installation and removal instructions.
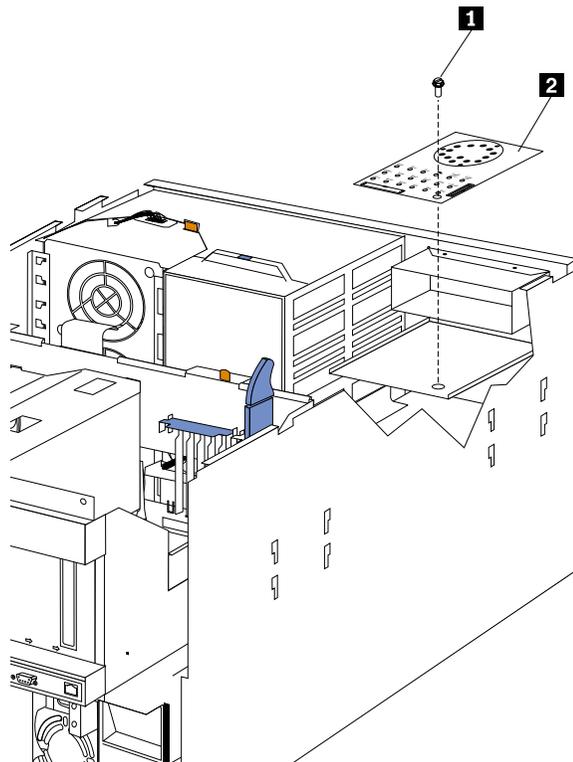
# FRU information (service only)

Field Replacement Units (FRUs) should be replaced by qualified service personnel only.

## Diagnostic switch card

Use the following illustration when replacing the diagnostic switch card.

Review the information in "Before you begin" on page 58.



~1~       Holding screw

~2~       Diagnostic switch card

1. Power-off the server, if it is on.
2. Disconnect the power cord for each power source from the electrical outlet.

    **Attention:** The presence of ac standby power might result in damage to the hardware unless you disconnect the power cord for each power source from the electrical outlet.
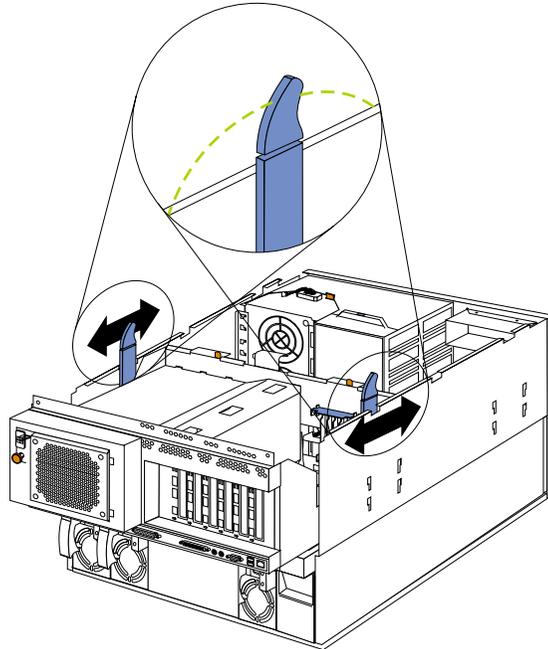
3. Remove the top cover (see "Removing the top cover" on page 59).
4. DIsconnect the shuttle (see "Disconnecting the shuttle" on page 108) and move it back slightly.
5. Disconnect the front LED card assembly cable from the diagnostic switch card.
6. Disconnect the diagnostic switch card cable.
7. Remove the screw from the diagnostic switch card.

8. Replace the card and reattach the front LED card cable and the diagnostic switch card cable.

## Disconnecting the shuttle

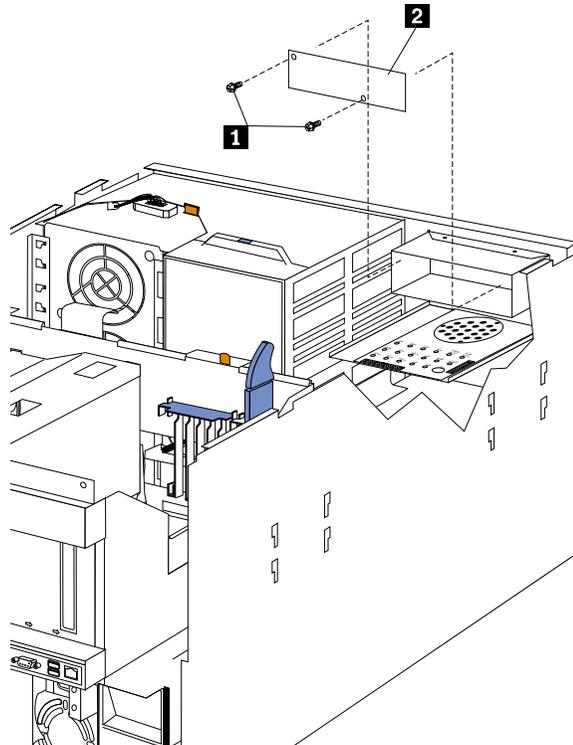Review the information in "Before you begin" on page 58.



1. Power-off the server, if it is on.
2. Disconnect the power cord for each power source from the electrical outlet.

   **Attention:** The presence of ac standby power might result in damage to the hardware unless you disconnect the power cord for each power source from the electrical outlet.
3. Remove the top cover (see "Removing the top cover" on page 59).
4. Flip the top end of each diagonal side latch inward.
5. Move each latch toward the rear of the shuttle until the latch is vertical.
6. Fold the hinged top end of each latch outwards at the notch of the chassis.
7. Slide the shuttle toward the rear of the server.
8. To remove the shuttle, see "Removing the shuttle" on page 115.

## Front LED card assembly

Review the information in "Before you begin" on page 58.

~1~     Retaining screws

~2~     Front LED card assembly

1. Power-off the server, if it is on.

2. Disconnect the power cord for each power source from the electrical outlet.

   **Attention:** The presence of ac standby power might result in damage to the hardware unless you disconnect the power cord for each power source from the electrical outlet.

3. Remove the top cover (see "Removing the top cover" on page 59).

4. Disconnect the cable to the diagnostic switch card.

5. Remove the two retaining screws that secure the board in place.

6. Remove and replace the board.

## I/O Legacy board

Review the information in "Before you begin" on page 58.

**Attention:**

- Existing system configuration will be lost. If possible, save the existing system configuration or obtain a previously saved copy.

- After replacing the I/O Legacy board, flash the system with the latest level BIOS. Match the BIOS level currently installed on the system.

Use the following illustration as a guide to removing the I/O Legacy board.
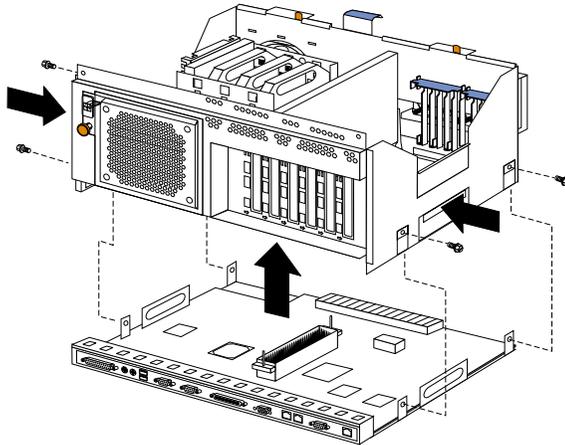
1. Power-off the server off, if it is on.
2. Disconnect the power cord for each power source from the electrical outlet.

   **Attention:** The presence of ac standby power might result in damage to the hardware unless you disconnect the power cord for each power source from the electrical outlet.
3. Remove the top cover (see "Removing the top cover" on page 59).
4. Disconnect the shuttle (see "Disconnecting the shuttle" on page 108.)
5. Remove the shuttle (see "Removing the shuttle" on page 115).
6. Remove the four shuttle screws (two on each side).
7. Push in on the shuttle touchpoints.
8. Separate the shuttle from the I/O Legacy board.
9. To replace the I/O Legacy board, reverse this procedure.

# Memory card removal

**Before you begin:**
- Read "Safety information" on page 180.
- Review "Before you begin" on page 58.
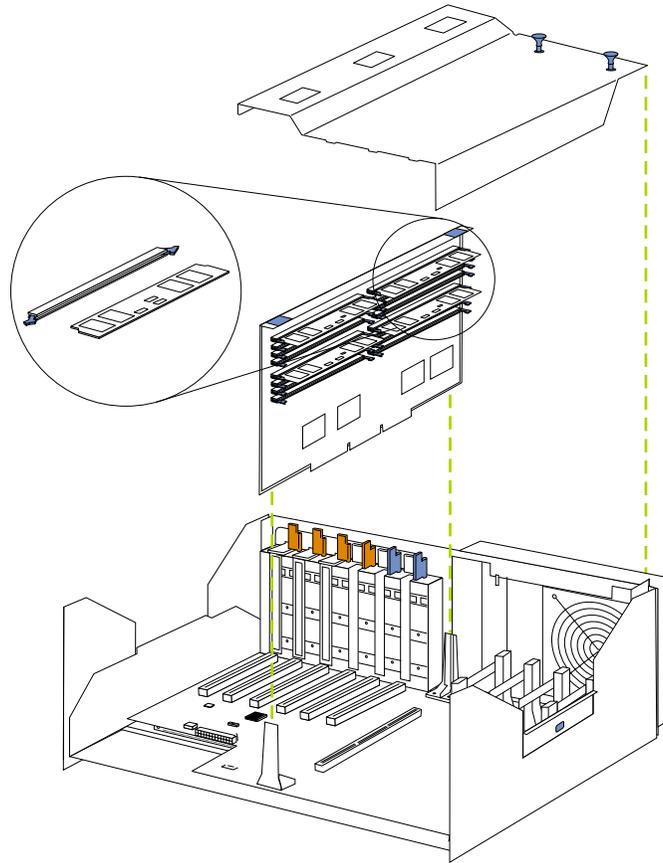
To replace the memory card assembly:

1. Power-off the server and all attached devices. Disconnect external cables and power cords and remove the top cover.

2. Pull up the two pop rivets on the processor housing cover and remove the cover from the processor housing.

3. Lift up on the memory card assembly and remove it from the server.

   **Note:** When setting down the memory card assembly, be sure to place the assembly only on a static-protective surface, such as a static-protective package.

4. Remove the memory modules (DIMMs) from the memory card assembly and seat them in the new memory card assembly. See "Installing memory-module kits" on page 84.

   **Note:** Be sure to put the memory modules in the same positions on the replacement assembly as they occupied on the assembly that has been removed from the server.

5. Install the memory card assembly:

   a. Hold the memory card assembly and align it over the memory card connector.

   b. Insert the memory card assembly into the connector.

6. Install the processor housing cover and push the two pop rivets down to secure the cover.

# PCI switch card

**Before you begin:**

- Read "Safety information" on page 180.
- Review "Before you begin" on page 58.
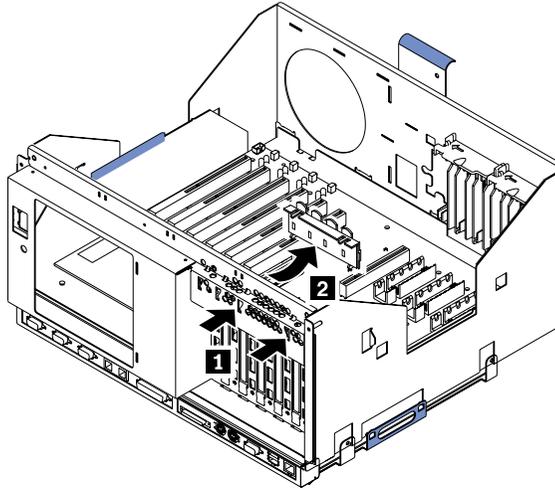


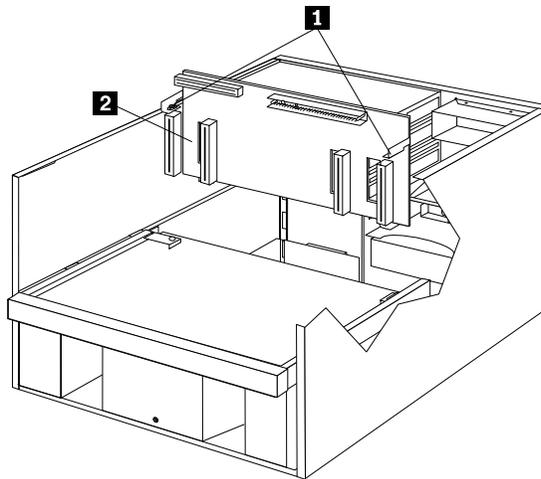| ~1~ | Switch card latches |
|-----|---------------------|
| ~2~ | Switch card assembly |

1. Power-off the server, if it is on.
2. Disconnect the power cord for each power source from the electrical outlet.

   **Attention:** The presence of ac standby power might result in damage to the hardware unless you disconnect the power cord for each power source from the electrical outlet.

3. Remove the top cover (see "Removing the top cover" on page 59).
4. Disconnect the switch card cable from the Processor/PCI board.
5. Disengage the switch card:

   a. Press the switch card latches toward the front and sides of the server.

   b. Push the latches through the notches.

6. When the switch card latches have been disengaged from the notches, gently pull the switch card free and lift it up and out of the server.

   **Note:** You may have to tilt the top of the switch card toward the front of the server when removing it.

7. To replace the switch card, reverse the steps above.

# Power backplane assembly

**Before you begin:**

- Read "Safety information" on page 180.
- Review "Before you begin" on page 58.

**~1~**        Retaining screws

**~2~**        Power backplane assembly

1. Power-off the server, if it is on.

2. Disconnect the power cord for each power source from the electrical outlet.

   **Attention:**   The presence of ac standby power might result in damage to the hardware unless you disconnect the power cord for each power source from the electrical outlet.

3. Remove the top cover (see "Removing the top cover" on page 59).

4. Remove the shuttle ("Removing the shuttle" on page 115).

5. Remove the hot-swap power supplies (reverse the steps in "Installing a hot-swap power supply" on page 88).

6. Turn the two retaining screws one-quarter turn.

7. Lift the power backplane assembly.

8. To replace the power backplane assembly, reverse this procedure.
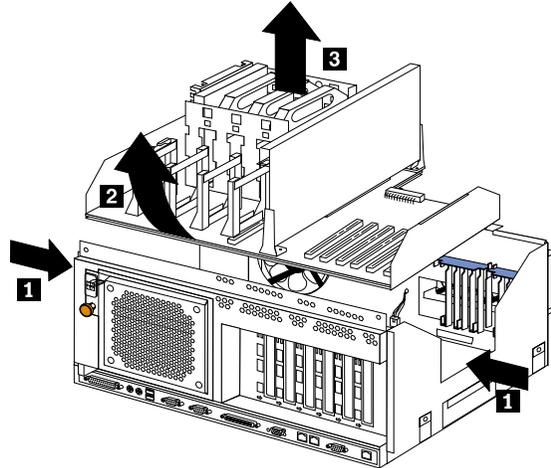
   **Note:**  When replacing the power backplane assembly, you must align the bottom of the assembly with the notches on the floor of the server.

## Processor/PCI backplane

Review the information in "Before you begin" on page 58.

**Note:**  Existing system configuration will be lost.  If possible, save the existing system configuration or obtain a previously saved copy.
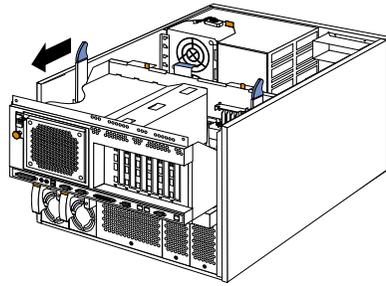
~1~     Cutouts

~2~     Processor/PCI Backplane assembly

~3~     Microprocessors

1.  Power-off the server, if it is on.

2.  Disconnect the power cord for each power source from the electrical outlet.

    **Attention:**  The presence of ac standby power might result in damage to the hardware unless you disconnect the power cord for each power source from the electrical outlet.

3.  Remove the top cover (see "Removing the top cover" on page 59).

4.  Disconnect the shuttle (see "Disconnecting the shuttle" on page 108.)

5.  Remove the shuttle (see "Removing the shuttle" on page 115).

6.  Disconnect the power cable.

7.  Disconnect the front fan cable.

8.  Disconnect the rear fan cable.

9.  Remove any hot-plug adapters (reverse the steps in "Installing a hot-plug adapter (slots 3 through 6)" on page 62.)

10. Remove microprocessors, voltage regulator modules and terminator cards (reverse the steps in "Installing a microprocessor kit" on page 86.)

11. Remove memory card.

12. Press the assembly inward at the cutouts to release the notches.

13. Lift the assembly out of the shuttle.

    **Note:**  Lift the assembly at an angle for easier removal.

14. To install the new Processor/PCI board, reverse the above procedure.

## Removing the shuttle



1. Power-off the server, if it is on.

2. Disconnect the power cord for each power supply from the electrical outlet.

   **Attention:** The presence of ac standby power might result in damage to the hardware unless you disconnect the power cord for each power supply from the electrical outlet.

3. Remove the top cover (see "Removing the top cover" on page 59).

4. Disconnect the shuttle (see "Disconnecting the shuttle" on page 108.)

5. Place one hand on the handle at the front portion of the shuttle, and place the other hand on the ledge at the rear of the shuttle.

6. Lift the shuttle at an angle with the rear of the shuttle being removed first and remove the shuttle from the server.

# Using IBM ServeRAID

**Note:** For a list of ServeRAID error codes, see "ServeRAID POST (ISPR) error codes" on page 161.

The following information is for configuring an IBM ServeRAID-3H, ServeRAID-3HB, or ServeRAID-3L. These high-performance, redundant array of independent disk (RAID) controllers are ideally suited for data-storage environments that require superior performance, flexibility, and reliable data storage.

You also can use the configuration and reference information in this chapter to configure the IBM ServeRAID controllers provided on some IBM server system boards.

## Understanding RAID technology

RAID is the technology of grouping several physical drives in a computer into an *array* that you can define 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 physical drive.

When you group multiple physical drives 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.

### Stripe-unit size

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

The granularity at which data is stored on one drive of the array before subsequent data is stored on the next drive of the array is called the *stripe-unit size.*

You can control the stripe-unit size and maximize the performance of the ServeRAID controller by setting a stripe-unit size to a value 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.*

**Note:** If you are using the ServeRAID-3L:

- Eight physical drives are supported in an array if the stripe-unit size is set to 32 KB or 64 KB.
- Sixteen physical drives are supported in an array if the stripe-unit size is set to 8 KB or 16 KB.

If you are using the ServeRAID-3H or ServeRAID-3HB, sixteen physical drives are supported in an array if the stripe-unit size is set to 32 KB or 64 KB.

# Supported RAID levels

Disk arrays are used to improve performance and reliability. The amount of improvement depends on the application programs that you run on the server, the RAID levels that you assign to the logical drives, and the stripe-unit size.

The ServeRAID controllers support RAID level-0, RAID level-1, RAID level-1 Enhanced (1E), RAID level-5 and RAID level-5 Enhanced (5E).

## Understanding 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.
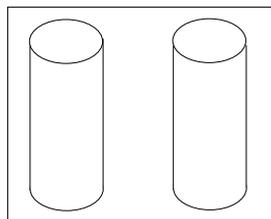
RAID level-0 requires a minimum of one drive and, depending upon the level of firmware and the stripe-unit size, supports a maximum of eight or 16 drives.

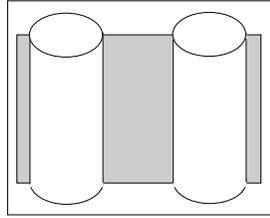The following illustration shows an example of a RAID level-0 logical drive.

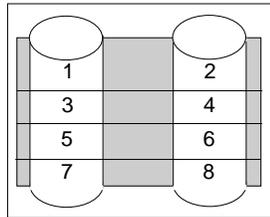You start with two physical drives.
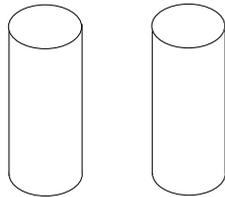
Create an array using the two physical drives.

Then, create a logical drive within that array.

The data is striped across the drives, creating blocks. Notice that the data is striped across all the drives in the array, but no redundant data is stored.



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

**Note:** You can assign RAID level-0 only to logical drives in an array that contains only one physical drive.

When you replace a failed drive, the ServeRAID controller can rebuild all the RAID level-1E and RAID level-5E logical drives automatically onto the replacement physical 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 you back up each day and for which safety is not of primary importance, that is, data that you can re-create easily. You also might want to use a RAID level-0 logical drive when the work you are doing requires maximum drive capacity.

## Understanding RAID Level-1

RAID level-1 provides 100% data redundancy and requires only two physical drives. With RAID level-1, the first half of a stripe is the original data; the second half of a stripe is a *mirror* (that is, a copy) of the data, but written to the other drive in the RAID level-1 array.
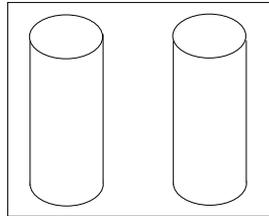
Because the data is mirrored, the capacity of the logical drive when assigned RAID level-1 is 50% of the array capacity.

The following illustration shows an example of a RAID level-1 logical drive.
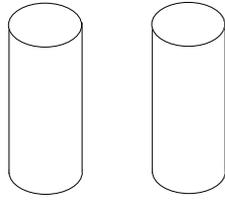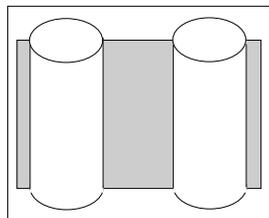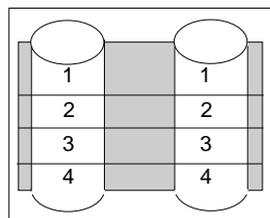
You start with two physical drives.

Create an array using the two physical drives.

Then, create a logical drive within that array.

The data is striped across the drives, creating blocks. Notice that the data on the drive on the right is a mirror copy of the drive on the left.

With RAID level-1, if one of the physical drives fails, the ServeRAID controller switches read and write requests to the remaining functional drive in the RAID level-1 array.

## Understanding RAID Level-1 Enhanced

If you have three or more physical drives in the array, you can no longer select RAID level-1, but you can select RAID level-1 Enhanced (also called RAID level-1E).

RAID level-1E combines mirroring with data striping. This RAID level stripes data and copies of the data across all of 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 array capacity of the grouping of physical drives in the array.

RAID level-1E requires a minimum of three drives and, depending upon the level of firmware and the stripe-unit size, supports a maximum of eight or 16 drives.

The following illustration is an example of an Enhanced RAID level-1 logical drive.

You start with three physical drives.
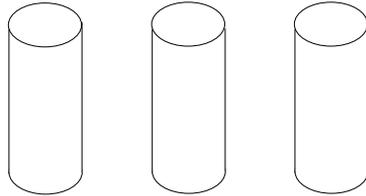
Create an array using the physical drives.
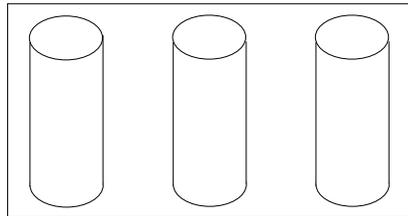
Then, create a logical drive within that array.
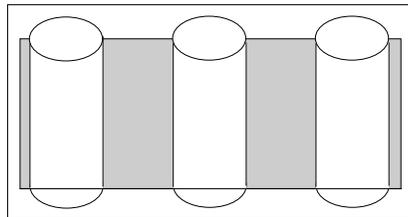
The data is striped across the drives, creating blocks. Notice that the stripe labeled ★ is the data stripe and the stripe labeled ★ ★ is the mirror (that is, the copy) of the preceding data stripe. Also notice that each block on the mirror stripe is shifted one drive.

With RAID level-1E, if one of the physical drives fails, the ServeRAID controller switches read and write requests to the remaining functional drives in the RAID level-1E array.

## Understanding RAID Level-5

RAID level-5 requires a minimum of three physical 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 array is reduced by one drive (for data-parity storage).

RAID level-5 is generally the most desirable choice, because it offers both data protection and increased throughput. RAID level-5 gives you higher capacity than RAID level-1, but RAID level-1 offers better performance.
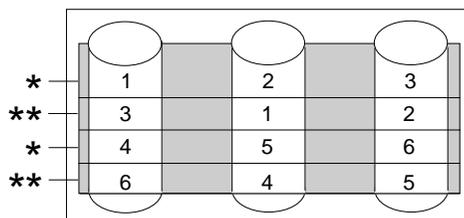
The RAID level-5 requires a minimum of three drives and, depending upon the level of firmware and the stripe-unit size, supports a maximum of eight or 16 drives.

The following illustration is an example of a RAID level-5 logical drive.

You start with four physical drives.

Create an array using three of the physical drives, leaving the fourth as a hot-spare drive.
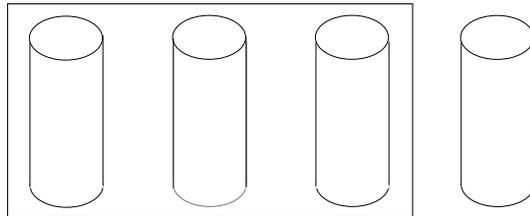
Then, create a logical drive within that array.
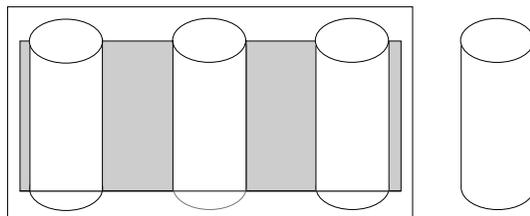
The data is striped across the drives, creating blocks. Notice that the storage of the data parity (denoted by ★ ) also is striped, and it shifts from drive to drive.
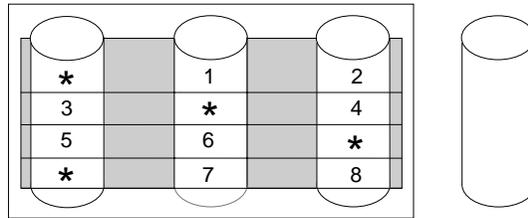
A parity block ($\star$) contains a representation of the data from the other blocks in the same stripe.

If a physical drive fails in the array, the ServeRAID controller switches read and write requests to the remaining functional drive in the RAID level-5 array, which is a hot-spare drive.
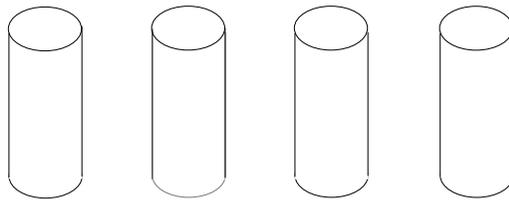


## Understanding RAID Level-5 Enhanced

RAID level-5 Enhanced (also called RAID level-5E) requires a minimum of four physical drives. RAID level-5E is also firmware-specific. You can think of RAID level-5E as "RAID level-5 with a built-in spare drive."

Reading from and writing to four disk drives is more efficient than three disk drives and an idle hot spare and therefore improves performance. Additionally, the spare drive is actually part of the RAID level-5E array, as shown in the following example. With such a configuration, you cannot share the spare drive with other arrays. If you want a spare drive for any other array, you must have another spare drive for those arrays.

Like RAID level-5, this RAID level stripes data and parity across all of the drives in the array. When an array is assigned RAID level-5E, the capacity of the logical drive is reduced by the capacity of two physical drives in the array (that is, one for parity and one for the spare).

RAID level-5E is a very desirable choice, because it offers both data protection and increased throughput, in addition to the built-in spare drive.

**Note:** For RAID level-5E, you can have only one logical drive in an array. When using RAID level-5E, you can have a maximum of seven logical drives on the controller.
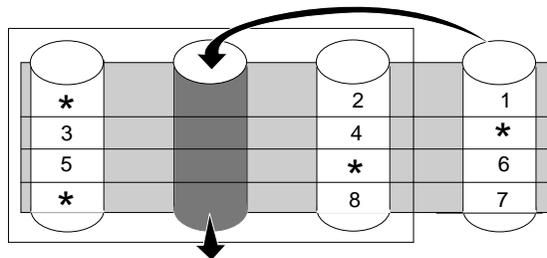
RAID level-5E requires a minimum of four drives and, depending upon the level of firmware and the stripe-unit size, supports a maximum of eight or 16 drives.

The following illustration is an example of a RAID level-5E logical drive.

You start with four physical drives.
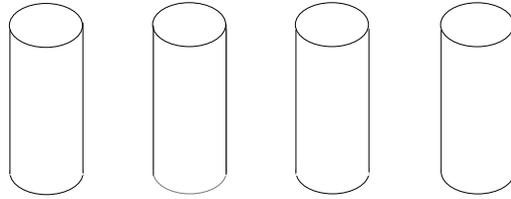
Create an array using all four physical drives.
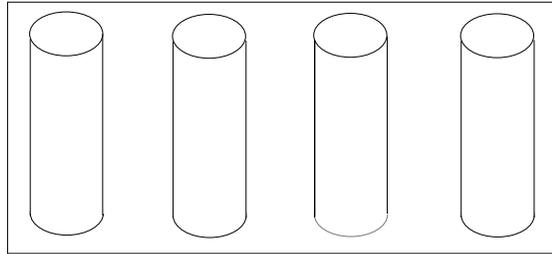


Then, create a logical drive (labeled as 1) within the array. Notice that the distributed spare drive is the free space (labeled as 2) below the logical drive.
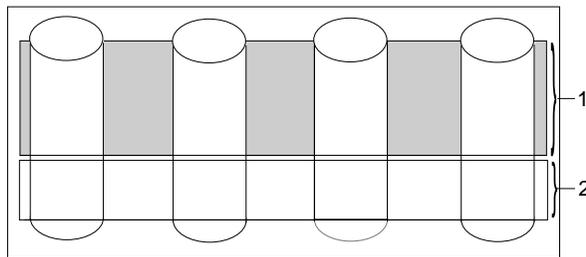


The data is striped across the drives, creating blocks in the logical drive. The storage of the data parity (denoted by ★ ) is striped, and it shifts from drive to drive as it does in RAID level-5. Notice that the spare drive is **not** striped.
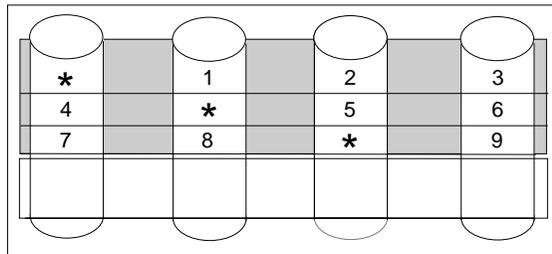


If a physical drive fails in the array, the data from the failed drive is compressed into the distributed spare drive. The logical drive remains RAID level-5E. When you replace the failed drive, the data for the logical drive decompresses and returns to the original striping scheme.

| | | | |
|---|---|---|---|
| * | 1 | | 2 |
| 3 | * | | 4 |
| 5 | 6 | | * |
| * | 7 | | 8 |
| 9 | * | | |
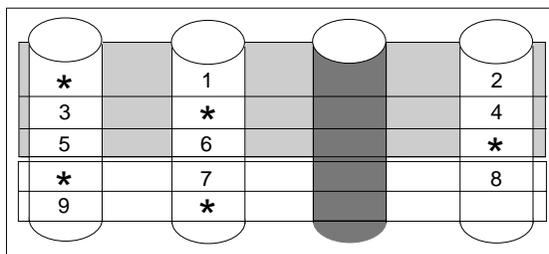
**Note:** The ServeRAID Manager program Express configuration does not default to RAID level-5E. If you have four physical drives, Express configuration defaults to RAID level-5 with a hot-spare drive.

## Selecting a RAID level and performance tuning

When selecting a RAID level for the system, consider the following:[1] [2]

| RAID level | Description |
|---|---|
| RAID level-0 | Data redundancy:  No<br>Hard disk drive capacity utilization: 100%<br>Read performance:  Excellent<br>Write performance:  Excellent<br>Built-in spare drive:  No |
| RAID level-1 | Data redundancy:  Yes<br>Hard disk drive capacity utilization: 50%<br>Read performance:  Very good<br>Write performance:  Very good<br>Built-in spare drive:  No |
| RAID level-1E | Data redundancy:  Yes<br>Hard disk drive capacity utilization: 50%<br>Read performance:  Very good<br>Write performance:  Very good<br>Built-in spare drive:  No |
| RAID level-5 | Data redundancy:  Yes<br>Hard disk drive capacity utilization: 67% to 94%<br>Read performance:  Excellent<br>Write performance:  Good<br>Built-in spare drive:  No |
| RAID level-5E | Data redundancy:  Yes<br>Hard disk drive capacity utilization: 50% to 88%<br>Read performance:  Excellent<br>Write performance:  Good<br>Built-in spare drive:  Yes |

# Drive state descriptions

This section provides descriptions of the physical and logical drive states.

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1.Depending on the number of physical drives in the array.

2.Performance depends on the number of drives in the array. Generally, the more drives in the array, the better the performance.

## Physical drive state descriptions

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

| Drive State | Meaning |
| --- | --- |
| Defunct | A physical 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.<br><br>If a physical drive has become defunct, refer to "Rebuilding a defunct drive" on page 23. |
| Hot Spare | A Hot-Spare drive is a physical 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 | The drive is being rebuilt.<br><br>For more information on rebuilding a drive, refer to "Rebuilding a defunct drive" on page 23. |
| Ready | The ServeRAID controller recognizes a Ready drive as being available for definition. |
| 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. |

## Logical drive state descriptions

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

| Drive State | Meaning |
| --- | --- |
| Blocked | 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, RAID level-1E, Raid level-5 and RAID level-5E logical drives.<br><br>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, reinstall, or restore the data from the most recent backup disk or tape to the RAID level-0 logical drive. |
| 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) when the logical drive is in the critical state. |
| Critical | A RAID level-1, RAID level-1E, RAID level-5, or RAID level-5E logical drive that contains a defunct physical drive is in the critical state. A critical logical drive is accessible, despite a physical drive failure.<br><br>**Attention:**<br><br>If the state of the logical drive is critical, refer to "Rebuilding a defunct drive" on page 23. |
| Migrating | The logical drive is undergoing a logical drive migration; that is, a change in RAID levels, a change in logical drive size, an increase in free space, or a RAID level-5E compression or decompression. |

| Drive State | Meaning |
|---|---|
| Offline | The logical drive is offline and not accessible. This state occurs when one of the following is true.<br><br>• One or more physical drives in a RAID level-0 logical drive is defunct.<br><br>• Two or more physical drives in a RAID level-1, RAID level-1E, or level-5 logical drive are defunct.<br><br>• Three or more drives in a RAID level-5E logical drive are defunct.<br><br>If any of these are true, refer to "Rebuilding a defunct drive" on page 23. |
| 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). |

# Configuring controllers using the ServeRAID Manager program

This chapter provides the information needed to start and use the ServeRAID Manager program. You can use the ServeRAID Manager program to easily configure and monitor the ServeRAID controllers. You can also use the ServeRAID Manager program to configure two ServeRAID controllers in a failover environment.

The information in this chapter is a high level explanation of the ServeRAID Manager program and its capabilities. For instructions on specific processes using the ServeRAID Manager program, refer to the ServeRAID Manager online help.

**Note:** The ServeRAID Manager program works with systems using Microsoft Windows NT, Windows 95, Windows 98, Novell NetWare, IBM OS/2, and SCO UnixWare.

## Using the ServeRAID Manager program interface

The graphical interface in the ServeRAID Manager program makes it easy for you to create, delete, change, view and monitor the ServeRAID configuration.

Before you begin, review the following illustration to become familiar with the layout of the ServeRAID Manager program screens.
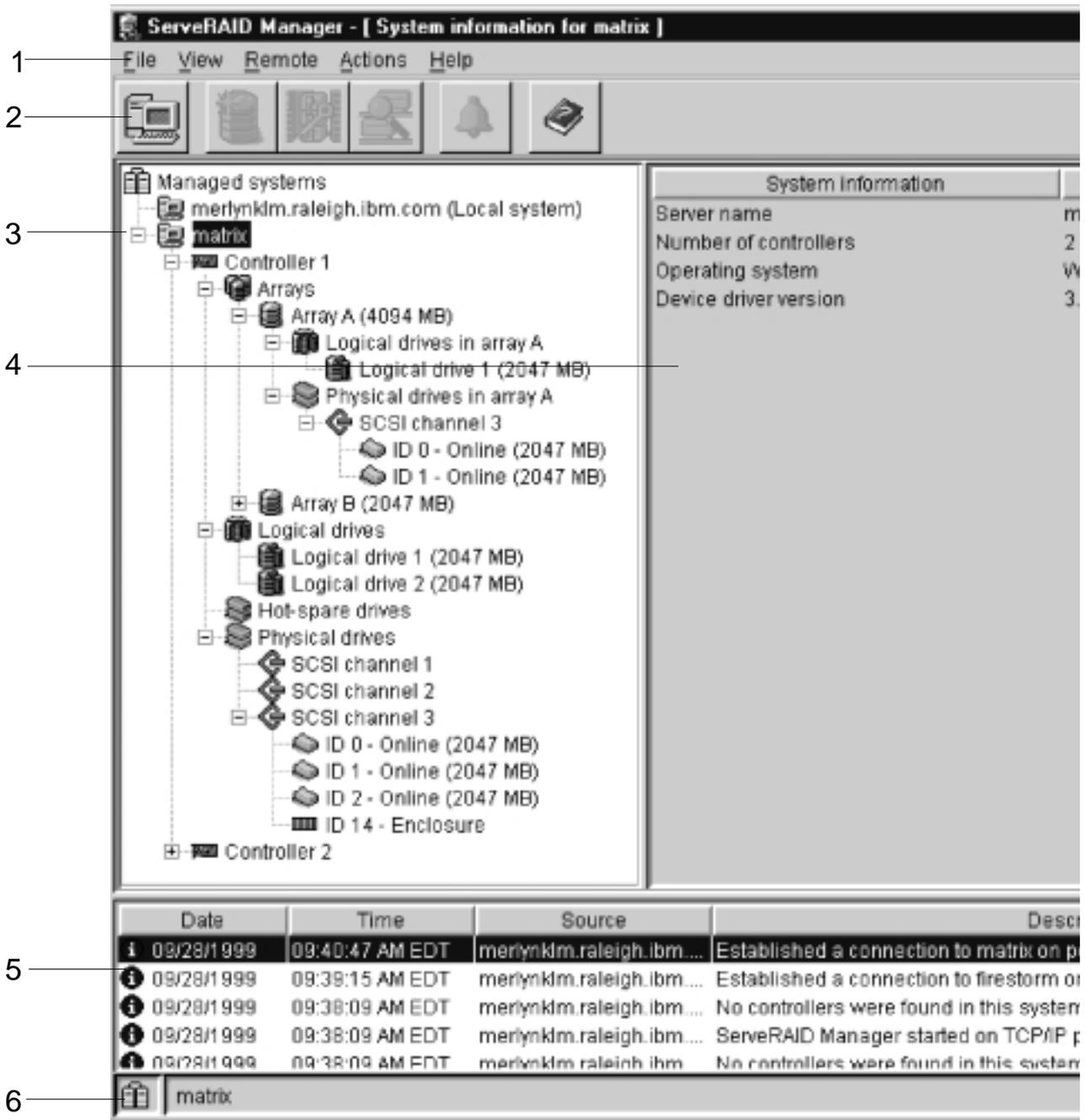
*Figure 1. ServeRAID Manager program screen layout*

Descriptions of the numbered areas are as follows:

**1. Menu bar**

Provides File, View, Remote, Actions, and Help pull-down menus.

**2. Tool bar**

Provides quick-path icons for common tasks. The icons from left to right are **Add remote system**, **Create arrays**, **Configure for clustering**, **Scan for new or removed ready drives**, **Silence repeating alarm**, and **Help**.

**3. Main Tree**

Provides an expandable tree view of the ServeRAID subsystem. You will perform most of the 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 ServeRAID Manager program is in the Information mode and you select an object from the Main Tree, detailed information about the object appears in this panel. When the ServeRAID Manager 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 and while monitoring systems with ServeRAID controllers. Each message appears with a host name from where the event originated, a time stamp, a date stamp, and an icon that classifies the severity of the event. The event icons are:

- Information: An "i" inside a blue circle

- Warning: A "!" inside a yellow triangle

- Fatal: An "x" inside a red circle

Warning messages identify potential data-loss situations, and Fatal messages inform you when a failure has occurred. All Fatal messages will launch an audible alarm.

**6. Status bar**

Provides three types of information in a resizable panel. The panels contain the following information:

- The left panel displays the managed system status, which is either **No problems detected on any system** or **Problems detected on one or more systems**.

- The center panel displays the current tree path.

- The right panel displays a progress meter with the label of the currently selected system and the process that is taking place at the current time.

# Using utility programs

This section provides the information needed to start and use the FlashMan program, the ServeRAID Mini-Configuration program, and the **IPSSEND** and **IPSMON** command-line programs.

## Using FlashMan, the IBM ServeRAID ROM Update program

FlashMan is an easy to use program that simplifies the updating of BIOS and firmware on ServeRAID controllers. FlashMan reports the current BIOS version, firmware version, and update status for each controller found. FlashMan also reports if a controller needs updating. You decide whether or not to update the controllers, but you must update all the controllers or none (that is, you cannot selectively update).

FlashMan is provided on the *IBM ServeRAID Support CD* packaged with the ServeRAID controller, and it also is provided on the configuration CD packaged with some IBM server models.

To access FlashMan:

1. Insert the *IBM ServeRAID Support CD* into the system CD-ROM drive.

2. Turn on the system.

3. The FlashMan splash screen appears. FlashMan automatically scans and identifies each ServeRAID controller in the system. After scanning completes and if an update is required, a report screen appears with the following information:

   - Controller types found
   - Controller slot number, if known
   - Firmware version
   - BIOS version
   - Update status. If a controller has down-level BIOS or firmware, the controller is marked as a candidate for update.

4. If any of the ServeRAID controller require updating, click **Update** to update *all marked* ServeRAID controllers. The controller BIOS or firmware is updated from the *IBM ServeRAID Support CD* or *IBM ServeRAID Device Driver Diskette*. FlashMan displays a progress indicator as it updates the controllers. If FlashMan detects an error, it displays the error message and saves the error message to a file on the disk.

   If you do not want to update the ServeRAID controllers, click **Cancel**.

5. When all updates are complete, scroll through the New Feature window. This window reports the changes that FlashMan applied to the ServeRAID controllers.

**Note:** When the splash screen appears, you can use **Ctrl+L** to copy **all** updated files to the RAMDISK. **Use this keystroke only when instructed by IBM Support.**

## Using the ServeRAID Mini-Configuration program

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

To access the Mini-Configuration program:

1. Turn on the server.  If the server already is turned on, press **Ctrl+Alt+Del**.

2. When the ServeRAID Mini-Configuration prompt appears, press **Ctrl+I**.

3. If the system contains more than one ServeRAID controller, a selection screen will appear.  To continue:

   a. Use the Up Arrow (N) or Down Arrow (~) key to select a controller.
   b. Press **Enter**.

   If the system contains only one ServeRAID controller, or after you select a ServeRAID 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 controller. (See "Viewing the controller status" on page 131 for more information.)

   - **View Configuration** shows the current configuration information for the ServeRAID controller. (See "Viewing the configuration" on page 131 for more information.)

   - **Advanced Functions** is used to initialize the configuration, import configuration from drives, configure BIOS settings, and view the controller and PCI information. (See "Using the advanced configuration functions" on page 132 for more information.)

4. Use the Up Arrow (N) or Down Arrow (~) key to highlight your choice; then, press **Enter**.

5. Follow the instructions that appear on the screen.

6. Click **Exit**; then, press **Enter**.

## Viewing the controller status

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

- All physical drives and their states

- **Unattended** shows the current state of the Unattended mode.
  - When this option is set to Off, you can choose the recovery method when a ServeRAID controller startup error occurs.
  - When this option is set to On, the ServeRAID controller chooses the recovery method when a startup error occurs.

- **Read Ahead** shows the current state of the read-ahead cache mode.

- **BootCD** shows the current state of the Bootable CD-ROM function. (Refer to "Setting the Bootable CD-ROM feature" on page 132.)

- **CompMode** shows the current BIOS compatibility mode. **On** indicates 8 gigabyte (GB) Extended; **Off** indicated 2 gigabyte (GB) Limited.

- **Clustered** shows the current state for clustering.

- **BBWC** shows the cache size of the battery-backup write cache, if it is installed (8 = 8 MB or 32 = 32 MB) or **No** if there is a no battery-backup write cache installed.

- **Boot Blk** shows the version number of the startable microcode (or firmware) loaded for the ServeRAID controller.

- **Code Blk** shows the current version number of the microcode (or firmware) loaded for the ServeRAID 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.

- **Bad Stripe, Locked Stripe, or Blocked Drive** identifies the logical drives that are affected.
  - **Bad Stripe Drives** indicates logical drives that has inaccessible areas.
  - **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 126 for more information.

## Viewing the configuration

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

## Using the advanced configuration functions

You can select the **Advanced Functions** to restore the controller configuration to factory default settings, copy the configuration from drives to controller, configure BIOS settings, and view the controller and PCI information.

When you select the **Advanced Functions** 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.

- **Restore to Factory Default Settings** is used to reset the configuration. When you reset the configuration, you will not have access to any data stored on the logical drives attached to the selected ServeRAID controller.

  This choice deletes the existing configuration information, sets all functional physical 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 controller settings (such as the stripe-unit size, rebuild rate, and so on) from their current or customized values.

- **Copy the Configuration from Drives to Controller** reads the most common configuration from the drives in the system and copies it to the ServeRAID controller.

- **Configure BIOS Settings** is used to modify the BIOS settings, such as the Bootable CD-ROM setting, for the ServeRAID controller. (See "Setting the Bootable CD-ROM feature" for more information.)

  Note: The Multiple Controller mode for extra BIOS 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 redundant copies of the ServeRAID BIOS are removed from memory but stored in the controller for future use. When you have multiple ServeRAID controllers installed, you need only one active copy of ServeRAID BIOS. However, to ensure that you have a copy of the ServeRAID BIOS available if your active copy becomes defective or unavailable, leave the Multiple Controller parameter set to **Shrink**.

- **View Controller and PCI Information** shows the ServeRAID controller hardware and PCI register information.

- **Exit** is used to exit from the Mini-Configuration program.

**Setting the Bootable CD-ROM feature:** When you attach a CD-ROM drive to the ServeRAID controller and set the Bootable CD-ROM feature to **Yes**, the ServeRAID controller will attempt to start a CD that has a bootable startup partition, if no other controller in the system is currently using INT13 extensions. Only one 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 (N) and Down Arrow (~) keys to highlight **BIOS Support for Bootable CD-ROM** then press Enter to change **No** to **Yes**.

4. Ensure that the screen has **Yes** next to **BIOS Support for Reading Partition Tables**. If not, use the Up Arrow (N) 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 an `Okay` message and then returns you to the Main Menu of the Mini-Configuration program.

6. Press **Ctrl+Alt+Del** to restart the system.

## Running the IPSSEND program

You can run the IPSSEND program from the operating system command line. When you run the IPSSEND program with no parameters, a list of available functions and their specific parameters appears. The following instructions are for running the IPSSEND program with no parameters. The available functions and their parameters are described in the sections that follow:

To run the IPSSEND program:

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

     *c*:\ipsadm\ipssend

     where c is the drive letter of the drive where OS/2 or Windows NT is installed.
  2. Press **Enter**.

- If you are using NetWare:
  1. From the console, type:

     load ipssend
  2. Press **Enter**.

- If you are using DOS:
  1. Insert the startable IPSSEND diskette into diskette drive A; then, type:

     a:\ipssend

     where a is the drive letter of the diskette drive.
  2. Press **Enter**.

- If you are using Linux, SCO OpenServer, or UnixWare:
  1. Type:

     /usr/bin/ipssend
  2. Press **Enter**.

## Using the IPSSEND program

There are five types of IPSSEND functions:

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

## Server roll-out functions

The IPSSEND server roll-out functions include the following:

**backup** Use the **backup** function to save a ServeRAID controller configuration and BIOS settings to a diskette or to a physical drive. The ServeRAID controller configuration must be valid.

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

Command:
**ipssend backup** *controller filename* [**noprompt**]

where:

- *controller* is the ServeRAID controller number (1–12)
- *filename* is the path and file name where the configuration is to be written
- **noprompt** is an optional parameter that overrides the user prompt

**copyld** Use the **copyld** function 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:
**ipssend copyld** *controller source target* [**noprompt**]

where:

- *controller* is the ServeRAID controller number (1–12)
- *source* is the source logical drive number
- *target* is the target logical drive number
- **noprompt** is an optional parameter that overrides the user prompt.

**restore** Use the **restore** function to load a configuration from a file stored on a diskette or a hard disk. The configuration must be a valid configuration file from the backup option in IPSSEND. This operation overwrites the existing configuration information and BIOS settings stored for the ServeRAID controller.

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

Command:
**ipssend restore** *controller filename* [**noprompt**]

where:

- *controller* is the ServeRAID controller number (1–12)
- *filename* is the path and file name where the configuration is to be written
- **noprompt** is an optional parameter that overrides the user prompt

**init** Use the **init** function to initialize the first 0.5 MB of a logical drive. This process will erase the partition tables and all data on the disk.

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

Command:
**ipssend init** *controller drivenum* [**noprompt**]

where:

- *controller* is the ServeRAID controller number (1–12)
- *drivenum* is the logical drive number (1–8)
- **noprompt** is an optional parameter that overrides the user prompt

**initsync** Use the **initsync** function 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 all data on the entire logical drive.

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

Command:
**ipssend initsync** *controller drivenum* [**noprompt**]

where:

- *controller* is the ServeRAID controller number (1–12)
- *drivenum* is the logical drive number (1–8)
- **noprompt** is an optional parameter that overrides the user prompt

**synch** Use the **synch** function to synchronize the parity information on redundant logical drives. If the parity information is inconsistent, the IPSSEND program will repair it automatically.

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

Command:
**ipssend synch** *controller drive drivenum*

where:

- *controller* is the ServeRAID controller number (1–12)
- *scope* indicates the number of logical drives:
  - — DRIVE is a single logical drive
  - — GROUP is a Merge Group
- *scopeID* specifies the *scope* item:
  - — If DRIVE, specifies the logical drive number (1–8)
  - — If GROUP, specifies the Merge Group number

## Error-recovery functions

The IPSSEND error-recovery functions include the following:

**getstatus**
Use the **getstatus** function 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, and information about the most recently completed logical-drive function.

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

Command:
**ipssend getstatus** *controller*

where:

*controller* is the ServeRAID controller number (1–12)

**rebuild** Use the **rebuild** function 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 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, Linux, OpenServer, UnixWare, and DOS

Command:
**ipssend rebuild** *controller dch dsid nch nsid*

where:

- *controller* is the ServeRAID controller number (1–12)
- *dch* is the channel number for the defunct drive (1–3)
- *dsid* is the SCSI ID for the defunct drive (0–15)
- *nch* is the channel number for the new drive (1–3)
- *nsid* is the SCSI ID for the new drive (0–15)

**setstate** Use the **setstate** function 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 device to online without first performing a rebuild operation.

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

Command:
**ipssend setstate** *controller channel sid nstate*

where:

- *controller* is the ServeRAID controller number (1–12)
- *channel* is the channel number for the drive (1–3)
- *sid* is the SCSI ID for the drive (0–15)
- *nstate* is 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.

**unblock** Use the **unblock** function 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, Linux, OpenServer, UnixWare, and DOS

Command:
**ipssend unblock** *controller drivenum*

where:

- *controller* is the ServeRAID controller number (1–12)
- *drivenum* is the logical drive number (1–8)

## Problem-isolation and debug commands

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

**certify** Use the **certify** function to verify the media of a physical drive. When 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:
**ipssend certify** *controller channel sid*

where:

- *controller* is the ServeRAID controller number (1–12)

- *channel* is the channel number for the device (1, 2, or 3)
- *sid* is the SCSI ID for the device (0–15)

**eraseevent**

Use the **eraseevent** function 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 controller soft and hard event logs.

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

Command:
**ipssend eraseevent** *controller options*

where:

- *controller* is the ServeRAID controller number (1–12)
- *options* is the designated event log:
    — DEVICE for the device event log
    — SOFT for the ServeRAID controller soft event log
    — HARD for the ServeRAID controller hard event log

**getbst** Use the **getbst** function to display the number of bad stripes in the bad stripe table for each logical drive.

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

Command:
**ipssend getbst** *controller*

where:

*controller* is the ServeRAID controller number (1–12)

**fmstatus** Use the **fmstatus** function to display the progress of a format operation currently processing.

Supported operating system: DOS

Command:
**ipssend fmstatus** *controller channel sid*

where:

- *controller* is the ServeRAID controller number (1–12)
- *channel* is the channel number for the device (1, 2, or 3)
- *sid* is the SCSI ID for the device (0–15)

**format** Use the **format** function to perform a low-level format of a physical drive.

**Attention:**

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

2. After a **format** command is issued, do not stop it. If a format process is stopped for any reason, the hard disk that was being formatted will not respond to any commands except the format command. Thus, the ServeRAID controller will not be able to recognize commands anymore. To recover the drive, refer to "Recovering from an incomplete format of a physical drive" on page 24.

Supported operating system: DOS

Command:
**ipssend format** *controller channel sid*

where:

- *controller* is the ServeRAID controller number (1–12)
- *channel* is the channel number for the device (1, 2, or 3)

- *sid* is the SCSI ID for the device (0–15)

**getevent** Use the **getevent** function 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 occurred while data was being transferred 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 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 controller that it might fail in the near future.

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

Command:
**ipssend getevent** *controller options*

where:

- *controller* is the ServeRAID controller number (1–12)
- *options* is the designated event log:

  — DEVICE for the device event log
  — SOFT for the ServeRAID controller soft event log
  — HARD for the ServeRAID controller hard event log

**selftest** The **selftest** function is used to direct a controller or a device to perform its self-test.

Supported operating systems: DOS

Command:
**ipssend selftest** *controller options*

where:

- *controller* is the ServeRAID controller number (1–12)
- *options* is the designated self-test:

  — AD for the ServeRAID controller self-test
  — PD *channel sid* for the device self-test

  **Note:** *channel* represents the drive channel, and *sid* is the SCSI ID for the device.

**startdely** Use the **startdely** function 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*

where:

- *controller* is the ServeRAID controller number (1–12)
- *options* is one of the following:

  — ? displays the concurrent drive startup count and the delay time.

— A number (1–16) that specifies the new concurrent drive startup count

— A number (1–16) that specifies the new concurrent drive startup count and a number (3–15) that specifies the startup delay time, in seconds.

## RAID Configuration commands

The IPSSEND RAID configuration commands include the following:

**drivever** Use the **drivever** function 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, Linux, OpenServer, UnixWare, and DOS

Command:
**ipssend drivever** *controller channel sid*

where:

- *controller* is the ServeRAID controller number (1–12)
- *channel* is the channel number for the device (1, 2, or 3)
- *sid* is the SCSI ID for the device (0–15)

**getconfig**
Use the **getconfig** function to display the ServeRAID 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, Linux, OpenServer, UnixWare, and DOS

Command:
**ipssend getconfig** *controller options*

where:

- *controller* is the ServeRAID controller number (1–12)
- *options* is one of the following:

    — AD for the controller information
    — LD for the logical drive information
    — PD for the physical device information
    — AL for all information. This is the default option.

**hsrebuild**
Use the **hsrebuild** function to turn on the ServeRAID controller hot-swap rebuild feature or display the current status of the hot-swap rebuild feature.

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

Command:
**ipssend hsrebuild** *controller options*

where:

- *controller* is the ServeRAID controller number (1–12)
- *options* is one of the following:

    — ON enables the hot-swap feature
    — ? displays the status of the hot-swap rebuild feature.

**readahead**
Use the **readahead** function to enable, disable, or set the adaptive mode for the read-ahead feature of the ServeRAID controller.

Supported operating systems: Windows NT and DOS

Command:
**ipssend readahead** *controller options*

where:

- *controller* is the ServeRAID controller number (1–12)
- *options* is one of the following:
    - ON enables the read-ahead feature
    - OFF disables the read-ahead feature
    - ADAPTIVE indicates that the controller will determine the best mode to use at any given time.
    - ? displays the current read-ahead feature mode being used.

**stripesize**

Use the **stripesize** function to set the size of the ServeRAID controller's stripe to 8 KB, 16 KB, 32 KB, or 64 KB.

Supported operating systems: DOS

Command:
**ipssend stripesize** *controller options*

where:

- *controller* is the ServeRAID controller number (1–12)
- *options* is one of the following:
    - 8 to set the stripe-unit size to 8 KB
    - 16 to set the stripe-unit size to 16 KB
    - 32 to set the stripe-unit size to 32 KB
    - 64 to set the stripe-unit size to 64 KB
    - ? to display the current stripe-unit size being used

**unattended**

Use the **unattended** command to enable or disable the unattended feature of the ServeRAID controllers.

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

Command:
**ipssend unattended** *controller options*

where:

- *controller* is the ServeRAID controller number (1–12)
- *options* is one of the following:
    - ON to enable the feature
    - OFF to disable the feature
    - ? to display the current setting of this feature

## Starting the IPSMON program

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

        where c is the drive letter of the drive where OS/2 or Windows NT is installed.

2. Press **Enter**.

- If you are using Novell NetWare:

    1. From the console, type:

       `load ipsmon`

    2. Press **Enter**.

- If you are using Linux, SCO OpenServer, or UnixWare:

    1. Type:

       `/usr/bin/ipsmon`

    2. Press **Enter**.

## Using the IPSMON program

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

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

Command:
**ipsmon** *options*

where:

- *options* is one of the following optional parameters:

    — -F:*filename* to specify the name of the file in which to record messages. The default file name is IPSMON.LOG.
    — -S to display messages on the standard output (usually the monitor)
    — -? to obtain a current list of valid parameters

    **Note:** If you start this program without any command-line parameters, the IPSMON program will log the messages to the IPSMON.LOG file, and the messages will not appear on the screen.

After you start the IPSMON program, the program will continuously poll the ServeRAID 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).

- The location specifier comes after the alert code:

    **A** followed by the controller number

    **SID** followed by the SCSI ID (if required)

    **C** followed by the channel number (if required)

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

The IPSMON 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

# Symptom-to-FRU index

This index supports xSeries 250 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 1.

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 displays 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 beep after successfully completing POST indicates the system is functioning properly.

| Beeps | Description |
|-------|-------------|
| 1-2-3 | • One beep <br> • A pause (or break) <br> • Two beeps <br> • A pause (or break) <br> • Three Beeps |
| 4 | Four continuous beeps |

| Beep/Symptom | FRU/Action |
|--------------|------------|
| **1-1-3** (CMOS write/read test failed) | 1. **Battery** <br> 2. I/O Legacy Board |
| **1-1-4** (BIOS EEPROM checksum failed) | 1. **I/O Legacy Board** |
| **1-2-1** (Programmable Interval Timer failed) | 1. **I/O Legacy Board** |
| **1-2-2** (DMA initialization failed) | 1. **I/O Legacy Board** |
| **1-2-3** (DMA page register write/read failed) | 1. **I/O Legacy Board** |

| Beep/Symptom | FRU/Action |
|---|---|
| **1-2-4** (RAM refresh verification failed) | 1. **DIMM**<br>2. Processor/PCI Board<br>3. Memory Card |
| **1-3-1** (1st 64K RAM test failed) | 1. **DIMM**<br>2. Processor/PCI Board<br>3. Memory Card |
| **1-3-2** (1st 64K RAM parity test failed) | 1. **DIMM**<br>2. I/O Legacy board |
| **2-1-1** (Secondary DMA register failed) | 1. **I/O Legacy Board** |
| **2-1-2** (Primary DMA register failed) | 1. **I/O Legacy Board** |
| **2-1-3** (Primary interrupt mask register failed) | 1. **I/O Legacy Board** |
| **2-1-4** (Secondary interrupt mask register failed) | 1. **I/O Legacy Board** |
| **2-2-2** (Keyboard controller failed) | 1. **I/O Legacy Board**<br>2. Keyboard |
| **2-2-3** (CMOS power failure and checksum checks failed) | 1. **Battery**<br>2. I/O Legacy board |
| **2-2-4** (CMOS configuration info validation failed) | 1. **Battery**<br>2. I/O Legacy board |
| **2-3-1** (Screen initialization failed) | 1. **Jumper on J6**<br>2. I/O Legacy Board |
| **2-3-2** (Screen memory failed) | 1. **I/O Legacy board** |
| **2-3-3** (Screen retrace failed) | 1. **I/O Legacy board** |
| **2-3-4** (Search for video ROM failed) | 1. **I/O Legacy board** |
| **2-4-1** (Video failed, screen believed operable) | 1. **I/O Legacy board** |
| **3-1-1** (Timer tick interrupt failed) | 1. **I/O Legacy Board** |
| **3-1-2** (Interval timer channel 2 failed) | 1. **I/O Legacy Board** |
| **3-1-3** (RAM test failed above address OFFFF h)) | 1. **DIMM**<br>2. Memory card<br>3. Processor/PCI board<br>4. I/O Legacy board |
| **3-1-4** (Time-Of-Day clock failed) | 1. **Battery**<br>2. I/O Legacy Board |
| **3-2-1** (Serial port failed) | 1. **I/O Legacy board** |

| Beep/Symptom | FRU/Action |
|---|---|
| **3**-**2**-**2** (Parallel port failed) | 1. **I/O Legacy board** |
| **3**-**2**-**3** (Math coprocessor failed) | 1. **Optional processor (if installed)**<br>2. Processor<br>3. Processor/PCI board |
| **3**-**2**-**4** (Failure comparing CMOS memory size against actual) | 1. **DIMM**<br>2. Processor/PCI board<br>3. Battery<br>4. I/O Legacy board |
| **3**-**3**-**1** (Memory size mismatch occurred, see "Memory Settings" on page 49) | 1. **DIMM**<br>2. Processor/PCI board<br>3. Battery |
| **3**-**3**-**2** (Critical SMBUS error occurred) | 1. **Disconnect the server power cord from outlet, wait 30 seconds and retry.**<br>2. I/O Legacy Board<br>3. Processor/PCI Board<br>4. DIMMs<br>5. Memory Card<br>6. DASD Backplane<br>7. Power Supply<br>8. Power Supply Backplane<br>9. 12C Cable |
| **3**-**3**-**3** (No operational memory in system) | 1. Install or reseat the memory modules, then power-on the system (see **"Using the Configuration/Setup Utility program" on page 45).**<br>2. If problem persists, restart the system 3 times.<br>   **Note:** Restarting the system three times will load default settings.<br>3. DIMMs<br>4. Memory Board<br>5. Processor/PCI Board<br>6. I/O Legacy Board |
| **Two Short Beeps** (Information only, the configuration has changed) | 1. **Run Diagnostics**<br>2. Run Configuration/Setup |
| **Three Short Beeps** | 1. **DIMM**<br>2. Processor/PCI Board<br>3. I/O Legacy Board |
| **One Continuous Beep** | 1. **Processor**<br>2. Optional Processor (if installed)<br>3. Processor/PCI Board<br>4. I/O Legacy Board |

| Beep/Symptom | FRU/Action |
|---|---|
| **Repeating Short Beeps** | 1. **Keyboard** <br> 2. I/O Legacy Board |
| **One Long and One Short Beep** | 1. **Video adapter (if present)** <br> 2. I/O Legacy Board |
| **One Long and Two Short Beeps** | 1. **Video adapter (if present)** <br> 2. I/O Legacy Board |
| **Two Long and Two Short Beeps** | 1. **Video adapter** |

## No beep symptoms

| No Beep Symptom | FRU/Action |
|---|---|
| **No beep and the system operates correctly.** | 1. **Diagnostic LED Panel** |
| **No Beeps occur after successfully completing POST** (The Power-On Status is disabled.) | 1. **Run Configuration/Setup, set the Start Options Power-On Status to enable.** <br> 2. Diagnostic LED Panel <br> 3. I/O Legacy Board |
| **No ac power** (Power supply ac LED is off) | 1. **Check the power cord.** <br> 2. Power Supply (If two are installed, swap them to determine if one is defective.) <br> 3. Power Backplane |
| **No beep and no video** | 1. **See "Undetermined problems" on page 170** |
| **System will not power-up** (Power supply ac LED is on) | 1. **See "Power supply LED errors" on page 154** |

## Diagnostic panel LEDs

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 correcting the problem.

**Note:** 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 55.
2. Check the System Error Log for additional information before replacing a FRU.
3. It may be necessary to view the system error log from a remote connection, such as MOST.

4.  The memory card 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.) | 1. **System Error Log is 75% full; clear the log.**<br>2. Bad, missing or mis-installed processor terminator; remove and reinsert terminator.<br>3. PFA alert; check log for failure; clear PFA alert; remove AC power for at least 20 seconds, reconnect, then power up system.<br>4. If failure reading I2C device, check devices on bus "X"; see "I2C bus fault messages" on page 169.<br>5. Run Information Panel diagnostics. |
| **CPU LED on** (The LED next to the failing CPU should be on.) | 1. **Processor 1, 2, 3, or 4.**<br>2. Processor/PCI Board. |
| **VRM LED on** (The LED next to the failing VRM should be on.) | 1. **Corresponding voltage regulator module.**<br>2. Processor/PCI Board. |
| **DASD LED on** (Check amber drive LED for a failing hard drive.) | 1. **Be sure the fans are operating correctly and the air flow is good.**<br>2. Failing drive.<br>3. SCSI Backplane. |
| **FAN LED on** | 1. **Check individual fan LEDs.**<br>2. Replace respective fan.<br>3. Fan Cable.<br>4. Processor/PCI Board.<br>5. I/O Legacy Board.<br>6. Power Backplane Board. |
| **MEM LED on** (The LED next to the failing DIMM is on.) | 1. **Failing DIMM(s) in slot J1-J16.**<br>2. Memory Card.<br>3. Processor/PCI Board. |
| **NMI LED on** | 1. **Reboot the system.**<br>2. Check the System Error Log. |
| **PCI A LED on** | 1. **PCI Card in slot 1 or 2.** See "Processor board component locations" on page 55.<br>2. Remove all PCI adapters from slots 1-6.<br>3. Processor/PCI Board<br>4. I/O Legacy Board. |
| **PCI B LED on** | 1. **Card in slots 3-6.** See "Processor board component locations" on page 55.<br>2. Remove all PCI adapters from slots 1-6.<br>3. Processor/PCI Board.<br>4. I/O Legacy Board. |

| Diagnostic Panel LED | FRU/Action |
|---|---|
| PCI C LED on | 1. **Remove all PCI adapters from slots 1-6.**<br>2. Processor/PCI Board.<br>3. I/O Legacy Board. |
| PS1 LED on | 1. **Check the DC Good LED on power supply 1. If off, replace power supply 1.**<br>2. Power Backplane. |
| PS2 LED on | 1. **Check the DC Good LED on power supply 2. If off, replace power supply 2.**<br>2. Power Backplane. |
| PS3 LED on | 1. **Check the DC Good LED on power supply 3. If off, replace power supply 3.**<br>2. Power Backplane. |
| PS4 LED on | 1. **Check the DC Good LED on power supply 4. If off, replace power supply 4.**<br>2. Power Backplane. |
| SMI LED on | 1. **Reboot the system.** |
| TEMP LED on | 1. **Ambient temperature must be within normal operating specifications.** See "Features and specifications" on page 3, and "Temperature error messages" on page 166.<br>2. Ensure fans are operating correctly.<br>3. Examine System Error Log.<br>  a. System over recommended temperature<br>  1)   Information LED Panel<br>    2) I/O Legacy Board<br>  b. DASD over recommended temperature (DASD LED also on)<br>    1) Overheating hard drive<br>    2) DASD Backplane<br>    3) I/O Legacy Board<br>  c. System over recommended temperature for CPU X (where X is CPU 1, 2, 3, or 4) (CPU LED also on)<br>    1) CPU X<br>    2) Processor/PCI Board<br>  d. I/O Legacy Board over recommended temperature<br>    1) Processor/PCI Board<br>    2) I/O Legacy Board |

# Diagnostic error codes

**Note:** 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. **Processor/PCI Board** |
| **001**-**XXX**-**001** (Failed core tests) | 1. **Processor/PCI Board** |
| **001**-**250**-**000** (Failed System Board ECC) | 1. **Processor/PCI Board** |
| **001**-**250**-**001** (Failed Processor Board ECC) | 1. **Processor/PCI Board** |
| **005**-**XXX**-**000** (Failed Video test) | 1. **Video Adapter (if installed)**<br>2. I/O Legacy Board |
| **011**-**XXX**-**000** (Failed COM1 Serial Port test) | 1. **I/O Legacy Board** |
| **011**-**XXX**-**001** (Failed COM2 Serial Port test) | 1. **I/O Legacy Board** |
| **014**-**XXX**-**000** (Failed Parallel Port test) | 1. I/O Legacy Board |
| **015**-**XXX**-**001** (USB interface not found. Board damaged.) | 1. **I/O Legacy Board.** |
| **015**-**XXX**-**015** (Failed USB External Loopback Test) | 1. **Make sure parallel port is not disabled.**<br>2. Re-run USB External Loopback Test.<br>3. I/O Legacy Board |
| **015**-**XXX**-**198** (USB device connected during USB test) | 1. **Remove USB devices from USB1 and USB2.**<br>2. Re-run test.<br>3. I/O Legacy Board |
| **020**-**XXX**-**000** (Failed PCI Interface test) | 1. **Processor/PCI Board**<br>2. System Board |
| **020**-**XXX**-**001** (Failed Hot-Swap Slot 1 PCI Latch test) | 1. **PCI Hot-Swap Latch Assembly**<br>2. Processor/PCI Board |
| **020**-**XXX**-**002** (Failed Hot-Swap Slot 2 PCI Latch test) | 1. **PCI Hot-Swap Latch Assembly**<br>2. Processor/PCI Board |
| **020**-**XXX**-**003** (Failed Hot-Swap Slot 3 PCI Latch test) | 1. **PCI Hot-Swap Latch Assembly**<br>2. Processor/PCI Board |
| **020**-**XXX**-**004** (Failed Hot-Swap Slot 4 PCI Latch test) | 1. **PCI Hot-Swap Latch Assembly**<br>2. Processor/PCI Board |
| **030**-**XXX**-**000** (Failed Internal SCSI interface test) | 1. **I/O Legacy Board** |
| **030**-**XXX**-**00N** (Failed SCSI test on PCI slot N. Check system error log before replacing a FRU.) | 1. **Adapter** |
| **035**-**XXX**-**099** | 1. **No adapters were found.**<br>2. If adapter is installed re-check connection. |

| Error Code/Symptom | FRU/Action |
|---|---|
| **035**-**XXX**-**S99** (Failed RAID test on PCI slot S. S = number of failing PCI slot. Check System Error Log before replacing a FRU.) | 1. **Cable**<br>2. SCSI Backplane<br>3. Adapter |
| **035**-**XXX**-**SNN** (Check System Error Log before replacing a FRU. S = number of failing PCI slot; NN = SCSI ID of failing fixed disk.) | 1. **Fixed Disk with SCSI ID NN on RAID adapter in PCI slot S.** |
| **035**-**253**-**S99** (RAID adapter initialization failure) | 1. **ServeRAID Adapter in slot S is not configured properly.** Obtain the basic and extended configuration status and refer to the ServeRAID Hardware Maintenance Manual for more information.<br>2. Cable<br>3. SCSI Backplane<br>4. Adapter |
| **075**-**XXX**-**000** (Failed Power Supply test) | 1. **Power Supply** |
| **089**-**XXX**-**001** (Failed Microprocessor test) | 1. **VRM for Microprocessor 1**<br>2. Microprocessor |
| **089**-**XXX**-**002** (Failed Optional Microprocessor test) | 1. **VRM for Optional Microprocessor 2**<br>2. Optional Microprocessor |
| **089**-**XXX**-**003** (Failed Optional Microprocessor test) | 1. **VRM for Optional Microprocessor 3**<br>2. Optional Microprocessor |
| **089**-**XXX**-**004** (Failed Optional Microprocessor test) | 1. **VRM for Optional Microprocessor 4**<br>2. Optional Microprocessor |
| **165**-**XXX**-**000** (Failed Service Processor test) | 1. **Check error log for any I2C messages** (see "I2C bus fault messages" on page 169).<br>2. Remove ac power from system for 20 seconds, then rerun service processor test. If problem persists, proceed to step 3..<br>3. I/O Legacy Board. Before replacing the I/O Legacy Board, ensure that I/O Legacy Board jumper J28 is not installed (the default) when the error occurs. |
| **180**-**XXX**-**000** (Diagnostics LED failure) | 1. **Run Diagnostic LED test for the failing LED.** |
| **180**-**XXX**-**001** (Failed information LED panel test) | 1. **Information LED Panel**<br>2. Diagnostic LED Panel<br>3. I/O Legacy Board |
| **180**-**XXX**-**002** (Failed Diagnostics LED Panel test) | 1. **Diagnostics LED Panel**<br>2. I/O Legacy Board |
| **180**-**XXX**-**003** (Failed System Board LED test) | 1. **System Board** |
| **180**-**XXX**-**004** (Failed Processor Board LED test) | 1. **Processor/PCI Board**<br>2. I/O Legacy Board |

| Error Code/Symptom | FRU/Action |
|---|---|
| **180**-**XXX**-**005** (Failed SCSI Backplane LED test) | 1. **SCSI Backplane**<br>2. SCSI Backplane Cable<br>3. I/O Legacy Board |
| **180**-**XXX**-**006** (Memory Board LED test) | 1. **Memory Board**<br>2. Processor/PCI Board<br>3. I/O Legacy Board |
| **201**-**XXX**-**0NN** (Failed Memory test, see "Memory Settings" on page 49.) NN = DIMM location. | 1. **DIMM Location J1-J16**<br>2. Memory card |
| **201**-**XXX**-**999** (Multiple DIMM failure, see error text.) | 1. **See error text for failing DIMMs**<br>2. Memory card |
| **202**-**XXX**-**001** (Failed System Cache test) | 1. **VRM 1**<br>2. Microprocessor CPU 1 |
| **202**-**XXX**-**002** (Failed System Cache test) | 1. **VRM 2**<br>2. Microprocessor CPU 2 |
| **202**-**XXX**-**003** (Failed System Cache test) | 1. **VRM 3**<br>2. Microprocessor CPU 3 |
| **202**-**XXX**-**004** (Failed System Cache test) | 1. **VRM 4**<br>2. Microprocessor CPU 4 |
| **206**-**XXX**-**000** (Failed Diskette Drive test) | 1. **Cable**<br>2. Diskette Drive<br>3. I/O Legacy Board |
| **215**-**XXX**-**000** (Failed IDE CD-ROM test) | 1. **CD-ROM Drive Cables**<br>2. CD-ROM Drive<br>3. I/O Legacy Board |
| **217**-**XXX**-**000** (Failed BIOS Fixed Disk test)<br><br>**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)<br><br>**Note:** If RAID is configured, the fixed disk number refers to the RAID logical array. | 1. **Fixed Disk 2** |
| **217**-**XXX**-**002** (Failed BIOS Fixed Disk test)<br><br>**Note:** If RAID is configured, the fixed disk number refers to the RAID logical array. | 1. **Fixed Disk 3** |

| Error Code/Symptom | FRU/Action |
|---|---|
| **217**-**XXX**-**003**  (Failed BIOS Fixed Disk test)<br><br>**Note:**  If RAID is configured, the fixed disk number refers to the RAID logical array. | 1.  **Fixed Disk 4** |
| **217**-**XXX**-**004**  (Failed BIOS Fixed Disk test)<br><br>**Note:**  If RAID is configured, the fixed disk number refers to the RAID logical array. | 1.  **Fixed Disk 5** |
| **217**-**XXX**-**005**  (Failed BIOS Fixed Disk test)<br><br>**Note:**  If RAID is configured, the fixed disk number refers to the RAID logical array. | 1.  **Fixed Disk 6** |
| **217**-**XXX**-**006**   (Failed BIOS Fixed Disk test)<br><br>**Note:**  If RAID is configured, the fixed disk number refers to the RAID logical array. | 1.  **Fixed Disk 7** |
| **217**-**XXX**-**007**  (Failed BIOS Fixed Disk test)<br><br>**Note:**  If RAID is configured, the fixed disk number refers to the RAID logical array. | 1.  **Fixed Disk 8** |
| **217**-**XXX**-**008** (Failed BIOS Fixed Disk test)<br><br>**Note:**  If RAID is configured, the fixed disk number refers to the RAID logical array. | 1.  **Fixed Disk 9** |
| **217**-**XXX**-**009**  (Failed BIOS Fixed Disk test)<br><br>**Note:**  If RAID is configured, the fixed disk number refers to the RAID logical array. | 1.  **Fixed Disk 10** |

| Error Code/Symptom | FRU/Action |
|---|---|
| **264**-**XXX**-**0NN** (NN = SCSI ID of failing Tape Drive) | 1. **Tape Cartridge, if user executed the Read/Write Tape Drive test (XXX = 256)** <br><br> 2. SCSI or power cable connected to the tape drive with SCSI ID NN <br><br> 3. Tape drive with SCSI ID NN – refer to Help and Service Information appendix of tape drive's User Guide. <br><br> 4. I/O Legacy Board or SCSI Controller – run SCSI Controller diagnostic to determine of SCSI bus is functioning properly. |
| **264**-**XXX**-**999** (Errors on multiple tape drives, see error text for more info) | 1. **See error messages/text in the PC Doctor 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 I/O Legacy Board) | 1. **Verify that Ethernet is not disabled in BIOS.** <br><br> 2. I/O Legacy Board |
| **405**-**XXX**-**00N** (Failed Ethernet test on adapter in PCI slot N) <br><br> **Note:** Insure modem is present and attached to server. | 1. **Adapter in PCI slot N.** <br><br> 2. I/O Legacy Board |
| **415**-**XXX**-**000** (Failed Modem test) | 1. **Cable** <br><br> 2. Modem <br><br> 3. I/O Legacy Board |

## Error symptoms

| Error Symptom | FRU/Action |
|---|---|
| **CD is not working properly.** | 1. **Clean the CD.** <br><br> 2. Run CD-ROM diagnostics. <br><br> 3. CD-ROM Drive |
| **CD-ROM drive tray is not working.** (The server must be powered-on.) | 1. **Insert the end of a paper clip into the manual tray-release opening.** <br><br> 2. Run CD-ROM diagnostics. <br><br> 3. CD-ROM Drive |
| **CD-ROM drive is not recognized.** | 1. **Run Configuration/Setup, enable primary IDE channel.** <br><br> 2. Check cables and jumpers. <br><br> 3. Check for correct device driver. <br><br> 4. Run CD-ROM diagnostics. <br><br> 5. CD-ROM drive <br><br> 6. I/O Legacy Board |

| Error Symptom | FRU/Action |
|---|---|
| **Power switch does not work and reset button does work.** | 1. **Verify that the power-on control jumper on J23 is on pins 1 and 2.**<br>2. Power Switch Assembly<br>3. I/O Legacy Board |
| **Diskette drive in-use light stays on, or the system bypasses the diskette drive, or the diskette drive does not work.** | 1. **If there is a diskette in the drive, verify that:**<br>  a. The diskette drive is enabled in the Configuration/Setup utility program.<br>  b. The diskette is good and not damaged. (Try another diskette if you have one.)<br>  c. The diskette is inserted correctly in the drive.<br>  d. The diskette contains the necessary files to start the server.<br>  e. The software program is OK.<br>  f. Cable is installed correctly (proper orientation)<br>2. Run Diskette Drive Diagnostics.<br>3. Cable<br>4. Diskette Drive<br>5. I/O Legacy 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. | 1. **Monitor**<br>2. Run Video Diagnostics. If diagnostics pass, the problem may be a video driver.<br>3. Display Adapter / I/O Legacy Board |

# Power supply LED errors

Use the power supply LED information on the following page to troubleshoot power supply problems.

**Note:** The minimum configuration required for the DC Good light to come on is:

- Power Supply
- Power Backplane
- Processor/PCI Board (with pins 2 and 3 on J23 connected together to bypass the power switch; see "Processor board jumpers" on page 57).
- Processor/PCI Board (Verify that Processor/PCI Board and I/O Legacy Board are properly connected together; see "Processor board component locations" on page 55.

| AC Good LED | DC Good LED | Description | FRU/Action |
|---|---|---|---|
| Off | Off | No power to system or ac problem. | 1. **Check ac power to system.**<br>2. Power Supply |

| AC Good LED | DC Good LED | Description | FRU/Action |
|---|---|---|---|
| On | Off | Standby mode or dc problem. | 1. Move jumper on J23 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. If the system powers up with no errors:<br><br>  a. Power Switch Assembly<br><br>2. 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.<br><br>3. Power Supply<br><br>4. Power Backplane<br><br>5. I/O Legacy Board<br><br>6. Processor Board |
| On | On | Power is OK. | N/A |

## POST error codes

In the following error codes, *X* can be any number or letter.

| Error Code/Symptom | FRU/Action |
|---|---|
| **062** (Three consecutive boot failures using the default configuration.) | 1. **Run Configuration/Setup**<br>2. Battery<br>3. I/O Legacy Board<br>4. Processor/PCI Board<br>5. Processor |
| **101, 102** (System and processor error) | 1. **I/O Legacy Board**<br>2. Processor/PCI Board |
| **106** (System and processor error) | 1. **I/O Legacy Board**<br>2. Processor/PCI Board |
| **111** (Channel check error) | 1. **Failing adapter**<br>2. DIMM<br>3. I/O Legacy board |
| **114** (Adapter read-only memory error) | 1. **Failing adapter**<br>2. Run diagnostics |

| Error Code/Symptom | FRU/Action |
|---|---|
| **129** (Internal cache error) | 1. **Processor**<br>2. Optional processor (if installed)<br>3. Processor/PCI board |
| **151** (Real time clock error) | 1. **Run Diagnostics**<br>2. Battery<br>3. I/O Legacy Board |
| **161** (Real time clock battery error) | 1. **Run Configuration/Setup**<br>2. Battery<br>3. I/O Legacy Board |
| **162** (Device Configuration Error)<br>**Note:** Be sure to load the default settings and any additional desired settings; then, **save the configura-tion.** | 1. **Run Configuration/Setup**<br>2. Battery<br>3. Failing Device<br>4. I/O Legacy Board |
| **163** (Real-Time Clock error) | 1. **Run Configuration/Setup**<br>2. Battery<br>3. I/O Legacy Board |
| **164** (Memory configuration changed, see "Memory Settings" on page 49.) | 1. **Run Configuration/Setup**<br>2. DIMM<br>3. Processor/PCI Board |
| **175** (Hardware error) | 1. **I/O Legacy Board**<br>2. Processor/PCI Board |
| **176** (Computer cover or cable cover was removed without a key being used) | 1. **Run Configuration/Setup**<br>2. I/O Legacy Board<br>3. C2 Security Switch |
| **177, 178** (Security hardware error) | 1. **Run Configuration/Setup**<br>2. I/O Legacy Board |
| **184** (Power-on password corrupted) | 1. **Run Configuration/Setup**<br>2. I/O Legacy Board |
| **185** (Drive startup sequence information corrupted) | 1. **Run Configuration/Setup**<br>2. I/O Legacy Board |
| **186** (Security hardware control logic failed) | 1. **Run Configuration/Setup**<br>2. I/O Legacy Board |
| **187** (VPD serial number not set.) | 1. **Set serial number in Setup**<br>2. I/O Legacy Board |
| **188** (Bad EEPROM CRC #2) | 1. **Run Configuration/Setup**<br>2. I/O Legacy Board |
| **189** (An attempt was made to access the server with invalid passwords) | 1. **Run Configuration/Setup, enter the administrator password**<br>2. I/O Legacy Board. |

| Error Code/Symptom | FRU/Action |
|---|---|
| **201** (Memory test error, see "Memory Settings" on page 49.) If the server does not have the latest level of BIOS installed, update the BIOS to the latest level and run the diagnostic program again. | 1. Run memory diagnostics.<br>2. DIMM<br>3. Memory card<br>4. Processor/PCI Board<br>5. I/O Legacy Board |
| **229** (Cache error) | 1. **Processor**<br>2. Optional Processor (if installed)<br>3. Processor/PCI Board |
| **289** (DIMM has been disabled by user or system, see "Memory Settings" on page 49.) | 1. **Run Configuration/Setup, if disabled by user**<br>2. Disabled DIMM, if not disabled by user.<br>3. Processor/PCI Board |
| **301** (Keyboard or keyboard controller error) | 1. **Keyboard**<br>2. I/O Legacy Board |
| **303** (Keyboard controller error) | 1. **I/O Legacy Board**<br>2. Keyboard |
| **602** (Invalid diskette boot record) | 1. **Diskette**<br>2. Diskette Drive<br>3. Cable<br>4. I/O Legacy Board |
| **604** (Diskette drive error) | 1. **Run Configuration/Setup and Diagnostics**<br>2. Diskette Drive<br>3. Drive Cable<br>4. I/O Legacy Board |
| **605** (Unlock error) | 1. **Diskette drive**<br>2. Drive cable<br>3. I/O Legacy board |
| **662** (Diskette drive configuration error) | 1. **Run Configuration/Setup and Diagnostics**<br>2. Diskette Drive<br>3. Drive Cable<br>4. I/O Legacy Board |
| **762** (Coprocessor configuration error) | 1. **Run Configuration/Setup utility**<br>2. Battery<br>3. Processor<br>4. Processor/PCI board |
| **962** (Parallel port error) | 1. **Disconnect external cable on parallel port.**<br>2. Run Configuration/Setup<br>3. I/O Legacy Board |
| **11XX** (System board serial port 1 or 2 error) | 1. **Disconnect external cable on serial port.**<br>2. Run Configuration/Setup<br>3. I/O Legacy Board |

| Error Code/Symptom | FRU/Action |
|---|---|
| **1301**  (cable to front panel not found) | 1. **Cable**<br>2.  Front Panel<br>3.  Power Switch Assembly<br>4.  I/O Legacy Board |
| **1302**   (cable from system board to power on and reset switches not found) | 1. **Cable**<br>2.  Power Switch Assembly<br>3.  I/O Legacy Board |
| **1303**  (cable from system board to power backplane not found) | 1. **Cable**<br>2.  Power Backplane<br>3.  I/O Legacy Board |
| **1304**  (cable to diagnostic LED board not found) | 1. **Cable**<br>2.  Diagnostic LED Board<br>3.  Power Switch Assembly<br>4.  I/O Legacy Board |
| **1600**  (The Service Processor is not functioning) Do the following before replacing a FRU:<br><br>1.  Ensure that a jumper is not installed on J51.<br><br>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. | 1. **I/O Legacy Board**<br>2.  Processor/PCI Board |
| **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:<br><br>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.<br><br>2.  Flash update the Service Processor. | 1. **I/O Legacy Board**<br>2.  Processor/PCI Board |
| **1762**  (Fixed Disk Configuration error) | 1. **Fixed Disk Drive**<br>2.  Fixed Disk Cables<br>3.  Run Configuration/Setup<br>4.  Fixed Disk Adapter<br>5.  SCSI Backplane<br>6.  I/O Legacy Board |

| Error Code/Symptom | FRU/Action |
|---|---|
| **178X** (Fixed Disk error) | 1. **Fixed Disk Cables** <br> 2. Run Diagnostics <br> 3. Fixed Disk Adapter <br> 4. Fixed Disk Drive <br> 5. I/O Legacy Board |
| **1800** (No more hardware interrupt available for PCI adapter) | 1. Run Configuration/Setup <br> 2. Failing Adapter <br> 3. I/O Legacy Board |
| **1962** (Drive does not contain a valid boot sector) | 1. **Verify a bootable operating system is installed.** <br> 2. If RAID system, refer to the IBM ServeRAID Hardware Maintenance Manual for more information. <br> 3. Run Diagnostics <br> 4. Hard Disk Drive <br> 5. Cable <br> 6. SCSI Backplane <br> 7. I/O Legacy Board |
| **2400** (Video controller test failure) | 1. **Video Adapter (if installed)** <br> 2. I/O Legacy Board |
| **2462** (Video memory configuration error) | 1. **Video Adapter (if installed)** <br> 2. I/O Legacy Board |
| **5962** (IDE CD-ROM configuration error) | 1. **Run Configuration/Setup** <br> 2. CD-ROM Drive <br> 3. CD-ROM Power Cable <br> 4. IDE Cable <br> 5. I/O Legacy Board <br> 6. Battery |
| **8603** (Pointing Device Error) | 1. **Pointing Device** <br> 2. I/O Legacy Board |
| **00012000** (Machine check architecture error) | 1. **Processor** <br> 2. Optional Processor <br> 3. Processor/PCI Board |
| **00019501** (Processor 1 is not functioning - check VRM and processor LEDs) | 1. **VRM 1** <br> 2. Processor 1 <br> 3. Processor Board <br> 4. I/O Legacy Board |
| **00019502** (Processor 2 is not functioning - check VRM and processor LEDs) | 1. **VRM 2** <br> 2. Processor 2 <br> 3. Processor Board <br> 4. I/O Legacy Board |

| Error Code/Symptom | FRU/Action |
|---|---|
| **00019503** (Processor 3 is not functioning - check VRM and processor LEDs) | 1. **VRM 3** <br> 2. Processor 3 <br> 3. Processor Board <br> 4. I/O Legacy Board |
| **00019504** (Processor 4 is not functioning - check VRM and processor LEDs) | 1. **VRM 4** <br> 2. Processor 4 <br> 3. Processor/PCI Board <br> 4. I/O Legacy Board |
| **00019701** (Processor 1 failed BIST) | 1. **Processor 1** <br> 2. Processor/PCI Board <br> 3. I/O Legacy Board |
| **00019702** (Processor 2 failed BIST) | 1. **Processor 2** <br> 2. Processor/PCI Board <br> 3. I/O Legacy Board |
| **00019703** (Processor 3 failed BIST) | 1. **Processor 3** <br> 2. Processor/PCI Board <br> 3. I/O Legacy Board |
| **00019704** (Processor 4 failed BIST) | 1. **Processor 4** <br> 2. Processor/PCI Board |
| **00180100** (No room for PCI option ROM) | 1. **Run Configuration/Setup** <br> 2. Failing Adapter <br> 3. I/O Legacy Board |
| **00180200** (No more I/O space available for PCI adapter) | 1. **Run Configuration/Setup** <br> 2. Failing Adapter <br> 3. I/O Legacy Board |
| **00180300** (No more memory (above 1MB for PCI adapter) | 1. **Run Configuration/Setup** <br> 2. Failing Adapter <br> 3. I/O Legacy Board |
| **00180400** (No more memory (below 1MB for PCI adapter) | 1. **Run Configuration/Setup** <br> 2. Failing Adapter <br> 3. I/O Legacy Board |
| **00180500** (PCI option ROM checksum error) | 1. **Remove Failing PCI Card** <br> 2. I/O Legacy Board |
| **00180600** (PCI device built-in self test failure) | 1. **Run Configuration/Setup** <br> 2. Failing Adapter <br> 3. I/O Legacy Board |
| **00180700, 00180800** (General PCI error) | 1. **I/O Legacy Board** <br> 2. PCI Card |
| **01295085** (ECC checking hardware test error) | 1. **Processor/PCI Board** <br> 2. Processor |

| Error Code/Symptom | FRU/Action |
|---|---|
| **01298001** (No update data for processor 1) | 1. **Ensure all processors are the same stepping level and cache size.**<br>2. Processor 1 |
| **01298002** (No update data for processor 2) | 1. **Ensure all processors are the same stepping level and cache size.**<br>2. Processor 2 |
| **01298003** (No update data for processor 3) | 1. **Ensure all processors are the same stepping level and cache size.**<br>2. Processor 3 |
| **01298004** (No update data for processor 4) | 1. **Ensure all processors are the same stepping level and cache size.**<br>2. Processor 4 |
| **01298101** (Bad update data for processor 1) | 1. **Ensure all processors are the same stepping level and cache size.**<br>2. Processor 1 |
| **01298102** (Bad update data for processor 2) | 1. **Ensure all processors are the same stepping level and cache size.**<br>2. Processor 2 |
| **01298103** (Bad update data for processor 3) | 1. **Ensure all processors are the same stepping level and cache size.**<br>2. Processor 3 |
| **01298104** (Bad update data for processor 4) | 1. **Ensure all processors are the same stepping level and cache size.**<br>2. Processor 4 |
| **I9990301** (Fixed boot sector error) | 1. **Hard Disk Drive**<br>2. If RAID system, refer to the ServeRAID Hardware Maintenance Manual for more information.<br>3. SCSI Backplane<br>4. Cable<br>5. I/O Legacy Board |
| **I9990305** (Fixed boot sector error, no operating system installed) | 1. **Install operating system to hard disk drive.** |
| **I9990650** (AC power has been restored) | 1. **Check cable**<br>2. Check for interruption of power supply<br>3. Power Cable |

## ServeRAID POST (ISPR) 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 a ServeRAID adapter unless such a replacement is a specifically recommended Action.

# ServeRAID POST (ISPR) 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.

**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 "Processor board component locations" on page 55.
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 "Processor board component locations" on page 55.
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, "Processor board component locations" on page 55.
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.

   **Notes:**
   a. 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 2 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.

d.   Check for proper backplane jumper configuration.

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 "Using IBM ServeRAID" on page 117.   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.)

**EFFE** (Firmware code corrupted or download jumpers are in place.)

1.   Verify download jumpers are in their default locations.  See "Processor board component locations" on page 55 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 a..

c.   Disconnect one drive at a time attached to channel identified in stepa.  and reboot each time to determine which drive is causing the problem.

d.   Replace SCSI Cable attached to channel identified in step a..

e.   Replace Backplane attached to channel identified in step a..

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

This index supports ServeRAID 3HB Adapters and Controllers. It lists symptoms, errors, and possible causes.

**Note:** Do not replace any FRU until you have followed the POST (ISPR) error procedures (see "ServeRAID POST (ISPR) error procedures" on page 162). Only replace a ServeRAID 3HB Adapter or controller if ind8icated to do so in the POST (ISPR) error procedures.

| Error Code/Symptom | Action |
|---|---|
| 1xxx (flash checksum error) | 1. ServeRAID 3HB Adapter/Controller |
| 2xxx (code DRAM error) | 1. Install download jumpers, flash latest level BIOS and firmware for adapter. Remove jumpers. <br> 2. ServeRAID 3HB Adapter/Controller |
| 2601 to 260B (POST detected error with ServeRAID subsystem) | 1. Install download jumpers, flash latest level BIOS and firmware for adapter. Remove jumpers. <br> 2. ServeRAID 3HB Adapter/Controller |
| 2610 (POST detected error with ServeRAID controller hardware) | 1. Install download jumpers, flash latest level BIOS and firmware for adapter. Remove jumpers. <br> 2. ServeRAID 3HB Adapter/Controller |
| 2620 (POST detected ServeRAID configuration or hard disk error) | 1. Install download jumpers, flash latest level BIOS and firmware for adapter. Remove jumpers. <br> 2. ServeRAID 3HB Adapter/Controller |
| 3xxx (NVRAM error) | 1. Install download jumpers, flash latest level BIOS and firmware for adapter. Remove jumpers. <br> 2. ServeRAID 3HB Adapter/Controller |
| 4xxx (timer/cache memory controller error) | 1. Install download jumpers, flash latest level BIOS and firmware for adapter. Remove jumpers. <br> 2. ServeRAID 3HB Adapter/Controller |
| 5xxx (cache memory controller error) | 1. Install download jumpers, flash latest level BIOS and firmware for adapter. Remove jumpers. <br> 2. ServeRAID 3HB Adapter/Controller |
| 6xxx (cache DRAM error) | 1. Reseat Cache Memory SIMM <br> 2. Install download jumpers, flash latest level BIOS and firmware for adapter. Remove jumpers. <br> 3. ServeRAID 3HB Adapter/Controller |

| Error Code/Symptom | Action |
|---|---|
| 7xxx (host/local PCI bus interface error) | 1. Install download jumpers, flash latest level BIOS and firmware for adapter. Remove jumpers.<br><br>2. ServeRAID 3HB Adapter/Controller |
| 8xxx (SCSI I/O port error) | 1. Install download jumpers, flash latest level BIOS and firmware for adapter. Remove jumpers.<br><br>2. ServeRAID 3HB Adapter/Controller |
| 9xxx (SCSI termination error) | 1. Refer to "ServeRAID POST (ISPR) error procedures" on page 162.<br><br>2. SCSI cable<br><br>3. SCSI backplane<br><br>4. Hard drive<br><br>5. ServeRAID 3HB Adapter/Controller |
| Axxx (SCSI I/O port error) | 1. Refer to "ServeRAID POST (ISPR) error procedures" on page 162. |
| Bxxx (SCSI bus interface error) | 1. Refer to "ServeRAID POST (ISPR) error procedures" on page 162.<br><br>2. SCSI cable<br><br>3. SCSI backplane<br><br>4. Hard drive<br><br>5. ServeRAID 3HB Adapter/Controller |

## SCSI error codes

| Error Code | FRU/Action |
|---|---|
| **All SCSI Errors** One or more of the following might be causing the problem:<br><br>• A failing SCSI device (adapter, drive, controller)<br>• An improper SCSI configuration or SCSI termination jumper setting<br>• Duplicate SCSI IDs in the same SCSI chain<br>• A missing or improperly installed SCSI terminator<br>• A defective SCSI terminator<br>• An improperly installed cable<br>• A defective cable | 1. **External SCSI devices must be powered-on before you power-on the server.**<br><br>2. The cables for all external SCSI devices are connected correctly.<br><br>3. If you have attached an external SCSI device to the server, make sure the external SCSI termination is set to automatic.<br><br>4. The last device in each SCSI chain is terminated correctly.<br><br>5. The SCSI devices are configured correctly. |

# Temperature error messages

| Message | Action |
|---|---|
| **DASD "X" Over Temperature** (level-critical; Direct Access Storage Device bay "X" was over temperature) | 1. **Ensure system is being properly cooled**; see "Temperature checkout" on page 32. |
| **DASD Over recommended Temperature** (sensor X) (level-warning; the DASD backplane had an over temperature condition) | 1. **Ensure system is being properly cooled**; see "Temperature checkout" on page 32. |
| **DASD under recommended temperature** (sensor X) level-warning; the DASD backplane had an under temperature condition) | 1. **Ambient temperature must be within normal operating specifications**; (see "Features and specifications" on page 3). |
| **Power Supply "X" Temperature Fault** (level-critical; power supply "x" had over temperature condition) | 1. **Ensure system is being properly cooled**; see "Temperature checkout" on page 32.<br>2. Replace Power Supply "X" |
| **System board is over recommended temperature** (level-warning; system board is over recommended temperature) | 1. **Ensure system is being properly cooled**; see "Temperature checkout" on page 32.<br>2. Replace system board |
| **System board is under recommended temperature** (level-warning; system board is under recommended temperature) | 1. **Ambient temperature must be within normal operating specifications**; (see "Features and specifications" on page 3). |
| **System over temperature for CPU "X"** (level-warning; CPU "X" reporting over temperature condition) | 1. **Ensure system is being properly cooled**; see "Temperature checkout" on page 32.<br>2. Replace CPU "X".<br>3. Replace Processor/PCI Board. |
| **System under recommended CPU "X" temperature** (level-warning; system reporting under temperature condition for CPU "X") | 1. **Ambient temperature must be within normal operating specifications**; (see "Features and specifications" on page 3).<br>2. Replace CPU "X".<br>3. Replace Processor/PCI Board. |

# Fan error messages

| Message | Action |
|---|---|
| **Fan "X" failure** (level-critical; fan "X" had a failure) | 1. **Check connections to fan "X"**<br>2. Replace fan "X" |
| **Fan "X" fault** (level-critical; fan "X" beyond recommended RPM range) | 1. **Check connections to fan "X"**<br>2. Replace fan "X" |

# Power error messages

| Message | Action |
|---|---|
| **Power supply "X" current fault** (level-critical; excessive current demand on power supply "X") | 1. **See "Power checkout" on page 32.** |
| **Power supply "X" DC good fault** (level-critical; power good signal not detected for power supply "X") | 1. **Replace power supply "X"** |
| **Power supply "X" fan fault** (level-critical; fan fault in power supply "X") | 1. **Replace power supply "X"** |
| **Power supply "X" fault** (level-critical; overcurrent condition exists) | 1. **See "Power checkout" on page 32.** |
| **Power supply "X" 12V fault** (level-critical; overcurrent condition detected) | 1. **See "Power checkout" on page 32.** |
| **Power supply "X" 3.3V fault** (level-critical; 3.3V power supply "X" had an error) | 1. **See "Power checkout" on page 32.** |
| **Power supply "X" 5V fault** (level-critical; 5V power supply "X" had an error) | 1. **See "Power checkout" on page 32.** |
| **System over recommended "X" current** (level-non-critical; system running too much current on that voltage) | 1. **See "Power checkout" on page 32.** |
| **System running non-redundant power** (level-non-critical; system does not have redundant power) | 1. **Add another power supply**<br>2. Remove options from system<br>3. System can continue to operate without redundancy protection if **1** and **2** above are not followed. |
| **System under recommended voltage for "X" v** (level-warning; indicated voltage supply under nominal value; value for "X" can be +12, -12, or +5) | 1. **Check connections to power subsystem**<br>2. Replace power supply<br>3. Replace power backplane |
| **System under recommended voltage on 3.3 v** (level-warning; 3.3 volt supply under nominal value) | 1. **Check connections to power subsystem**<br>2. Replace power supply<br>3. Replace power backplane |
| **System under recommended X current** (level-non-critical; system drawing less current than recommended on voltage "X") | 1. **See "Power checkout" on page 32.** |
| **"X" V bus fault** (level-critical; overcurrent condition on "X" voltage bus) | 1. **See "Power checkout" on page 32.** |
| **12V "X" bus fault** (level-critical; overcurrent condition on 12 volt "X" voltage bus) | 1. **See** "Power checkout" on page 32. |
| **5V fault** (level-critical; overcurrent condition on 5 V subsystem) | 1. **See** "Power checkout" on page 32. |
| **240 VA bus fault** (level-critical; overcurrent or overvoltage condition in power subsystem) | 1. **See "Power checkout" on page 32.** |

# System shutdown

Refer to the following tables when experiencing system shutdown related to voltage or temperature problems.

## Power related system shutdown

| Message | Action |
|---|---|
| **System powered off due to "X" current over max value** (level-critical; system drawing too much current on voltage "X" bus) | 1. **See "Power checkout" on page 32.** |
| **System shutoff due to "X" current under min value** (level-critical; current on voltage bus "X" under minimum value) | 1. **See "Power checkout" on page 32.** |
| **System shutoff due to "X" V over voltage** (level-critical; system shutoff due to "X" supply over voltage) | 1. **Check power supply connectors**<br>2. Replace power supply<br>3. Replace power backplane |
| **System shutoff due to "X" V under voltage** (level-critical system shutoff due to "X" supply under voltage) | 1. **Check power supply connectors**<br>2. Replace power supply<br>3. Replace power backplane |
| **System powered off due to faults on each power supply.** | 1. **See "Power checkout" on page 32.** |

## Temperature related system shutdown

| Message | Action |
|---|---|
| **System shutoff due to board over temperature** (level-critical; processor board is over temperature) | 1. **Ensure system is being properly cooled**, see "Temperature checkout" on page 32.<br>2. Replace processor board |
| **System shutoff due to CPU "X" over temperature** (level-critical; CPU "X" is over temperature) | 1. **Ensure system is being properly cooled**, see "Temperature checkout" on page 32.<br>2. Replace CPU "X" |
| **System shutoff due to CPU "X" under temperature** (level-critical; CPU "X" is under temperature) | 1. **Ambient temperature must be within normal operating specifications** (see "Features and specifications" on page 3.<br>2. |
| **System shutoff due to DASD temperature (sensor X)** (level-critical; DASD area reported temperature outside recommended operating range) | 1. **Ensure system is being properly cooled**, see "Temperature checkout" on page 32. |

| Message | Action |
|---|---|
| **System shutoff due to high ambient temperature** (level-critical; high ambient temperature) | 1. **Ambient temperature must be within normal operating specifications** (see "Features and specifications" on page 3. |
| **System shutoff due to system board under temperature** (level-critical; system board is under temperature) | 1. **Ambient temperature must be within normal operating specifications** (see "Features and specifications" on page 3. |

## DASD checkout

| Message | Action |
|---|---|
| **Hard drive (SCSI ID "X") removal detected** (level-critical; hard drive "X" has been removed) | 1. **Information only, take action as appropriate.** |
| **Hard drive (SCSI ID "X") fault** | 1. **Replace hard drive (SCSI ID "X").** |

## Host Built-In Self Test (BIST) checkout

| Message | Action |
|---|---|
| **Host BIST fail** (level-informational; host's built-in self test failed) | 1. **Reseat CPU** <br> 2. Reseat VRM <br> 3. Replace CPU |

## I2C bus fault messages

| Message | Action |
|---|---|
| Failure reading I2C device. Check devices on bus 0. | 1. Replace I/O Legacy Board |
| Failure reading I2C device. Check devices on bus 1. | 1. Reseat I/O Legacy Board <br> 2. Reseat power supplies <br> 3. Replace power supply <br> 4. Replace Power Backplane <br> 5. Replace I/O Legacy Board |

| Message | Action |
|---|---|
| Failure reading I2C device. Check devices on bus 2. | 1. Reseat front panel connector<br>2. Reseat diagnostics panel connector<br>3. Reseat I/O Legacy Board<br>4. Replace front panel<br>5. Replace diagnostics panel<br>6. Replace Power Backplane<br>7. Replace I/O Legacy Board |
| Failure reading I2C device. Check devices on bus 3. | 1. Reseat VRMs<br>2. Reseat Processor/PCI Board<br>3. Replace VRMs<br>4. Replace Processor/PCI Board<br>5. Replace I/O Legacy Board |
| Failure reading I2C device. Check devices on bus 4. | 1. Reseat Power Backplane/DASD power cable<br>2. Reseat I/O Legacy Board<br>3. Replace Power Backplane/DASD power cable<br>4. Replace DASD Backplane<br>5. Replace Power Backplane<br>6. Replace I/O Legacy Board |
| Failure reading I2C device. Check devices on bus 5. | 1. Reseat CPUs<br>2. Reseat Processor/PCI Board<br>3. Replace CPUs<br>4. Replace Processor/PCI Board<br>5. Replace I/O Legacy Board |
| Failure reading I2C device. Check devices on bus 6. | 1. Reseat memory card<br>2. Reseat Processor/PCI Board<br>3. Replace memory card<br>4. Replace Processor/PCI Board<br>5. Replace I/O Legacy Board |
| Failure reading I2C device. Check devices on bus 7. | 1. Reseat Processor/PCI Board<br>2. Replace Processor/PCI Board<br>3. Replace I/O Legacy Board |
| Failure reading I2C device. Check devices on bus 8. | 1. Replace I/O Legacy Board |

# 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. A corrupt CMOS can cause undetermined problems.

2. A faulty I2C Bus can cause undetermined problems. Check the system error log for any I2C Bus errors; see "I2C bus fault messages" on page 169.

Check the LEDs on all the power supplies, see"Power supply LED errors" on page 154. 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
      Hard disk drives
      Memory-Modules (Minimum requirement = 512 MB (4x128 MB DIMMs))

    **Note:** Minimum operating requirements are:

        a. 1 Power Supply
        b. Power Backplane
        c. Processor/PCI Board (with pins 2 and 3 on J23 connected together to bypass the power switch; default is pins 1 and 2)
        d. I/O Legacy Board  (Verify that connection to Processor/PCI Board is secure.)
        e. 1 Microprocessor and VRM
        f. 3 Terminator Cards
        g. Memory Modules (with a minimum of 1 bank of four 128 MB DIMMs (4x128))

4. Power-on the computer. If the problem remains, suspect the following FRUs in the order listed:

      Power Supply
      Power Backplane
      Processor/PCI Board
      I/O Legacy 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 Processor/PCI Board, then the I/O Legacy Board.

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 8665)

## Part A
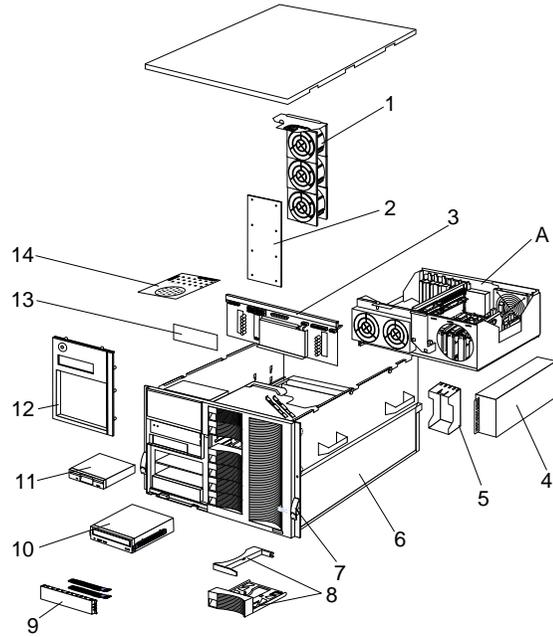
# System

**Note:** Components of the shuttle (A) are shown in "Part B" on page 175.

| Index | System (xSeries 250)  Models 6RY, 7RY, 8RY, 61Y, 71Y, 81Y | FRU No. |
|---|---|---|
| 1 | DASD fan assembly w/bracket (All models) | 37L6314 |
| 2 | LVD SCSI backplane (Audi) (All models) | 24P4003 |
| 3 | Power supply backplane assembly (Models 61Y, 71Y, 81Y) | 37L6329 |
| 4 | Hot swap power supply 250W (All models) | 36L8819 |
| 5 | Power supply filler assembly (2) (All models) | 00N6405 |
| 6 | Chassis (All models) | 37L6316 |
| 7 | Front bezel (All models) | 37L6335 |
| 8 | Hard disk drive bezel filler assembly (All models) | 37L0198 |
| 9 | Blank 5.25 bezel assembly (All models) | 00N6407 |
| 10 | 40X CD-ROM (All models) | 19K1517 |
| 11 | 1.44MB diskette drive (All models) | 76H4091 |
| 12 | Trim bezel (All models) | 37L0260 |
| 13 | Front LED card assembly (All models) | 37L6328 |
| 14 | Diagnostic switch card (All models) | 37L6327 |
| | Media trim bezel assembly (All models) | 06P5959 |
| | Bezel assembly (All models) | 06P5955 |
| | Bezel (All models) | 19K1231 |
| | Front door (Models 61Y, 71Y, 81Y) | 06P5981 |
| | Power switch cover (All models) | 09N7764 |

# Part B
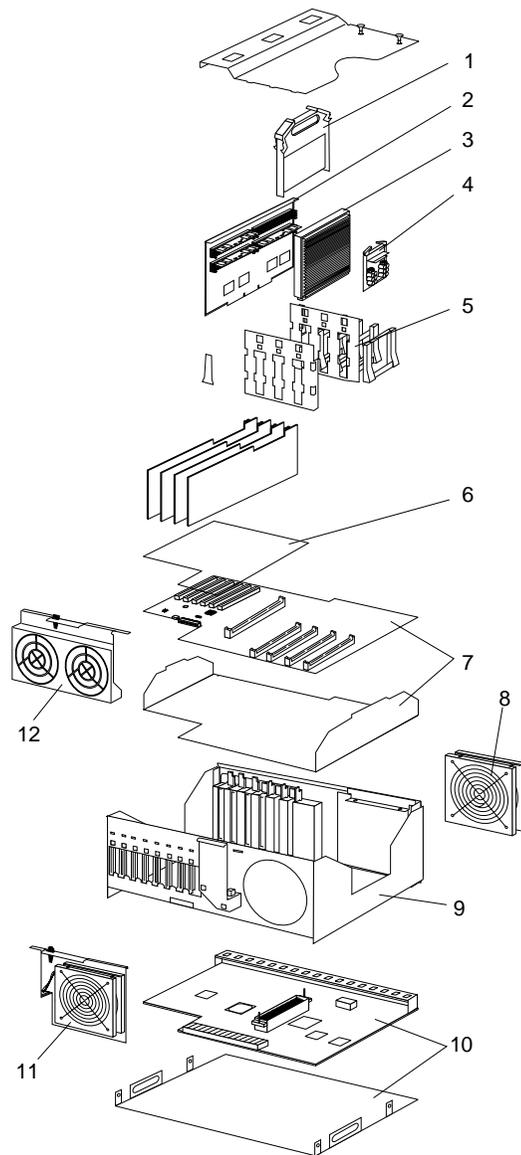
# System

| Index | System (xSeries 250)  Models 6RY, 7RY, 8RY, 61Y, 71Y, 81Y | FRU No. |
|---|---|---|
| 1 | Terminator card (All models) | 94H0598 |
| 2 | Memory card (All models) | 24P1631 |
| 3 | 700MHZ/1MB cache (Models 6RY, 61Y) | 19K0982 |
| 3 | 700MHZ/2MB cache (Models 7RY, 71Y) | 19K0983 |
| 3 | 900MHZ/2MB cache (Models 8RY, 81Y) | 23P1421 |
| 4 | Dual voltage regulator module assembly (All models) | 24P6804 |
| 5 | Misc. processor kit (Models 1RY, 2RY) (contains processor guide (2), VRM guide (8), VRM guide retainer (4), memory card guide (2)) (All models) | 37L6340 |
| 6 | I/O legacy label (All models) | 37L6318 |
| 7 | Processor/PCI board with backerplate assembly (All models) | 37L6337 |
| 8 | Rear fan assembly w/bracket (All models) | 37L6325 |
| 9 | Shuttle (All models) | 37L6320 |
| 10 | I/O Legacy card assembly w/backerplate (Snark) (All models) | 06P4117 |
| 11 | Front fan assembly w/bracket (All models) | 37L6324 |
| 12 | I/O fan assembly w/bracket (All models) | 37L6326 |
| | Processor terminator case (All models) | 10L6936 |
| | Processor retention bracket (All models) | 37L6319 |
| | 40X CD-ROM (2nd source) (All models) | 36L8791 |
| | CD-ROM 5.25 rail (All models) | 00N6412 |
| | Misc. hot swap kit #2 (Model 1RY, 2RY) (contains PCI handles (4), blank fillers (4), PCI clamps (4), M3x5 screw (5), insulator (5), switch housing (1), card guide (2), guide retainers) (All models) | 00N6776 |
| | Misc. hot plug kit (All models) | 33L3707 |
| | Top cover (All models) | 12J3063 |
| | Left EIA side flange assembly (All models) | 00N6794 |
| | Right EIA side flange assembly (All models) | 00N6795 |
| | Cam handle lever (All models) | 03K9083 |
| | Shuttle eject lever (All models) | 37L6317 |
| | PCI handle (All models) | 37L6322 |
| | EMI shield (All models) | 37L6323 |
| | PCI switch card (All models) | 37L0178 |
| | PCI switch, single (All models) | 00N6830 |
| | Bracket, floppy disk drive (All models) | 12J3065 |
| | Slide assembly | 00N6839 |
| | 128MB DIMM (4) (All models) | 33L3114 |
| | 256MB DIMM (All models) | 33L3116 |
| | 512MB DIMM (All models) | 33L3118 |
| | 1GB DIMM (All models) | 33L3120 |
| | Service label (All models) | 06P5973 |
| | Battery (All models) | 33F8354 |
| | Shuttle power cable (All models) | 37L0126 |
| | Power cable-power backplane to SCSI backplane (All models) | 37L0132 |
| | Power cable-power backplane to CD (All models) | 37L0130 |
| | Signal cable-power backplane to SCSI backplane (All models) | 37L0147 |
| | Signal cable-power backplane to 5.25 bays (All models) | 37L0149 |

| Index | System (xSeries 250)  Models 6RY, 7RY, 8RY, 61Y, 71Y, 81Y | FRU No. |
|---|---|---|
| | Signal cable diskette drive (All models) | 37L0144 |
| | Signal cable-power backplane to CD-ROM (All models) | 37L0146 |
| | Signal cable (All models) | 06P5975 |
| | Power cable-processor to rear processor (All models) | 37L0134 |
| | Power cable-processor to front fans (All models) | 37L0136 |
| | Power cable-power backplane to hard disk drive fans (All models) | 37L0131 |

# Keyboards

| Keyboard | FRU No. |
|---|---|
| US English | 37L2551 |
| French Canadian | 37L2552 |
| LA Spanish | 37L2553 |
| Arabic | 37L2555 |
| Belgium/French | 37L2556 |
| Belgium/UK | 37L2557 |
| Bulgarian | 37L2558 |
| Czech | 37L2559 |
| Danish | 37L2560 |
| Dutch | 37L2561 |
| French | 37L2562 |
| German | 37L2563 |
| Greek | 37L2564 |
| Hebrew | 37L2565 |
| Hungarian | 37L2566 |
| Korean | 02K0901 |
| Iceland | 37L2567 |
| Italy | 37L2568 |
| Norwegian | 37L2569 |
| Polish | 37L2570 |
| Portuguese | 37L2571 |
| Romanian | 37L2572 |
| Russian | 37L2573 |
| Serbian/Cyrillic | 37L2574 |
| Slavic | 37L2575 |
| Spanish | 37L2576 |
| Swedish/Finn | 37L2577 |
| Swiss, F/G | 37L2578 |
| Turkish | 37L2579 |
| Turkish | 37L2580 |
| UK English | 37L2581 |
| Yugosl/Lat | 37L2582 |
| US English-EMEA | 37L2583 |
| Chinese/US | 37L2585 |
| Thailand | 37L2587 |
| French Canadian | 37L0913 |

# Power cords

| Power cord | FRU No. |
| --- | --- |
| China (PRC) | 01K9851 |
| Japan | 01K9853 |
| Thailand | 12J5120 |
| Israel | 12J5122 |
| Bangladesh, Burma, India, Pakistan, South Africa, Sri Lanka | 12J5124 |
| Chile, Ethiopia, Italy, Libya, Somalia | 12J5126 |
| Argentina, Australia, New Zealand, Papua New Guinea, Paraguay, Uruguay, Western Samoa | 12J5128 |
| Antigua, Bahrain, Brunei, Channel Islands, Cyprus, Dubai, Fiji, Ghana, Hong Kong, Iraq, Ireland, Kenya, Kuwait, Malawi, Malaysia, Malta, Nepal, Nigeria, Polynesia, Qatar, Sierra Leone, Singapore, Tanzania, Uganda, United Kingdom, Yemen, Zambia | 12J5987 |
| Afghanistan, Algeria, Andorra, Angola, Austria, Belgium, Benin, Bulgaria, Burkina Faso, Burundi, Cameroon, Central African Rep., Chad, Czech Republic, Egypt, Finland, France, French Guiana, Germany, Greece, Guinea, Hungary, Iceland, Indonesia, Iran, Ivory Coast, Jordan, Lebanon, Luxembourg, Macau, Malagasy, Mali, Martinique, Mauritania, Mauritius, Monaco, Morocco, Mozambique, Netherlands, New Caledonia, Niger, Norway, Poland, Portugal, Romania, Senegal, Slovakia, Spain, Sudan, Sweden, Syria, Togo, Tunisia, Turkey, former USSR, Vietnam, former Yugoslavia, Zaire, Zimbabwe | 55H6643 |
| Denmark, Switzerland, Liechtenstein | 55H6646 |
| Bahamas, Barbados, Bermuda, Bolivia, Brazil, Canada, Cayman Islands, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Guatemala, Guyana, Haiti, Honduras, Jamaica, Korea (South), Liberia, Mexico, Netherlands Antilles, Nicaragua, Panama, Peru, Philippines, Saudi Arabia, Suriname, Taiwan, Trinidad (West Indies), Venezuela | 76H4865 |
| United States of America | 6952301 (110) 1838574 (220) 36L8886 (220V/15A) |

# Related service information

**Note:** The service procedures are designed to help you isolate problems. They are written with the assumption that you have model-specific training on all computers, or that are familiar with the computers, functions, terminology, and service information provided in this manual.

# Safety information

The following section contains the safety information that you need to be familiar with before servicing an IBM mobile computer.

## General safety

Follow these rules to ensure general safety:

- Observe good housekeeping in the area of the machines during and after maintenance.

- When lifting any heavy object:

    1. Ensure you can stand safely without slipping.

    2. Distribute the weight of the object equally between your feet.

    3. Use a slow lifting force. Never move suddenly or twist when you attempt to lift.

    4. Lift by standing or by pushing up with your leg muscles; this action removes the strain from the muscles in your back. *Do not attempt to lift any objects that weigh more than 16 kg (35 lb) or objects that you think are too heavy for you.*

- Do not perform any action that causes hazards to the customer, or that makes the equipment unsafe.

- Before you start the machine, ensure that other service representatives and the customer's personnel are not in a hazardous position.

- Place removed covers and other parts in a safe place, away from all personnel, while you are servicing the machine.

- Keep your tool case away from walk areas so that other people will not trip over it.

- Do not wear loose clothing that can be trapped in the moving parts of a machine. Ensure that your sleeves are fastened or rolled up above your elbows. If your hair is long, fasten it.

- Insert the ends of your necktie or scarf inside clothing or fasten it with a nonconductive clip, approximately 8 centimeters (3 inches) from the end.

- Do not wear jewelry, chains, metal-frame eyeglasses, or metal fasteners for your clothing.

    **Remember:** Metal objects are good electrical conductors.

- Wear safety glasses when you are: hammering, drilling soldering, cutting wire, attaching springs, using solvents, or working in any other conditions that might be hazardous to your eyes.

- After service, reinstall all safety shields, guards, labels, and ground wires. Replace any safety device that is worn or defective.

- Reinstall all covers correctly before returning the machine to the customer.

## Electrical safety



**CAUTION:**
**Electrical current from power, telephone, and communication cables can be**

**hazardous. To avoid personal injury or equipment damage, disconnect the attached power cords, telecommunication systems, networks, and modems before you open the server covers, unless instructed otherwise in the installation and configuration procedures.**

Observe the following rules when working on electrical equipment.

**Important:** Use only approved tools and test equipment. Some hand tools have handles covered with a soft material that does not insulate you when working with live electrical currents.

Many customers have, near their equipment, rubber floor mats that contain small conductive fibers to decrease electrostatic discharges. Do not use this type of mat to protect yourself from electrical shock.

- Find the room emergency power-off (EPO) switch, disconnecting switch, or electrical outlet. If an electrical accident occurs, you can then operate the switch or unplug the power cord quickly.

- Do not work alone under hazardous conditions or near equipment that has hazardous voltages.

- Disconnect all power before:

  — Performing a mechanical inspection

  — Working near power supplies

  — Removing or installing main units

- Before you start to work on the machine, unplug the power cord. If you cannot unplug it, ask the customer to power-off the wall box that supplies power to the machine and to lock the wall box in the off position.

- If you need to work on a machine that has exposed electrical circuits, observe the following precautions:

  — Ensure that another person, familiar with the power-off controls, is near you.

    **Remember:** Another person must be there to switch off the power, if necessary.

  — Use only one hand when working with powered-on electrical equipment; keep the other hand in your pocket or behind your back.

    **Remember:** There must be a complete circuit to cause electrical shock. By observing the above rule, you may prevent a current from passing through your body.

  — When using testers, set the controls correctly and use the approved probe leads and accessories for that tester.

  — Stand on suitable rubber mats (obtained locally, if necessary) to insulate you from grounds such as metal floor strips and machine frames.

Observe the special safety precautions when you work with very high voltages; these instructions are in the safety sections of maintenance information. Use extreme care when measuring high voltages.

- Regularly inspect and maintain your electrical hand tools for safe operational condition.

- Do not use worn or broken tools and testers.

- *Never assume* that power has been disconnected from a circuit. First, *check* that it has been powered-off.

- Always look carefully for possible hazards in your work area. Examples of these hazards are moist floors, nongrounded power extension cables, power surges, and missing safety grounds.

- Do not touch live electrical circuits with the reflective surface of a plastic dental mirror. The surface is conductive; such touching can cause personal injury and machine damage.
- Do not service the following parts with the power on when they are removed from their normal operating places in a machine:
  — Power supply units
  — Pumps
  — Blowers and fans
  — Motor generators

  and similar units. (This practice ensures correct grounding of the units.)
- If an electrical accident occurs:
  — Use caution; do not become a victim yourself.
  — Switch off power.
  — Send another person to get medical aid.

## Safety inspection guide

The intent of this inspection guide is to assist you in identifying potentially unsafe conditions on these products. Each machine, as it was designed and built, had required safety items installed to protect users and service personnel from injury. This guide addresses only those items. However, good judgment should be used to identify potential safety hazards due to attachment of non-IBM features or options not covered by this inspection guide.

If any unsafe conditions are present, you must determine how serious the apparent hazard could be and whether you can continue without first correcting the problem.

Consider these conditions and the safety hazards they present:

- Electrical hazards, especially primary power (primary voltage on the frame can cause serious or fatal electrical shock).
- Explosive hazards, such as a damaged CRT face or bulging capacitor
- Mechanical hazards, such as loose or missing hardware

The guide consists of a series of steps presented in a checklist. Begin the checks with the power off, and the power cord disconnected.

Checklist:

1. Check exterior covers for damage (loose, broken, or sharp edges).
2. Power-off the computer. Disconnect the power cord.
3. Check the power cord for:
   a. A third-wire ground connector in good condition. Use a meter to measure third-wire ground continuity for 0.1 ohm or less between the external ground pin and frame ground.
   b. The power cord should be the appropriate type as specified in the parts listings.
   c. Insulation must not be frayed or worn.
4. Remove the cover.
5. Check for any obvious non-IBM alterations. Use good judgment as to the safety of any non-IBM alterations.

6. Check inside the unit for any obvious unsafe conditions, such as metal filings, contamination, water or other liquids, or signs of fire or smoke damage.

7. Check for worn, frayed, or pinched cables.

8. Check that the power-supply cover fasteners (screws or rivets) have not been removed or tampered with.

## Handling electrostatic discharge-sensitive devices

Any computer part containing transistors or integrated circuits (ICs) should be considered sensitive to electrostatic discharge (ESD).  ESD damage can occur when there is a difference in charge between objects.  Protect against ESD damage by equalizing the charge so that the machine, the part, the work mat, and the person handling the part are all at the same charge.

**Notes:**

1. Use product-specific ESD procedures when they exceed the requirements noted here.

2. Make sure that the ESD protective devices you use have been certified (ISO 9000) as fully effective.

When handling ESD-sensitive parts:

• Keep the parts in protective packages until they are inserted into the product.

• Avoid contact with other people.

• Wear a grounded wrist strap against your skin to eliminate static on your body.

• Prevent the part from touching your clothing.  Most clothing is insulative and retains a charge even when you are wearing a wrist strap.

• Use the black side of a grounded work mat to provide a static-free work surface. The mat is especially useful when handling ESD-sensitive devices.

• Select a grounding system, such as those listed below, to provide protection that meets the specific service requirement.

   **Note:**  The use of a grounding system is desirable but not required to protect against ESD damage.

   — Attach the ESD ground clip to any frame ground, ground braid, or green-wire ground.

   — Use an ESD common ground or reference point when working on a double-insulated or battery-operated system.  You can use coax or connector-outside shells on these systems.

   — Use the round ground-prong of the ac plug on ac-operated computers.

## Grounding requirements

Electrical grounding of the computer is required for operator safety and correct system function.  Proper grounding of the electrical outlet can be verified by a certified electrician.

## Safety notices (multi-lingual translations)

The caution and danger safety notices in this section are provided in the following languages:

• English

• Brazilian/Portuguese

- Chinese
- French
- German
- Italian
- Korean
- Spanish

**Important:** All caution and danger statements in this IBM documentation begin with a number. This number is used to cross reference an English caution or danger statement with translated versions of the caution or danger statement in this section.

For example, if a caution statement begins with a number 1, translations for that caution statement appear in this section under statement 1.

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

- Statement 1



**DANGER**

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

**To avoid a shock hazard:**
- **Do not connect or disconnect any cables or perform installation, maintenance, or reconfiguration of this product during an electrical storm.**
- **Connect all power cords to a properly wired and grounded electrical outlet.**
- **Connect to properly wired outlets any equipment that will be attached to this product.**
- **When possible, use one hand only to connect or disconnect signal cables.**
- **Never turn on any equipment when there is evidence of fire, water, or structural damage.**
- **Disconnect the attached power cords, telecommunications systems, networks, and modems before you open the device covers, unless instructed otherwise in the installation and configuration procedures.**
- **Connect and disconnect cables as described in the following table when installing, moving, or opening covers on this product or attached devices.**

| To Connect | To Disconnect |
| --- | --- |
| 1. Turn everything OFF. | 1. Turn everything OFF. |
| 2. First, attach all cables to devices. | 2. First, remove power cords from outlet. |
| 3. Attach signal cables to connectors. | 3. Remove signal cables from connectors. |
| 4. Attach power cords to outlet. | 4. Remove all cables from devices. |
| 5. Turn device ON. | |

- Statement 2

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

*Do not:*

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

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

- Statement 3



**CAUTION:**
**When laser products (such as CD-ROMs, DVD-ROM drives, fiber optic devices, or transmitters) are installed, note the following:**

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



**DANGER:  Some laser products contain an embedded Class 3A or Class 3B laser diode.  Note the following:**

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

- Statement 4
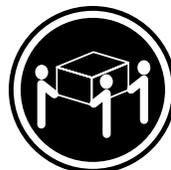
≥18 kg (37 lbs)        ≥32 kg (70.5 lbs)        ≥55 kg (121.2 lbs)

**CAUTION:**
**Use safe practices when lifting.**

- Statement 5

**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.**

2

1
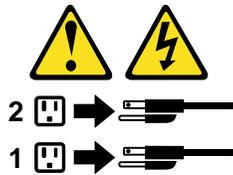
- Statement 10

**CAUTION:**

**Do not place any object weighing more than 82 kg (180 lbs.) on top of rack-mounted devices.**

**Importante:**

Todas as instruções de cuidado e perigo da IBM documentation começam com um número. Este número é utilizado para fazer referência cruzada de uma instrução de cuidado ou perigo no idioma inglês com as versões traduzidas das instruções de cuidado ou perigo encontradas nesta seção.

Por exemplo, se uma instrução de cuidado é iniciada com o número 1, as traduções para aquela instrução de cuidado aparecem nesta seção sob a instrução 1.

Certifique-se de ler todas as instruções de cuidado e perigo antes de executar qualquer operação.

Instrução 1

**PERIGO**

A corrente elétrica proveniente de cabos de alimentação, de telefone e de comunicações é perigosa.

Para evitar risco de choque:

- Não conecte ou desconecte cabos e não realize instalação, manutenção ou reconfiguração deste produto durante uma tempestade com raios.
- Conecte todos os cabos de alimentação a tomadas elétricas corretamente instaladas e aterradas.
- Conecte todos os equipamentos ao qual esse produto será conectado a tomadas corretamente instaladas.
- Sempre que possível, utilize apenas uma das mãos para conectar ou desconectar cabos de sinal.
- Nunca ligue qualquer equipamento quando existir evidência de danos por fogo, água ou na estrutura.
- Desconecte cabos de alimentação, sistemas de telecomunicação, redes e modems antes de abrir as tampas dos dispositivos, a menos que especificado de maneira diferente nos procedimentos de instalação e configuração.
- Conecte e desconecte cabos conforme descrito na seguinte tabela, ao instalar ou movimentar este produto ou os dispositivos conectados, ou ao abrir suas tampas.

| Para Conectar: | Para Desconectar: |
|---|---|
| 1. DESLIGUE Tudo. | 1. DESLIGUE Tudo. |
| 2. Primeiramente, conecte todos os cabos aos dispositivos. | 2. Primeiramente, remova os cabos de alimentação das tomadas. |
| 3. Conecte os cabos de sinal aos conectores. | 3. Remova os cabos de sinal dos conectores. |
| 4. Conecte os cabos de alimentação às tomadas. | 4. Remova todos os cabos dos dispositivos. |
| 5. LIGUE os dispositivos. | |

Instrução 2



**CUIDADO:**

Ao substituir a bateria de lítio, utilize apenas uma bateria IBM, Número de Peça 33F8354 ou uma bateria de tipo equivalente, recomendada pelo fabricante. Se o seu sistema possui um móídulo com uma bateria de lítio, substitua-o apenas pelo mesmo tipo de mídulo, do mesmo fabricante. A bateria contém lítio e pode explodir se não for utilizada, manuseada e descartada de maneira correta.

Não:

- Jogue ou coloque na água
- Aqueça a mais de 100°C (212°F)
- Conserte nem desmonte

Para descartar a bateria, entre em contato com a área de atendimento a clientes IBM, pelo telefone (011) 889-8986, para obter informações sobre como enviar a bateria pelo correio para a IBM.

Instrução 3



**PRECAUCIÓN:**

Quando produtos a laser (unidades de CD-ROM, unidades de DVD, dispositivos de fibra ítica, transmissores, etc.) estiverem instalados, observe o seguinte:

- Não remova as tampas. A remoção das tampas de um produto a laser pode resultar em exposição prejudicial à radiação de laser. Nenhuma peça localizada no interior do dispositivo pode ser consertada.
- A utilização de controles ou ajustes ou a execução de procedimentos diferentes dos especificados aqui pode resultar em exposição prejudicial à radiação.

**PERIGO**

Alguns produtos a laser contêm um diodo laser da Classe 3A ou Classe 3B embutido. Observe o seguinte:

Radiação de laser quando aberto. Não olhe diretamente para o raio a olho nu ou com instrumentos íticos, e evite exposição direta ao raio.

Instrução 4

≥18 kg (37 lbs)    ≥32 kg (70,5 lbs)    ≥55 kg (121,2 lbs)

**CUIDADO:**

Ao levantar a máquina, faça-o com segurança.

Instrução 5

**CUIDADO:**

Os botões Liga/Desliga localizados no dispositivo e na fonte de alimentação não desligam a corrente elétrica fornecida ao dispositivo. O dispositivo também pode ter mais de um cabo de alimentação. Para remover toda a corrente elétrica do dispositivo, assegure que todos os cabos de alimentação estejam desconectados da fonte de energia elétrica.

**CUIDADO:**

Instrução 10

**CUIDADO:**

Não coloque nenhum objeto com peso superior a 82 kg (180 lbs.) sobre dispositivos montados em rack.

**重要:**

Netfinity Server Library 中的所有提醒和危险条款
前都有一个数字标识。该数字是用来交叉引用一个英
文的提醒和危险条款及本部分中的与之对应的已翻译
成其它文字的提醒和危险条款。

例如，如果一个提醒条款前的数字为 1，则本部分中相
应的译文也带有标号 1。

在执行任何指示的操作之前，请确保您已经阅读了全部
提醒和危险条款。

**声明 1**



**危险**

| |
|---|
| 电源、电话和通信电缆中带有危险电流。 |
| 为避免电击: |
| 雷电期间不要拆接电缆或安装、维修及重新配置本产品。 |
| 将所有电源线连接至正确布线并已安全接地的电源插座上。 |
| 将应与本产品连接的所有设备连接至正确布线的插座上。 |
| 尽量只使用单手拆接信号电缆。 |
| 有水、火及结构损坏迹象时，请勿打开任何设备。 |
| 除非在安装配置过程中有明确指示，否则，打开设备机盖前应先断开与电源线、远程通信系统、网络和调制解调器的所有连接。 |
| 安装、移动或打开本产品及其附带设备的机盖时，应按下表所述连接和断开电缆。 |

| 连接时: | 断开连接时: |
|---|---|
| 1. 关闭所有设备。 | 1. 关闭所有设备。 |
| 2. 首先将所有电缆连接至设备。 | 2. 首先从插座中拔出电源线。 |
| 3. 将信号电缆连接至接口。 | 3. 从接口上拔下信号电缆。 |
| 4. 将电源线连接至插座。 | |

声明 2



警告:

更换锂电池时,只能使用 IBM 产品号 33F8354 或者是厂商推荐的等同
类型的电池。

如果系统模块中含有锂电池,则只能使用同一厂商制造的同一类型的模
块进行更换。电池中含有锂,如果使用、拿放或处理不当,可能会发生
爆炸。

请勿对电池进行下列操作:
扔入或浸入水电      。
加热超过 100  (212 F)
进行修理或分解
请按本地法规要求处理电池。

声明 3



警告:

安装激光产品(如 CD–ROM、DVD 驱动器、光纤设备或送话器)时,应注
意以下事项:

不要拆除外盖。拆除激光产品的外盖可能会导致激光辐射的危险,本设备中
没有用户可维修的部件。

非此处指定的其它控制、调整或与性能有关的操作都有可能导致激光辐射的
危险。



危险

某些激光产品中包含内嵌的 3A 级或 3B 级激光二极管。请注意以下事项。

打开时会产生激光辐射。不要直视光束,不要使用光学仪器直接观看光束,
避免直接暴露于光束之下。

声明 4

≥18 kg (37 磅)    ≥32 kg (70.5 磅)    ≥ 55 kg (121.2 磅)

警告:
抬起时请采用安全操作方法。

声明 5

警告:

使用设备上的电源控制按钮和电源上的开关都不能断开本设备上的电流。
另外，本设备可能带有多条电源线。如要断开设备上的所有电流，请确
保所有电源线均已与电源断开连接。

2
1
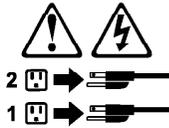
声明 6

警告:

如果在电源线连接设备的一端安装了固定松紧夹，则必须将电源线的另一端连接至
使用方便的电源、

声明 7



警告：

如果设备带有外门，则在移动或抬起设备前应将其拆除或固定
以避免造成人员伤害。外门支撑不了设备的重量。

声明 8



警告：
不要拆除电源外盖或贴有下列标签的任何部件。



贴有此标签的组件内部存在高电压、高电流的危险。这些组件中
没有用户可维修的部件。如果怀疑其中的部件存在问题，应与服
务技术人员联系。

声明 9



警告：

为避免人员伤害，拆除设备上的风扇前应拔下热插拔风扇电缆。

声明 10



警告：

机柜安装的设备上面不能放置重于 82kg（180 磅）的物品。



> 82 kg (180 磅)

声明 11



**警告：**

下面的标签表明附近有锋利的边、角或接头。



声明 12



**警告：**
下面的标签表明附近有高热表面。

重要資訊：

*Netfinity Server Library* 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」聲明可在本節中找到相同內容的「注意」或「危險」聲明的譯文。

例如，有一「危險」聲明以數字 1 開始，則該「危險」聲明的譯文將出現在本節的「聲明」1 中。

執行任何指示之前，請詳讀所有「注意」及「危險」的聲明。

聲明 1



危險

| |
|---|
| 電源、電話及通信電纜上所產生的電流均有危險性。<br><br>欲避免電擊危險：<br><br>－ 在雷雨期間，請勿連接或切斷本產品上的任何電纜線，或安裝、維修及重新架構本產品。<br>－ 請將電源線接至接線及接地正確的電源插座。<br>－ 請將本產品隨附的設備連接至接線正確的插座。<br>－ 儘可能使用單手來連接或切斷信號電纜線。<br>－ 當設備有火燒或泡水的痕跡，或有結構性損害時，請勿開啟該設備的電源。<br>－ 在安裝及架構之時，若非非常熟悉，在開啟裝置蓋子之前，請切斷電源線、電信系統、網路及數據機。<br>－ 在安裝、移動本產品或附加裝置，或開啟其蓋子時，請依照下表中「連接」及「切斷」電纜線的步驟執行。 |

| 連接： | 切斷： |
|---|---|
| 1. 關閉所有開關。 | 1. 關閉所有開關。 |
| 2. 先將所有電纜線接上裝置。 | 2. 先自電源插座拔掉電源線。 |
| 3. 將信號電纜接上接頭。 | 3. 拔掉接頭上的所有信號電纜。 |
| 4. 再將電源線接上電源插座。 | 4. 再拔掉裝置上的所有電纜線。 |
| 5. 開啟裝置的電源。 | |

聲明 2



注意：
更換鋰電池時，只可使用 IBM 零件編號 33F8354 的電池，或製造商建議之相當類型的電池。若系統中具有包含鋰電池的模組，在更換此模組時，請使用相同廠商製造的相同模組類型。如未正確使用、處理或丟棄含有鋰的電池時，可能會引發爆炸。

請勿將電池：
－ 丟入或浸入水中
－ 加熱超過 100 ℃ (212 ℉)
－ 修理或拆開

請遵照當地法令規章處理廢棄電池。

聲明 3



注意：

安裝雷射產品 (如 CD-ROM、DVD 光碟機、光纖裝置或發射器) 時，請注意下列事項：

— 請勿移開蓋子。移開雷射產品的蓋子，您可能會暴露於危險的雷射輻射之下。裝置中沒有需要維修的組件。

— 不依此處所指示的控制、調整或處理步驟，您可能會暴露於危險的輻射之下。



危險

有些雷射產品含有內嵌式 Class 3A 或 Class 3B 雷射二極體。請注意下列事項：

開啟時會產生雷射輻射。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 4



≥ 18 公斤 (37 磅)　≥ 32 公斤 (70.5 磅)　　≥ 55 公斤 (121.2 磅)
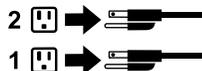
注意：

抬起裝置時，請注意安全措施。

聲明 5



注意：

裝置上的電源控制按鈕及電源供應器上的電源開關均無法關閉裝置上的電流。

本裝置可能有一條以上的電源線。如要移除裝置上的所有電流，請確認所有電源線已與電源分離。

聲明 10



注意：
請勿將任何重量超過 82 公斤 (180 磅) 的物品置於已安裝機架的裝置上方。



**>** 82 公斤 (180 磅)

**Important:**

Toutes les consignes Attention et Danger indiquées dans la bibliothèque IBM documentation sont précédées d'un numéro. Ce dernier permet de mettre en correspondance la consigne en anglais avec ses versions traduites dans la présente section.

Par exemple, si une consigne de type Attention est précédée du chiffre 1, ses traductions sont également précédées du chiffre 1 dans la présente section.

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

Notice n° 1



**DANGER**

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:

- Ne manipulez aucun câble et n'effectuez aucune opération d'installation, d'entretien ou de reconfiguration de ce produit au cours d'un orage.

- Branchez tous les cordons d'alimentation sur un socle de prise de courant correctement câblé et mis à la terre.

- Branchez sur des socles de prise de courant correctement câblés tout équipement connecté à ce produit.

- Lorsque cela est possible, n'utilisez qu'une seule main pour connecter ou déconnecter les câbles d'interface.

- Ne mettez jamais un équipement sous tension en cas d'incendie ou d'inondation, ou en présence de dommages matériels.

- Avant de retirer les carters de l'unité, mettez celle-ci hors tension et déconnectez ses cordons d'alimentation, ainsi que les câbles qui la relient aux réseaux, aux systèmes de télécommunication et aux modems (sauf instruction contraire mentionnée dans les procédures d'installation et de configuration).

- Lorsque vous installez ou que vous déplacez le présent produit ou des périphériques qui lui sont raccordés, reportez-vous aux instructions ci-dessous pour connecter et déconnecter les différents cordons.

| Connexion | Déconnexion |
|---|---|
| 1. Mettez les unités hors tension. | 1. Mettez les unités hors tension. |
| 2. Commencez par brancher tous les cordons sur les unités. | 2. Débranchez les cordons d'alimentation des prises. |
| 3. Branchez les câbles d'interface sur des connecteurs. | 3. Débranchez les câbles d'interface des connecteurs. |
| 4. Branchez les cordons d'alimentation sur des prises. | 4. Débranchez tous les câbles des unités. |
| 5. Mettez les unités sous tension. | |

Notice n° 2

**ATTENTION:**

**Remplacez la pile au lithium 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.**

Notice n° 3

**ATTENTION:**

**Si des produits laser sont installés (tels que des unités de CD-ROM ou de DVD, des périphériques contenant des fibres optiques ou des émetteurs-récepteurs), prenez connaissance des informations suivantes:**

- **N'ouvrez pas ces produits pour éviter une exposition directe au rayon laser. Vous ne pouvez effectuer aucune opération de maintenance à l'intérieur.**
- **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.**
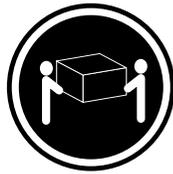
**DANGER**

**Certains produits laser 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.**

Notice n° 4
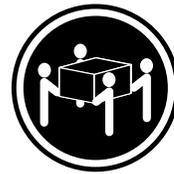




| ≥18 kg | ≥32 kg | ≥55 kg |

**ATTENTION:**

Faites-vous aider pour soulever ce produit.

Notice n° 5



**ATTENTION:**

**Le bouton de mise sous tension/hors tension de l'unité et l'interrupteur d'alimentation du bloc d'alimentation ne coupent pas l'arrivée de courant électrique à l'intérieur de la machine. Il se peut que votre unité dispose de plusieurs cordons d'alimentation. Pour isoler totalement l'unité du réseau électrique, débranchez tous les cordons d'alimentation des socles de prise de courant.**
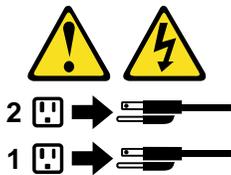


Notice n° 10

**ATTENTION:**

Ne posez pas d'objet dont le poids dépasse 82 kg sur les unités montées en armoire.

**Wichtig:**

Alle Sicherheitshinweise in dieser IBM documentation beginnen mit einer Nummer. Diese Nummer verweist auf einen englischen Sicherheitshinweis mit den übersetzten Versionen dieses Hinweises in diesem Abschnitt.

Wenn z. B. ein Sicherheitshinweis mit der Nummer 1 beginnt, so erscheint die übersetzung für diesen Sicherheitshinweis in diesem Abschnitt unter dem Hinweis 1.

Lesen Sie alle Sicherheitshinweise, bevor Sie eine Anweisung ausführen.

Hinweis 1



**VORSICHT**

Elektrische Spannungen von Netz-, Telefon- und Datenübertragungsleitungen sind gefährlich.

Aus Sicherheitsgründen:

- Bei Gewitter an diesem Gerät keine Kabel anschließen oder lösen. Ferner keine Installations-, Wartungs- oder Rekonfigurationsarbeiten durchführen.
- 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.
- Keine Geräte einschalten, wenn die Gefahr einer Beschädigung durch Feuer, Wasser oder andere Einflüsse besteht.
- Die Verbindung zu den angeschlossenen Netzkabeln, Telekommunikationssystemen, Netzwerken und Modems ist vor dem öffnen des Gehäuses zu unterbrechen. Es sei denn, dies ist in den zugehörigen Installations- und Konfigurationsprozeduren anders angegeben.
- Nur nach den nachfolgend aufgeführten Anweisungen arbeiten, die für Installation, Transport oder öffnen von Gehäusen von Personal Computern oder angeschlossenen Einheiten gelten.

| Kabel anschlieβen: | Kabel lösen: |
|---|---|
| 1. Alle Geräte ausschalten und Netzstecker ziehen. | 1. Alle Geräte ausschalten. |
| 2. Zuerst alle Kabel an Einheiten anschließen. | 2. Zuerst Netzstecker von Steckdose lösen. |
| 3. Signalkabel an Anschlußbuchsen anschließen. | 3. Signalkabel von Anschlußbuchsen lösen. |
| 4. Netzstecker an Steckdose anschließen. | 4. Alle Kabel von Einheiten lösen. |
| 5. Gerät einschalten. | |

Hinweis 2

**ACHTUNG:**

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.

Hinweis 3

**ACHTUNG:**

Wenn ein Laserprodukt (z. B. CD-ROM-Laufwerke, DVD-Laufwerke, Einheiten mit Glasfaserkabeln oder Transmitter) installiert ist, beachten Sie folgendes.

*   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.
*   Steuer- und Einstellelemente sowie Verfahren nur entsprechend den Anweisungen im vorliegenden Handbuch einsetzen. Andernfalls kann gefährliche Laserstrahlung auftreten.

**VORSICHT**

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.

Hinweis 4
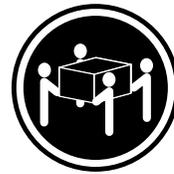
≥18 kg          ≥32 kg          ≥55 kg

**ACHTUNG:**

Beim Anheben der Maschine die vorgeschriebenen Sicherheitsbestimmungen beachten.

Hinweis 5



**ACHTUNG:**

Mit dem Betriebsspannungsschalter an der Vorderseite des Servers und dem Betriebsspannungsschalter am Netzteil 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.
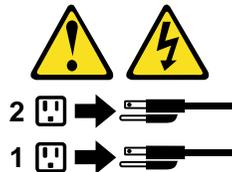


Hinweis 10



**ACHTUNG:**



Keine Gegenstände, die mehr als 82 kg wiegen, auf Rack-Einheiten ablegen.

**Importante:**

Tutti gli avvisi di attenzione e di pericolo riportati nella pubblicazione IBM documentation iniziano con un numero. Questo numero viene utilizzato per confrontare avvisi di attenzione o di pericolo in inglese con le versioni tradotte riportate in questa sezione.

Ad esempio, se un avviso di attenzione inizia con il numero 1, la relativa versione tradotta è presente in questa sezione con la stessa numerazione.

Prima di eseguire una qualsiasi istruzione, accertarsi di leggere tutti gli avvisi di attenzione e di pericolo.

Avviso 1



**PERICOLO**

La corrente elettrica circolante nei cavi di alimentazione, del telefono e di segnale è pericolosa.

Per evitare il pericolo di scosse elettriche:

- Non collegare o scollegare i cavi, non effettuare l'installazione, la manutenzione o la riconfigurazione di questo prodotto durante i temporali.

- Collegare tutti i cavi 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.

- Non accendere qualsiasi apparecchiatura in presenza di fuoco, acqua o se sono presenti danni all'apparecchiatura stessa.

- Scollegare i cavi di alimentazione, i sistemi di telecomunicazioni, le reti e i modem prima di aprire i coperchi delle unità, se non diversamente indicato nelle procedure di installazione e configurazione.

- Collegare e scollegare i cavi come descritto nella seguente tabella quando si effettuano l'installazione, la rimozione o l'apertura dei coperchi di questo prodotto o

  delle unità collegate.

| Per collegare: | Per scollegare: |
|---|---|
| 1. SPEGNERE tutti i dispositivi. | 1. SPEGNERE tutti i dispositivi. |
| 2. Collegare prima tutti i cavi alle unità. | 2. Rimuovere prima i cavi di alimentazione dalle prese elettriche. |
| 3. Collegare i cavi di segnale ai connettori. | 3. Rimuovere i cavi di segnale dai connettori. |
| 4. Collegare i cavi di alimentazione alle prese elettriche. | 4. Rimuovere tutti i cavi dalle unità. |
| 5. ACCENDERE le unità. | |

Avviso 2

**ATTENZIONE:**

Quando si sostituisce la batteria al litio, utilizzare solo una batteria IBM con numero parte 33F8354 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 smontarla

Smaltire secondo la normativa in vigore (D.Lgs 22 del 5/2/9) e successive disposizioni nazionali e locali.

Avviso 3



**ATTENZIONE:**

Quando si installano prodotti laser come, ad esempio, le unità DVD, CD-ROM, a fibre ottiche o trasmettitori, prestare attenzione a quanto segue:

- Non rimuovere i coperchi. L'apertura dei coperchi di prodotti laser può determinare l'esposizione a radiazioni laser pericolose. All'interno delle unità non vi sono parti su cui effettuare l'assistenza tecnica.
- L'utilizzo di controlli, regolazioni o l'esecuzione di procedure non descritti nel presente manuale possono provocare l'esposizione a radiazioni pericolose.



**PERICOLO**

Alcuni prodotti laser contengono all'interno un diodo laser di Classe 3A o Classe 3B. Prestare attenzione a quanto segue:

Aprendo l'unità vengono emesse radiazioni laser. Non fissare il fascio, non guardarlo direttamente con strumenti ottici ed evitare l'esposizione diretta al fascio.

Avviso 4

≥18 kg                    ≥32 kg                    ≥55 kg

**ATTENZIONE:**

Durante il sollevamento della macchina seguire delle norme di sicurezza.

Avviso 5

**ATTENZIONE:**

Il pulsante del controllo dell'alimentazione situato sull'unità e l'interruttore di alimentazione posto sull'alimentatore non disattiva la corrente elettrica fornita all'unità.  L'unità potrebbe disporre di più di un cavo di alimentazione. Per disattivare la corrente elettrica dall'unità, accertarsi che tutti i cavi di alimentazione siano scollegati dalla sorgente di alimentazione.

**2**

**1**
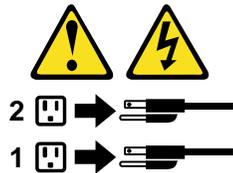
Avviso 10

**ATTENZIONE:**

Non poggiare oggetti che pesano più di 82 kg sulla parte superiore delle unità montate in rack.

경고문 1



위험

전원, 전화 및 통신 케이블로부터 흘러 나오는 전류는
위험합니다.

전기 충격을 피하려면:

- 뇌우를 동반할 때는 케이블의 연결이나 철수, 이 제품의
  설치, 유지보수 또는 재구성을 하지 마십시오.

- 모든 전원 코드를 적절히 배선 및 접지해야 합니다.

- 이 제품에 연결될 모든 장비를 적절하게 배선된 콘센트에
  연결하십시오.

- 가능한한 신호 케이블을 한 손으로 연결하거나
  끊으십시오.

- 화재, 수해 또는 구조상의 손상이 있을 경우 장비를 커지
  마십시오.

- 설치 및 구성 프로시저에 다른 설명이 없는 한, 장치 덮개를
  열기 전에 연결된 전원 코드, 원거리 통신 시스템, 네트워크
  및 모뎀을 끊어 주십시오.

- 제품 또는 접속된 장치를 설치, 이동 및 덮개를 열 때
  다음 설명에 따라 케이블을 연결하거나 끊도록 하십시오.

| 연결하려면: | 연결을 끊으려면: |
|---|---|
| 1. 모든 스위치를 끕니다. | 1. 모든 스위치를 끕니다. |
| 2. 먼저 모든 케이블을 장치에 연결합니다. | 2. 먼저 콘센트에서 전원 코드를 뽑습니다. |
| 3. 신호 케이블을 커넥터에 연결합니다. | 3. 신호 케이블을 커넥터에서 제거합니다. |
| 4. 콘센트에 전원 코드를 연결합니다. | 4. 장치에서 모든 케이블을 제거합니다. |
| 5. 장치 스위치를 켭니다. | |

경고문 2



주의:

리튬 배터리를 교체할 때는 IBM 부품 번호 33F8354 또는 제조업체에서
권장하는 동등한 유형의 배터리를 사용하십시오. 시스템에 리튬 배터리를
갖고 있는 모듈이 있으면 동일한 제조업체에서 생산된 동일한 모듈
유형으로 교체하십시오. 배터리에 리튬이 있을 경우 제대로 사용, 처리
또는 처분하지 않으면 폭발할 수 있습니다.

다음을 주의하십시오.

- 던지거나 물에 담그지 않도록 하십시오.
- 100℃(212℉) 이상으로 가열하지 마십시오.
- 수리하거나 분해하지 마십시오.

지역 법령이나 규정의 요구에 따라 배터리를 처분하십시오.

경고문 3



주의:
레이저 제품(CD-ROMs, DVD 드라이브, 광 장치 또는 트랜스미터 등과
같은)이 설치되어 있을 경우 다음을 유의하십시오.

- 덮개를 제거하지 마십시오. 레이저 제품의 덮개를 제거했을 경우
위험한 레이저 광선에 노출될 수 있습니다. 이 장치 안에는 서비스를
받을 수 있는 부품이 없습니다.

- 여기에서 지정하지 않은 방식의 제어, 조절 또는 실행으로 인해 위험한
레이저 광선에 노출될 수 있습니다.



위험

일부 레이저 제품에는 클래서 3A 또는 클래스 3B 레이저
다이오드가 들어 있습니다. 다음을 주의하십시오.

열면 레이저 광선에 노출됩니다. 광선을 주시하거나 광학 기계를
직접 쳐다보지 않도록 하고 광선에 노출되지 않도록 하십시오.

경고문 4



≥18 kg (37 lbs)     ≥ 32 kg (70.5 lbs)     ≥  55 kg (121.2 lbs)

주의:
기계를 들 때는 안전하게 들어 올리십시오.

경고문 5



주의:
장치의 전원 제어 버튼 및 전원 공급기의 전원 스위치는 장치에
공급되는 전류를 차단하지 않습니다. 장치에 둘 이상의 전원 코드가
연결되어 있을 수도 있습니다. 장치에서 모든 전류를 차단하려면
모든 전원 코드가 전원으로부터 차단되어 있는 지 확인하십시오.



2
1

경고문 10



주의:
서랍형 모델의 장치 상단에 82 kg(180 lbs.)이 넘는 물체를 올려
놓지 마십시오.



**>** 82 kg (180 lbs)

**Importante:**

Todas las declaraciones de precauciín de esta IBM documentation empiezan con un número. Dicho número se emplea para establecer una referencia cruzada de una declaraciín de precauciín o peligro en inglés con las versiones traducidas que de dichas declaraciones pueden encontrarse en esta secciín.

Por ejemplo, si una declaraciín de peligro empieza con el número 1, las traducciones de esta declaraciín de precauciín aparecen en esta secciín bajo Declaraciín 1.

Lea atentamente todas las declaraciones de precauciín y peligro antes de llevar a cabo cualquier operaciín.

Declaración 1



**PELIGRO**

La corriente eléctrica de los cables telefínicos, de alimentaciín y de comunicaciones es perjudicial.

Para evitar una descarga eléctrica:

- No conecte ni desconecte ningún cable ni realice las operaciones de instalaciín, mantenimiento o reconfiguraciín de este producto durante una tormenta.
- Conecte cada cable de alimentaciín a una toma de alimentaciín eléctrica con conexiín a tierra y cableado correctos.
- Conecte a tomas de alimentaciín con un cableado correcto cualquier equipo que vaya a estar conectado a este producto.
- Si es posible, utilice una sola mano cuando conecte o desconecte los cables de sent.al.
- No encienda nunca un equipo cuando haya riesgos de incendio, de inundaciín o de daños estructurales.
- Desconecte los cables de alimentaciín, sistemas de telecomunicaciones, redes y mídems conectados antes de abrir las cubiertas del dispositivo a menos que se indique lo contrario en los procedimientos de instalaciín y configuraciín.
- Conecte y desconecte los cables tal como se describe en la tabla siguiente cuando desee realizar una operaciín de instalaciín, de traslado o de apertura de las cubiertas para este producto o para los dispositivos conectados.

| Para la conexin | Para la desconexiín |
|---|---|
| 1. APÁGUELO todo. | 1. APÁGUELO todo. |
| 2. En primer lugar, conecte los cables a los dispositivos. | 2. En primer lugar, retire cada cable de alimentaciín de la toma de alimentaciín. |
| 3. Conecte los cables de señal a los conectores. | 3. Retire los cables de señal de los conectores. |
| 4. Conecte cada cable de alimentaciín a la toma de alimentaciín. | 4. Retire los cables de los dispositivos. |
| 5. ENCIENDA el dispositivo. | |

Declaración 2

PRECAUCIÓN:

Cuando desee sustituir la batería de litio, utilice únicamente el número de pieza 33F8354 de IBM o cualquier tipo de batería equivalente que recomiende el fabricante. Si el sistema tiene un mídulo que contiene una batería de litio, sustitúyalo únicamente por el mismo tipo de mídulo, que ha de estar creado por el mismo fabricante. La batería contiene litio y puede explotar si el usuario no la utiliza ni la maneja de forma adecuada o si no se desprende de la misma como corresponde.

No realice las acciones siguientes:

- Arrojarla al agua o sumergirla
- Calentarla a una temperatura que supere los 100°C (212°F)
- Repararla o desmontarla

Despréndase de la batería siguiendo los requisitos que exija el reglamento o la legislaciín local.

Declaración 3

PRECAUCIÓN:

Cuando instale productos láser (como, por ejemplo, CD-ROM, unidades DVD, dispositivos de fibra íptica o transmisores), tenga en cuenta las advertencias siguientes:

- No retire las cubiertas. Si retira las cubiertas del producto láser, puede quedar expuesto a radiaciín láser perjudicial. Dentro del dispositivo no existe ninguna pieza que requiera mantenimiento.
- El uso de controles o ajustes o la realizaciín de procedimientos que no sean los que se han especificado aquí pueden dar como resultado una exposiciín perjudicial a las radiaciones.

PELIGRO

Algunos productos láser contienen un diodo de láser incorporado de Clase 3A o de Clase 3B. Tenga en cuenta la advertencia siguiente.

Cuando se abre, hay radiaciín láser. No mire fijamente el rayo ni lleve a cabo ningún examen directamente con instrumentos ípticos; evite la exposiciín directa al rayo.

Declaración 4

≥18 kg (37 libras)    ≥32 kg (70,5 libras)    ≥55 kg (121,2 libras)
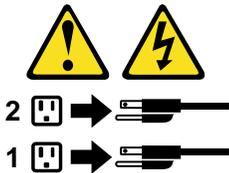
**PRECAUCIÓN:**

Tome medidas de seguridad al levantar el producto.

Declaración 5



**PRECAUCIÓN:**

El botín de control de alimentaciín del dispositivo y el interruptor de alimentaciín de la fuente de alimentaciín no apagan la corriente eléctrica suministrada al dispositivo. Es posible también que el dispositivo tenga más de un cable de alimentaciín. Para eliminar la corriente eléctrica del dispositivo, asegúrese de desconectar todos los cables de alimentaciín de la fuente de alimentaciín.



Declaración 10



**PRECAUCIÓN:**



No coloque ningún objeto que pese más de 82 kg (180 libras) encima de los dispositivos montados en bastidor.

# Send us your comments!

We want to know your opinion about this manual (part number 24P2909). 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?

   _____
   _____
   _____
   _____

   **Thank you for your response!**

# Problem determination tips

Due to the variety of hardware and software combinations that can be encountered, use the following information to assist you in problem determination. If possible, have this information available when requesting assistance from Service Support and Engineering functions.

- Machine type and model
- Processor or hard disk upgrades
- Failure symptom
  - Do diagnostics fail?
  - What, when, where, single, or multiple systems?
  - Is the failure repeatable?
  - Has this configuration ever worked?
  - If it has been working, what changes were made prior to it failing?
  - Is this the original reported failure?
- Reference/Diagnostics version
  - Type and version level
- Hardware configuration
  - Print (print screen) configuration currently in use
  - BIOS level
- Operating system software
  - Type and version level

**Note:** 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.

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Part Number: 24P2909
File Number:

24P2909