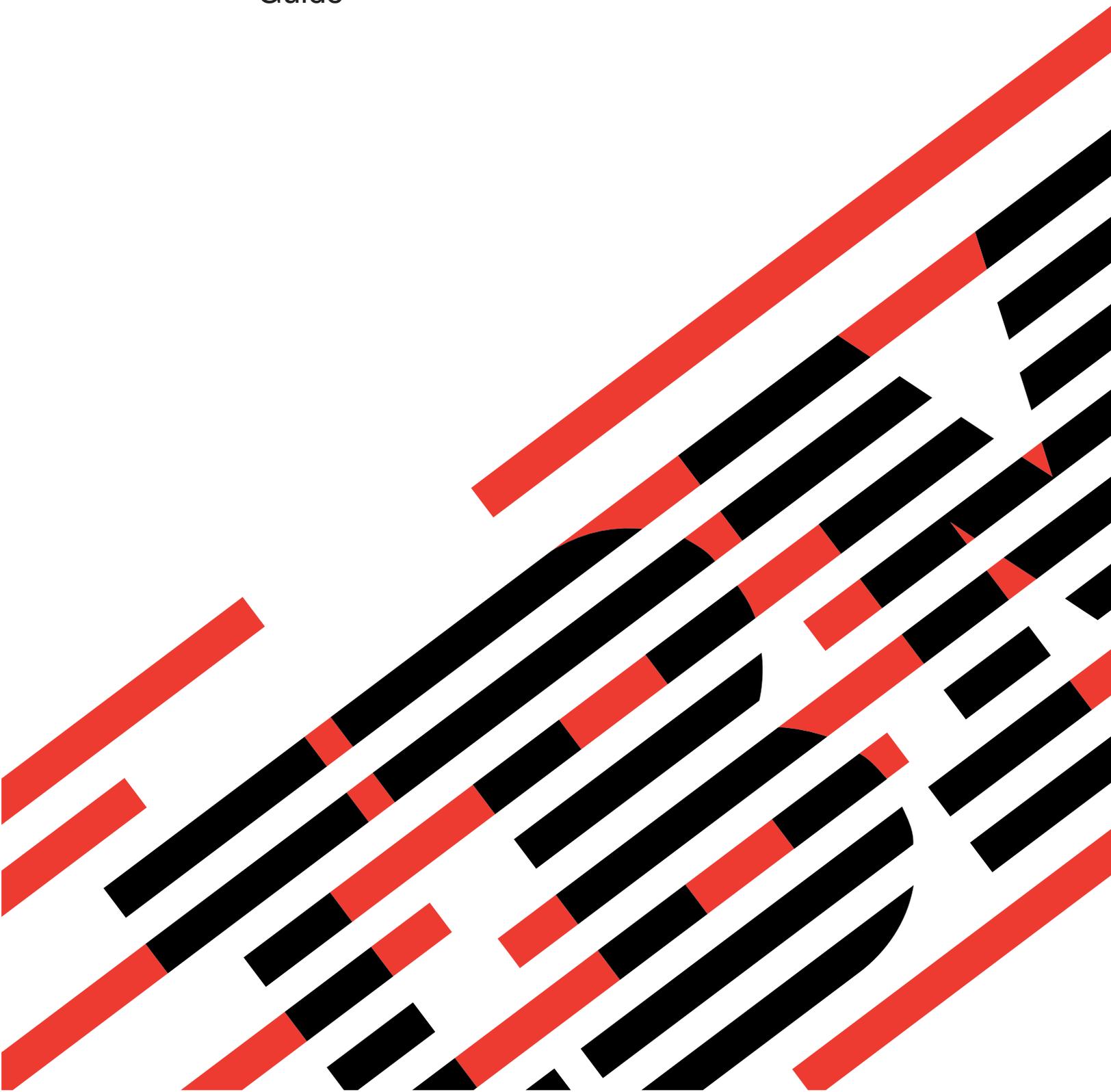
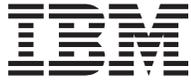


IBM xSeries 450
Type 8688

Hardware Maintenance Manual and Troubleshooting Guide





@server

IBM xSeries 450
Type 8688

Hardware Maintenance Manual and Troubleshooting
Guide

Note

Before using this information and the product it supports, read Appendix C, "Notices," on page 237.

Fifth Edition (February 2004)

The most recent version of this document is available on the World Wide Web at <http://www.ibm.com/pc/support>.

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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® 450 Type 8688 server.

Important: The field replaceable unit (FRU) procedures are intended for trained servicers who are familiar with IBM products. Before servicing an IBM product, be sure to review “Safety information” on page 197.

Important safety information

Be sure to read all caution and danger statements in this book before performing any of the instructions. See “Safety information” on page 197.

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

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

安裝本產品之前，請先閱讀「安全資訊」。

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.

製品の設置の前に、安全情報をお読みください。

본 제품을 설치하기 전에 안전 정보를 읽으십시오.

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

WARNING: Handling the cord on this product or cords associated with accessories sold with this product will expose you to lead, a chemical known to the State of California to cause cancer, and birth defects or other reproductive harm. **Wash hands after handling.**

ADVERTENCIA: El contacto con el cable de este producto o con cables de accesorios que se venden junto con este producto, pueden exponerle al plomo, un elemento químico que en el estado de California de los Estados Unidos está considerado como un causante de cancer y de defectos congénitos, además de otros riesgos reproductivos. **Lávese las manos después de usar el producto.**

Online support

You can download the most current diagnostic, system abstraction layer/extensible firmware interface (SAL/EFI) flash, and device driver files from <http://www.ibm.com/pc/support> on the World Wide Web.

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Chapter 1. General information

Your IBM @server xSeries 450 Type 8688 server is a high-performance symmetric multiprocessing (SMP) server. It is ideally suited for networking environments that require superior microprocessor performance, efficient memory management, flexibility, and reliable data storage.

The xSeries 450 server contains several IBM X-Architecture™ technologies, which help increase server performance and reliability.

Your server comes with a limited warranty. If you have access to the World Wide Web, you can obtain up-to-date information about your server model and other IBM server products at <http://www.ibm.com/pc/us/eserver/xseries/>.

Your server serial number and model number are on the ID label located on the left side of the bezel just above the hard disk drives. You will need these numbers when you register your server with IBM. The information label containing the serial number, machine type, model number, and agency marks for your server is on the bottom of the server.

Related publications

This *Hardware Maintenance Manual and Troubleshooting Guide* contains information to help you solve the problem yourself or to provide helpful information to a service technician.

In addition to this *Hardware Maintenance Manual and Troubleshooting Guide*, the following xSeries 450 Type 8688 documentation is provided with your server:

- *Installation Guide*
This printed publication contains setup and installation instructions.
- *Rack Installation Instructions*
This printed publication contains the instructions to install your server in a rack.
- *Safety Book*
This multilingual publication is provided in Portable Document Format (PDF) on the IBM *xSeries Documentation CD*. It contains translated versions of the caution and danger statements that appear in the documentation for your server. Each caution and danger statement has an assigned number, which you can use to locate the corresponding statement in your native language.
- *User's Guide*
This publication is provided in PDF on the IBM *xSeries Documentation CD*. It contains general information about your server, including information about features, how to configure your server, and how to get help.
- *Option Installation Guide*
This publication is provided in PDF on the IBM *xSeries Documentation CD*. It contains instructions to install, remove, and connect optional devices supported by your server.

Depending on your server model, additional publications might be included on the IBM *xSeries Documentation CD*.

Notices and statements in this book

The caution and danger statements used in this book also appear in the multilingual *Safety Information* book provided on the IBM *xSeries Documentation* CD. Each caution and danger statement is numbered for easy reference to the corresponding statements in the safety book.

The following types of notices and statements are used in this book:

- **Note:** These notices provide important tips, guidance, or advice.
- **Important:** These notices provide information or advice that might help you avoid inconvenient or problem situations.
- **Attention:** These notices indicate possible damage to programs, devices, or data. An attention notice is placed just before the instruction or situation in which damage could occur.
- **Caution:** These statements indicate situations that can be potentially hazardous to you. A caution statement is placed just before the description of a potentially hazardous procedure step or situation.
- **Danger:** These statements indicate situations that can be potentially lethal or extremely hazardous to you. A danger statement is placed just before the description of a potentially lethal or extremely hazardous procedure step or situation.

Features and specifications

The following table provides a summary of the features and specifications of your xSeries 450.

<p>Microprocessor:</p> <ul style="list-style-type: none"> • Intel[®] Itanium[®] 2 900 MHz or higher, depending on server model • 1.5 MB (minimum) Level-3 cache • 200 MHz front-side bus (FSB), at two data transfers per cycle, yielding a 400 MHz system bus (minimum) • Support for up to four microprocessors • XceL4[™] Server Accelerator Cache: 64 MB <p>Active Memory[™]:</p> <ul style="list-style-type: none"> • Minimum: 1 GB • Maximum: 40 GB • Type: 2-way interleaved PC2100, ECC DDR SDRAM, registered DIMMs only • Supports 512 MB, 1 GB, and 2 GB dual inline memory modules (DIMMs) <p>Drives standard:</p> <p>DVD/CD-RW: IDE</p> <p>Expansion bays:</p> <ul style="list-style-type: none"> • Two removable media bays (one DVD/CD-RW preinstalled) • Supports up to two internal Ultra320 SCSI hard disk drives <p>Active[™] PCI-X expansion slots:</p> <p>Six 64-bit Active PCI-X expansion slots:</p> <ul style="list-style-type: none"> • Two 66 MHz PCI-X slots • Two 100 MHz PCI-X slots • Two 133 MHz PCI-X slots <p>Cooling:</p> <p>Four hot-swap fans</p> <ul style="list-style-type: none"> • Two 150 mm x 51 mm fans • Two 150 mm x 38 mm fans <p>Acoustical noise emissions:</p> <ul style="list-style-type: none"> • Declared sound power, idle: 6.5 bels • Declared sound power, operating: 6.5 bels • Bystander sound pressure, idle: 49 dBa • Bystander sound pressure, operating: 49 dBa 	<p>Power supply:</p> <p>Two power supplies: 550 watts at 100-127 V ac or 1050 watts at 200-240 V ac (hot-swappable and redundant at 200-240 V ac only)</p> <p>Video:</p> <ul style="list-style-type: none"> • Integrated ATI RageXL video • PCI bus interface • Compatible with SVGA • 8 MB SDRAM video memory <p>Size (4 U):</p> <ul style="list-style-type: none"> • Height: 17.8 cm (7 inches, 4 U) • Depth: 69.85 cm (27.5 inches) • Width: 48.3 cm (19 inches) • Maximum weight: 38.6 kg (85 lb), depending on your configuration <p>Integrated functions:</p> <ul style="list-style-type: none"> • Broadcom 5704 10/100/1000 dual port Ethernet controller • Light Path Diagnostics[™] • One external and one internal Ultra320 SCSI port (dual-channel integrated controller with RAID capabilities) • Remote Supervisor Adapter (service processor) <ul style="list-style-type: none"> – ASM interconnect (peer-to-peer) port – Ethernet port – Serial port • IDE controller • RXE Management port • RXE Expansion ports • Three USB ports • SCSI ports • Serial port • Wake on LAN[®] <p>Environment:</p> <ul style="list-style-type: none"> • Air temperature: <ul style="list-style-type: none"> – Server on: 10° to 35°C (50.0° to 95.0°F). Altitude: 0 to 914 m (2998.7 ft) – Server on: 10° to 32°C (50.0° to 89.6°F). Altitude: 0 to 2133 m (6998.0 ft) – Server off: -40° to 60°C (-104° to 140°F). Maximum altitude: 2133 m (6998.0 ft) • Humidity: <ul style="list-style-type: none"> – Server on: 8% to 80% – Server off: 5% to 100% 	<p>Heat output:</p> <p>Approximate heat output in British thermal units (Btu) per hour</p> <ul style="list-style-type: none"> • Minimum configuration: 854 Btu (250 watts) • Maximum configuration: 2646 Btu (775 watts) <p>Electrical input:</p> <ul style="list-style-type: none"> • Sine-wave input (50-60 Hz) required • Input voltage low range: <ul style="list-style-type: none"> – Minimum: 100 V ac – Maximum: 127 V ac • Input voltage high range: <ul style="list-style-type: none"> – Minimum: 200 V ac – Maximum: 240 V ac • Input kilovolt-amperes (kVA) approximately: <ul style="list-style-type: none"> – Minimum: 0.250 kVA – Maximum: 1.3 kVA <p>Notes:</p> <ol style="list-style-type: none"> 1. Power consumption and heat output vary depending on the number and type of optional features installed and the power-management optional features in use. 2. These levels were measured in controlled acoustical environments according to the procedures specified by the American National Standards Institute (ANSI) S12.10 and ISO 7779 and are reported in accordance with ISO 9296. Actual sound-pressure levels in a given location might exceed the average values stated because of room reflections and other nearby noise sources. The declared sound-power levels indicate an upper limit, below which a large number of computers will operate.
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What your IBM xSeries 450 offers

Your server includes the following features and technologies:

- **IBM Enterprise X-Architecture technology**

Enterprise X-Architecture technology combines proven, innovative IBM designs to make your Intel-processor-based server powerful, scalable, and reliable. For more information, go to

<http://www.ibm.com/pc/us/eserver/xseries/xarchitecture/enterprise/index.html> on the World Wide Web.

- **Active Memory**

The Active Memory feature improves the reliability of memory through memory mirroring, memory scrubbing, and the Memory ProteXion™ feature. For more information, see the *User's Guide*.

- **Large system memory**

The memory bus supports up to 40 GB of system memory. The memory controller provides error code correcting (ECC) support for up to 28 industry-standard PC2100, 2.5 V, 184-pin, 133 megahertz (MHz), registered, double data rate (DDR), synchronous dynamic random access memory (SDRAM) dual inline memory modules (DIMMs).

- **Xcel4™ Server Accelerator Cache**

The Xcel4 Server Accelerator Cache provides 64 MB of external Level-4 cache, which increases effective memory bandwidth.

- **Light Path Diagnostics feature**

The Light Path Diagnostics feature provides LEDs to help you isolate problems. For more information, see “Light Path Diagnostics feature” on page 36.

- **System-management capabilities**

The server comes with a Remote Supervisor Adapter installed in a dedicated connector. This adapter, in conjunction with the system-management software that comes with the server, enables you to manage the functions of the server locally and remotely. The Remote Supervisor Adapter also provides system monitoring, event recording, and dial-out alert capability.

- **Integrated network support**

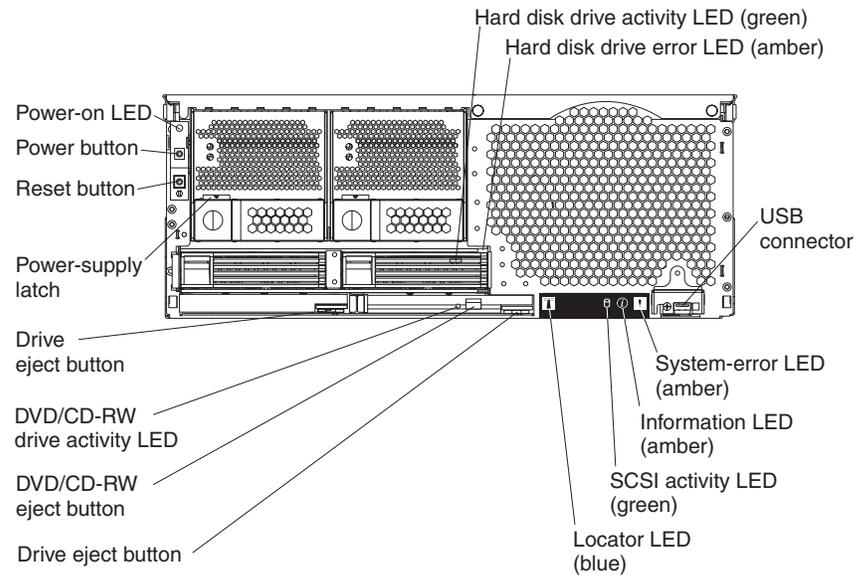
Your server comes with an integrated Broadcom Gigabit Ethernet controller, which supports connection to a 10-Mbps, 100-Mbps, or 1000-Mbps network. For more information, see “Configuring the Gigabit Ethernet controller” on page 31.

Server controls and indicators

The following section identifies the controls and indicators on the front and rear of your server.

Note: Illustrations in this document might differ slightly from your hardware.

Front view



Power-on LED: This green LED turns on and stays on when you turn on your server, and it flashes when the server is in Standby mode.

Hard disk drive activity LED: When this green LED is lit, it indicates that the hard disk drive is in use.

Hard disk drive error LED: On some server models, each hot-swap hard disk drive has an error LED. The interpretation of a flashing error LED depends on the SCSI controller connected to the hot-swap drive. When the drive is connected to the integrated SCSI controller with RAID capabilities, a flashing error LED indicates that the drive is a secondary drive in a mirrored pair and the drive is being synchronized.

USB connector: This is an automatically configured port that you can use to connect one or more USB devices to the front of the server, using Plug and Play technology.

System-error LED: When this amber LED is lit, it indicates that a system error has occurred.

Information LED: When this amber LED is lit, it indicates that information about a system error has been placed in the system-error log.

SCSI activity LED: When this green LED is lit, it indicates that there is activity on the SCSI bus.

Locator LED: This blue LED is used to help you locate other devices connected to the server.

Drive-eject button: Push this button to release a drive from the server.

DVD/CD-RW eject button: Push this button to release a DVD or CD from the drive.

DVD/CD-RW drive activity LED: When this LED is lit, it indicates that the DVD/CD-RW drive is in use.

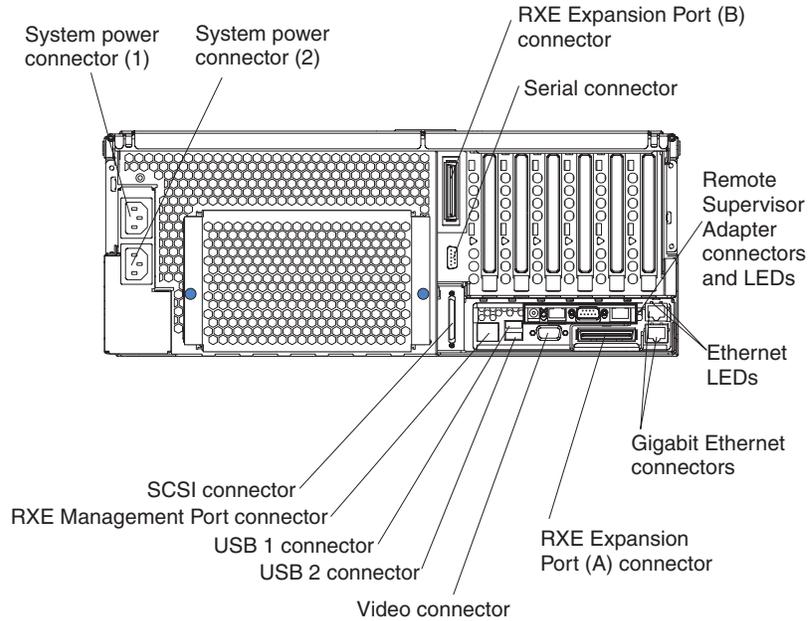
Drive-eject button: Push this button to release a drive from the server.

Power-supply latch: This latch is used to secure the power supply in place.

Reset button: Press this button to reset the server and run the power-on self-test (POST). You might need to use a pen or the end of a straightened paper clip to press the button.

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

Rear view

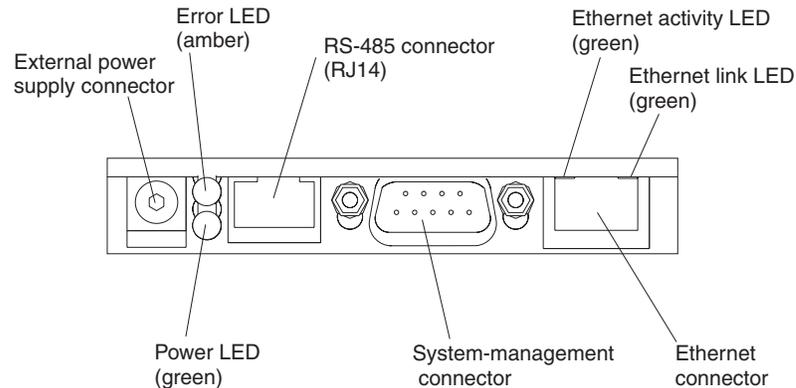


System power connectors (1 and 2): The system power cords are connected to these two connectors to provide power to the system.

RXE Expansion Port B connector: Use this port to connect the server to a remote input/output (I/O) enclosure.

Serial connector: The signal cable for a system console or other serial device connects to the serial port.

Remote Supervisor Adapter connectors and LEDs: This group of ports and indicators on the back of the server are used for system-management information and control.



- **External power-supply connector:** This connector is not supported on this server.
- **Error LED:** This amber LED is lit when a system-management error has occurred.
- **RS-485 connector:** Signal cables for managing expansion module resources are attached to this connector.
- **Ethernet activity LED:** This green LED is lit when there is activity on the Ethernet LAN attached to the Ethernet connector.
- **Ethernet link LED:** This green LED is lit when there is an active link connection on the Ethernet controller for the Ethernet port.
- **Ethernet connector:** Ethernet signal cables are attached to the Ethernet connector.
- **System-management connector:** Signal cables for modems or other serial devices are attached to this connector.
- **Power LED:** This green LED goes on and stays on when you plug in your server.

Ethernet LEDs: These LEDs are lit green when there is an active link connection on the Gigabit Ethernet controller and flash amber when there is activity on the Ethernet LAN.

Gigabit Ethernet connectors: Gigabit Ethernet signal cables are connected to the Gigabit Ethernet ports. These ports support 10/100/1000 Mbps data transfer rates.

RXE Expansion Port A connector: Use this connector to attach the server to a remote I/O enclosure.

Video connector: The signal cable for a monitor attaches to the video connector.

USB 2 connector: This is an automatically configured port that you can use to attach one or more USB devices to the server, using Plug and Play technology.

USB 1 connector: This is an automatically configured port that you can use to attach one or more USB devices to the server, using Plug and Play technology.

RXE Management Port connector: Use this connector to attach a management cable from the server to a remote I/O enclosure.

SCSI connector: This connector is used to attach external SCSI devices to the server.

Server power features

When the server is connected to an ac power source but is not turned on, the operating system does not run, and all core logic except for the service processor is shut down; however, the server can respond to requests from the service processor, such as a remote request to turn on the server. The power-on LED flashes to indicate that the server is connected to ac power but is not turned on.

Turning on the server

Approximately 20 seconds after the server is connected to ac power, the power-control button becomes active, and you can turn on the server and start the operating system by pressing the power-control button. The server can also be turned on in any of the following ways:

- If a power failure occurs while the server is turned on, the server will restart automatically when power is restored.
- If ac power is present, the server can be turned on from the Remote Supervisor Adapter user interface.
- The Wake on LAN feature can turn on the server.

Notes:

1. The power supplies are hot-swappable and redundant only at 200-240 V ac.
2. Both power supplies must be connected to the power source for operation at 100-127 V ac.
3. During normal operation, both power supplies must be installed for proper operation.
4. While the server is powering up, the power-on LED on the front of the server is lit. When the server is connected to ac power but is not turned on, the power-on LED on the front of the server flashes.

Turning off the server

When you turn off the server and leave it connected to ac power, the server can respond to requests from the service processor, such as a remote request to turn on the server. To remove all power from the server, you must disconnect it from the power source.

Some operating systems require an orderly shutdown before you turn off the server. See your operating-system documentation for information about shutting down the operating system.

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.



The server can be turned off in any of the following ways:

- You can turn off the server from the operating system, if your operating system supports this feature. After an orderly shutdown of the operating system, the server will be turned off automatically.
- You can press the power-control button to start an orderly shutdown of the operating system and turn off the server if your operating system supports this feature.
- If the operating system stops functioning, you can press and hold the power-control button for more than 4 seconds to turn off the server.
- If the server is connected to an Advanced System Management interconnect network, the server can be turned off from the Remote Supervisor Adapter user interface.

Notes:

1. You might need to press and hold the power-control button for more than 4 seconds to cause an immediate shutdown of the server. You can use this feature if the operating system stops functioning.
2. If you disconnect the server from the power source, wait approximately 15 seconds for the server to stop running before you open the cover. Watch for the power-on LED on the front of the server to stop flashing.

Chapter 2. Configuring the server

The following configuration programs and capabilities come with your server:

- **Extensible Firmware Interface (EFI) Boot Manager program**

This program controls the startup environment. You can use this program to configure startup options, such as starting the server to an operating system on the network or on media, or to the EFI Boot Maintenance Manager main menu. See “Using the Extensible Firmware Interface (EFI) Boot Manager” for more information.

- **Configuration/Setup Utility program**

This program is an EFI utility that comes with your server. You can use this program to set the date and time and to set passwords. See “Using the Configuration/Setup Utility program” on page 12 for more information.

- **LSI Logic Configuration Utility program**

With the built-in LSI Logic Configuration Utility program, you can configure the integrated SCSI controller and the devices that are attached to it. See “Using the LSI Logic Configuration Utility program” on page 15 for more information.

- **Remote Supervisor Adapter configuration process**

See “Setting up the Remote Supervisor Adapter” on page 16 for information about setting up and cabling the Remote Supervisor Adapter for use with an Advanced System Management (ASM) network.

- **Ethernet controller configuration process**

To configure the integrated Ethernet controller, see “Configuring the Gigabit Ethernet controller” on page 31.

Using the Extensible Firmware Interface (EFI) Boot Manager

You can use the EFI Boot Manager to configure a variety of start options, including starting to an external device or to a specific file. The following table provides a summary of the selections available from the EFI Boot Maintenance Manager main menu.

Selection	Description
Boot from a file	Automatically adds EFI applications as start options, or you can start the server from a specific file.
Add a boot option	Adds a start option to the EFI Boot Manager. You specify the option by providing the name of the EFI application.
Delete boot options	Deletes a specific start option or all start options.
Change boot order	Controls the relative order in which the EFI Boot Manager attempts start options.
Manage boot next setting	Defines a start option to use one time (the next start operation).
Set automatic boot timeout value	Defines the amount of time before the server automatically starts without user intervention.
Select active console output devices	Displays the list of available console output devices, as contained in the ConOutDev list. You can select output console devices from the list.
Select active console input devices	Displays the list of available console input devices, as contained in the ConInDev list and the subset detailed in the ConIn variable.

Selection	Description
Select active error devices	Displays the list of available error devices as contained in the ErrOutDev list and the subset detailed in the ErrOut variable.
Cold reset	Performs a platform-specific cold reset of the server. Note: A cold reset typically is a full-platform reset.
Exit	Returns control to the EFI Boot Manager startup options. This will display the active start devices.

Complete the following steps to start the EFI Boot Manager and access the EFI Boot Maintenance Manager main menu:

1. Turn on the server.
2. From the EFI Boot Manager startup options, select the EFI Boot Maintenance Manager main menu.
3. Follow the instructions that appear on the screen.

Using the Configuration/Setup Utility program

Use the Configuration/Setup Utility program to:

- Enable memory mirroring
- Set the date and time
- Set passwords

The following sections provide instructions for starting the Configuration/Setup Utility program and descriptions of the menu choices that are available.

Starting the Configuration/Setup Utility program

Complete the following steps to start the Configuration/Setup Utility program:

1. Turn on the server.
2. From the EFI Boot Manager startup options, select the Configuration/Setup Utility program.
3. Follow the instructions that appear on the screen.

Configuration/Setup Utility menu choices

The following choices are on the Configuration/Setup Utility main menu. Depending on the version of the system abstraction layer/extensible firmware interface (SAL/EFI) code in your server, some menu choices might differ slightly from these descriptions.

- **System Summary**

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

- **System Information**

- **System Product Data**

Select this choice to view system information, such as the machine type and model, the server serial number, and the revision level, date, and build level of the SAL/EFI code, diagnostic code, and ASM adapter code.

- **System Card Data**

Select this choice to view identifying information about the PCI-X board, processor board, memory board, power supplies, hard disk drive backplane, and power backplane.

- **Devices and I/O Ports**

Select this choice to view information about, enable, or disable the integrated SCSI and Ethernet controllers.

Notes:

1. The default setting is **Enable** for all of the controllers. If you select **Disable**, the system will not configure the disabled device, and the operating system will not detect the device. (This is equivalent to unplugging the device.)
2. If the integrated SCSI controller is disabled and no other controller for a mass storage device is installed, operating-system startup cannot occur.

- **Date and Time**

Select this choice to set the system date and time and to change the system time that is sent to the Remote Supervisor Adapter when the server is started.

The system time is in a 24-hour format (hour:minute:second). All fields are required.

- **System Security**

Select this choice to set or change the power-on or administrator password. See “Passwords” on page 14 for more information.

The Remote Control Security Settings menu is located in System Security. This menu is used to set the Failed Login Threshold and the Automatic Lockout Delay. You can also use this menu to save, change, or delete a remote-control password.

- **Advanced Setup**

Select this choice to change values for advanced hardware features, such as memory configuration, cache control, PCI configuration, and system-management settings.

- **Memory Configuration**

Select this choice to manually enable a set, or bank, of four DIMMs used for memory mirroring and to enable memory mirroring.

If a memory error is detected during POST or memory configuration, the server can automatically disable the failing DIMM bank and continue operating with reduced memory capacity. If this occurs, you must manually enable the DIMM bank after the problem is corrected. Use the arrow keys to highlight the bank that you want to enable. Press Enter to view detailed information about your selection; then, use the arrow keys to select **Enable**.

- **Cache Control**

Select this choice to enable or disable the Xcel4 cache.

- **PCI Slot Information**

Select this choice to configure and view information about the PCI-X slots and devices in your server and those located in the remote expansion enclosure, if one is attached.

- **System Management Settings**

Select this choice to set the server to restart automatically after a nonmaskable interrupt (NMI) occurs. You can also enable the system to assign the memory mapped I/O (MMIO) above 4 GB.

- **System Event and Error Log**

Select this choice to view or clear the system-error log and enable or disable debug options. Use the debug options to define the severity level of messages viewable during POST.

- Select **View System Error Log** to view the system-error log. The system-error log contains all the system error and warning messages that the server has generated. You can use the arrow keys to move between pages in the system-error log.
- Select **Clear System Error Log** to clear the system-error log.

- **Save Settings**

Select this choice to save your customized settings (except PCI-X Slot Information changes, the date and time, and password settings).

- **Save Settings and Reboot**

Select this choice to save your customized settings (except PCI-X Slot Information changes, the date and time, and password settings), and restart the server.

- **Restore Settings**

Select this choice to delete your changes (except PCI-X Slot Information changes, the date and time, and password settings), and restore the previous settings.

- **Load Default Settings**

Select this choice to restore the factory settings (except PCI-X Slot Information changes, the date and time, and password settings).

- **Exit Setup**

If you have made any changes and not saved them (except PCI-X Slot Information changes, the date and time, and password settings), the program will prompt you to save the changes or exit without saving the changes.

Passwords

After you select this choice, you can set a power-on password or an administrator password.

Power-on password: You can use any combination of up to seven characters (A–Z, a–z, and 0–9) for your power-on password. Keep a record of your password in a secure place. When a power-on password is set, POST does not complete until you type the password. If you forget the power-on password, you can regain access to the server through one of the following methods:

- Remove the battery and then reinstall the battery (see “Replacing the battery” on page 109).
 - Attention:** Before changing any switch settings or moving any jumpers, turn off the server and peripheral devices, and disconnect all power cords and external cables.
- Move the jumper on J20 to positions 2 and 3, and restart the server to remove the power-on password. Restart the server, and start the Configuration/Setup Utility program to change the power-on password. For detailed instructions, see “Clearing a power-on password” on page 72.

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 user to change a power-on

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

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

Using the LSI Logic Configuration Utility program

The LSI Logic Configuration program is a built-in, menu-driven configuration utility program. You can use it to:

- Configure a redundant array of independent disks (RAID)
- Perform a low-level format on a hard disk
- Set the SCSI device scan order
- Set the SCSI ID for a controller

Notes:

1. The integrated SCSI controller with RAID capabilities in your server supports RAID level 1 operation; however, you might need to download an updated release of the system abstraction layer/extensible firmware interface (SAL/EFI) code for the firmware and device driver to provide support for RAID level 1. To download the updated LSI SCSI controller device driver with support for RAID Level 1, when available, go to <http://www.ibm.com/pc/support/> on the World Wide Web.
2. You must configure your SCSI controller with RAID capabilities *before* you install your operating system. If the hard disk has been previously partitioned, run DISKPART.EFI after mirroring but before installing the operating system to completely remove the previous partition table. A pointer to DISKPART.EFI can be found on the *Resource* CD that comes with the server.
3. If you install a different type of RAID adapter in your server, use the configuration method supplied with the RAID adapter to view or change SCSI settings for attached devices.
4. The internal hard disk drives can connect only to the integrated SCSI controller with RAID capabilities.

Complete the following steps to start the LSI Logic Configuration Utility program:

1. Turn on the server, and watch the monitor screen.
2. From the EFI Boot Manager startup options, select **EFI Shell [Built-In]**, and press Enter.
3. Type `drivers -b` to display the device driver handle identifiers. Note the device driver handle identifier in the far left column for the LSI Logic Ultra320 SCSI device driver.
4. Type `drvcfg drv` to display the controller identifiers. Note the controller identifier for the LSI Logic Ultra320 SCSI device driver.
5. Type `drvcfg drv ctrl -s` to run the utility (where *drv* is the device driver handle identifier and *ctrl* is the controller identifier).
6. Type `drvcfg /?` for help.

You can use the LSI Logic Configuration Utility program to perform a low-level format on a SCSI hard disk drive. Complete the following steps to format a drive:

1. Select the controller channel for the drive from the list of adapters.
2. Select **Device Properties**.

3. Use the arrow keys to select the drive to format.
Attention: Low-level formatting removes all data from the hard disk. If there is data you want to save, back up the hard disk before continuing this procedure.
4. Use the arrow keys or the End key to scroll to the right.
5. Select **Format**, and press Enter to start.

Setting up the Remote Supervisor Adapter

This section describes the Remote Supervisor Adapter features and setup requirements. It also explains how to cable and configure the adapter for use on an Advanced System Management (ASM) network so that you can manage the server from a remote location. For more detailed information, see the *Remote Supervisor Adapter User's Guide* on the IBM xSeries Documentation CD.

Remote Supervisor Adapter features

The Remote Supervisor Adapter has the following features:

- Continuous health monitoring and control
- Advanced Predictive Failure Analysis[®] (PFA)
- Configurable notification and alerts
- Time-stamped event logs that can be saved in nonvolatile memory and attached to e-mail alerts
- Remote graphics console redirection
- LAN, serial, and Advanced System Management (ASM) interconnect remote access
- Point-to-point protocol (PPP) support
- Simple Network Management Protocol (SNMP)
- Domain Name System (DNS) and Dynamic Host Configuration Protocol (DHCP) support
- Remote power control
- Microsoft[®] Windows[®] Server 2003, Enterprise Edition (64-bit) blue-screen capture
- Remote firmware update and access to critical server settings
- Optional, independent power, which enables around-the-clock access to the server, even if the server is turned off

Setup requirements

Before you set up the Remote Supervisor Adapter, you must download the EFI Remote Supervisor Utility program from <http://www.ibm.com/pc/support/> on the World Wide Web, and create a CD.

You might need to enable the server to use the CD creation feature to create the Remote Supervisor Utility CD. If you have Microsoft Windows Server 2003, complete the following steps to enable the CD creation feature.

Note: You cannot copy an ISO image or make a CD that recognizes the El Torito format using the CD creation feature.

1. Right-click **My Computer**.
2. Click **Manage**.
3. Double-click **Services and Applications**.
4. Double-click **IMAPI CD-Burning COM Service**.

5. Click **Manual** for **Startup Type**.
6. Click **OK** to close the window.
7. Log off Windows Explorer, and logon again.

To copy an ISO image to a CD using SuSe Linux, type `cdrecord -v dev=b, t, l <ISO-image-file>` in the command prompt, where `b` is the SCSI bus, `t` is the target device, and `l` is the logical unit number (LUN) for your DVD/CD-RW device.

To determine the appropriate SCSI bus, the target device, and the LUN for the DVD/CD-RW for the device, type `cdrecord -scanbus`, and press Enter.

You might need to add a startup option in the `elilo.conf` file to enable IDE to SCSI emulation. If the IDE DVD/CD-RW drive is the first IDE device in your startup order, complete the following steps:

1. Add the following startup option to the stanza for the kernel you are starting up: `append="hda=ide-scsi"`, and restart the server.
2. When the server starts up, type `# lsmod`, and look for `ide-scsi` in the list of modules currently loaded to verify that the IDE to SCSI driver is loaded.
3. If the IDE to SCSI driver is not loaded, type `insmod ide-scsi` to manually load the driver.

Complete the following tasks before you set up the Remote Supervisor Adapter:

- Install the operating system on the server, using the documentation that comes with the operating system.
- Ensure that the remote alert recipients are IBM Director-enabled servers with UM Server Extensions, if you are configuring remote alert recipients for Director over LAN or Director over modem.
- If you want to use a Web browser to access the Remote Supervisor Adapter remotely, ensure that your Web browser meets the following requirements:
 - Microsoft Internet Explorer 4.0 (with Service Pack 1) or later
 - Netscape Navigator 4.72 or later (version 6.0 is not currently supported)
 - Java™ enabled Web browser (see your browser documentation or online help for instructions for enabling its Java support)
 - Support for JavaScript™ 1.2 or later (see your browser documentation or online help for instructions for enabling its JavaScript support)
 - Support of HTTP version 1.0 or later
 - Minimum display resolution of 800 x 600 pixels and 256 colors

Note: The ASM Web interface and the ASM text-based interface do not support the double-byte character set (DBCS) languages.

Cabling and configuring the Remote Supervisor Adapter

Complete the following tasks to cable and configure the Remote Supervisor Adapter.

Note: After you initially configure the adapter, use the Web-based interface to create a backup copy of the configuration. If you need to replace the adapter in the future, you can use the backup copy to restore the configuration and resume normal operation more quickly. See the *Remote Supervisor Adapter User's Guide* on the IBM xSeries Documentation CD for details.

- Task 1.** Connect the Ethernet and serial port cables. See “Cabling the Ethernet LAN port and serial port.”
- Task 2.** Perform the initial configuration to enable remote access to the Remote Supervisor Adapter. See “Enabling remote access to the adapter” on page 20. Completing this task enables you to:
1. Configure the Ethernet port
 2. Configure the serial (COM) port
 3. Set up the point-to-point protocol
- Task 3.** Configure the remote-control password to enable the ASM Web interface remote-control features. See “Configuring the remote-control password” on page 25.
- Task 4.** Install the ASM device drivers. See “Installing Advanced System Management device drivers” on page 25.

For service, assistance, or additional information, see Appendix A, “Getting help and technical assistance,” on page 195.

Cabling the Ethernet LAN port and serial port

You can manage the server remotely through the Remote Supervisor Adapter using one of the user interfaces and one of the connection methods that are described in Table 1 on page 19. Perform the cabling procedure for the interface method you want to use.

If you plan to set up an ASM interconnect network, before you begin cabling the server, see “Using the ASM interconnect network” on page 26 for instructions for cabling the ASM interconnect port and setting up the network. You might want to review the information in “ASM interconnect network configuration examples” on page 28 before you connect the cables. Then, return here to start the cabling procedures.

Table 1. Cabling tasks to enable remote access to the Remote Supervisor Adapter

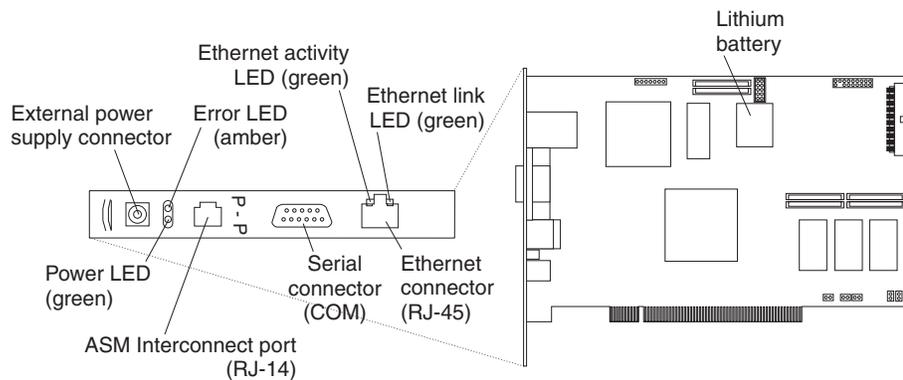
User interface to Remote Supervisor Adapter	Connection to Remote Supervisor Adapter	For the cabling procedure, see
ASM Web interface using the HTTP protocol	LAN using the Ethernet port	“Cabling the Ethernet LAN port” on page 19
Text-based user interface using the Telnet protocol		
Text-based user interface using a modem or a null modem	Serial (COM) port	“Cabling the serial (COM) port” on page 20
ASM Web interface using point-to-point protocol (PPP)		
Text-based user interface using the Telnet protocol over PPP		

Cabling the Ethernet LAN port: This section describes how to cable the Ethernet LAN port.

Attention: To avoid damage to the Ethernet connector on the Remote Supervisor Adapter, *do not* connect the ASM Interconnect module to the Ethernet connector.

Complete the following steps to attach the Ethernet cables:

1. Connect one end of a Category 3 or Category 5 Ethernet cable to the Ethernet connector on the Remote Supervisor Adapter. Connect the other end of the Ethernet cable to the network.
2. Check the Ethernet LEDs to ensure that the network connection is working. The following illustration shows the locations of the LEDs.



Ethernet activity LED

When the green Ethernet activity LED flashes, it indicates that there is Ethernet activity.

Ethernet link LED

When the green Ethernet link LED is lit, it indicates that the Ethernet cable is connected properly.

If you want to use the serial port connection, continue with “Cabling the serial (COM) port” on page 20; otherwise, go to “Configuring the adapter” on page 20.

Cabling the serial (COM) port: To cable the serial (COM) port, connect a modem or null modem cable to the serial connector on the Remote Supervisor Adapter. Then, continue with “Configuring the adapter.”

Configuring the adapter

This section describes how to enable remote access to the Remote Supervisor Adapter and install ASM device drivers. These procedures assume that you have a keyboard and pointing device attached to the server.

Enabling remote access to the adapter: The Remote Supervisor Adapter must be configured to enable remote access through the Ethernet connector or the serial connector. Perform the configuration procedure for the interface method you want to use.

Note: For detailed information about using the ASM Web interface and the text-based interface, see the *Remote Supervisor Adapter User’s Guide* on the IBM xSeries Documentation CD.

Table 2. Configuration tasks to enable remote access to the Remote Supervisor Adapter

User interface to Remote Supervisor Adapter	Connection to Remote Supervisor Adapter	For the configuration procedure, see
ASM Web interface using the HTTP protocol	LAN using the Ethernet port	“Configuring the Ethernet settings for Web-based remote access”
Text-based user interface using the Telnet protocol		
Text-based user interface using a modem or a null modem	Serial (COM) port	“Configuring the serial port for text-based remote access” on page 22 and “Setting up point-to-point protocol” on page 23
ASM Web interface using point-to-point protocol (PPP)		
Text-based user interface using the Telnet protocol over PPP		

Configuring the Ethernet settings for Web-based remote access: If you have an accessible, active, and configured Dynamic Host Configuration Protocol (DHCP) server on the network, the host name, IP address, gateway address, subnet mask, and DNS server IP address are set automatically. The default value should have no effect on whether you have to do any other configuration. If you need to configure the serial port, go to “Configuring the serial port for text-based remote access” on page 22; otherwise, go to “Configuring the remote-control password” on page 25.

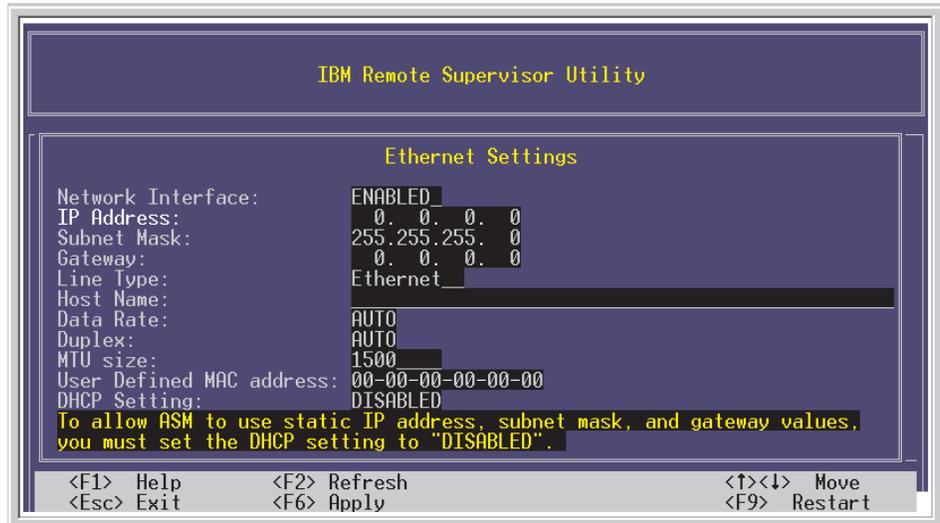
If you do not have a DHCP server on the network, complete the following steps to configure the Ethernet settings.

Note: For instructions to create the Remote Supervisor Utility CD, see “Setup requirements” on page 16.

1. With the server turned off, insert the CD containing the EFI Remote Supervisor Utility program into the drive; then, turn on the server. The utility starts automatically, displaying the Remote Supervisor Utility window.
2. Use the Up Arrow and Down Arrow keys (↑ and ↓) to select **Configuration Settings**; then, press Enter. The Configuration Settings window opens.

- Use the arrow keys to select **Ethernet Settings**, and press Enter. The Ethernet Settings window opens.

Note: The values in the window are only examples; your settings might be different.



- Use the arrow keys to navigate to each field. Your system administrator can provide the information for the following fields:

Network Interface

The default setting is **Enabled**; verify that it is still set to **Enabled**.

IP Address

Type the IP address of the Remote Supervisor Adapter.

Subnet Mask

Type the subnet mask used by the Remote Supervisor Adapter. The default value is 255.255.255.0.

Gateway

Type the IP address of the gateway.

Host Name

Type the hostname of the Remote Supervisor Adapter. The default hostname is ASMA *<burned-in MAC address>*.

For detailed information about the Ethernet settings, see the *Remote Supervisor Adapter User's Guide* on the IBM xSeries Documentation CD.

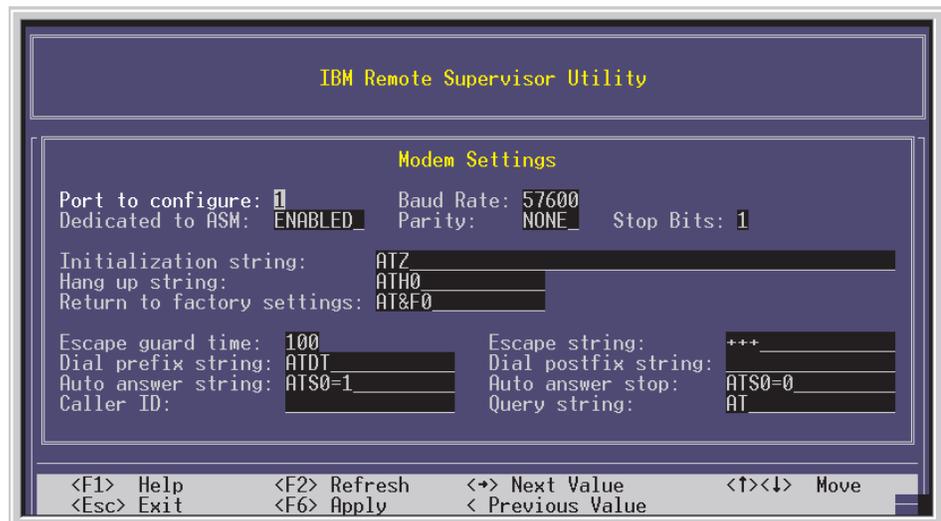
- Change the DHCP Setting field to **Disabled**. The default setting is **Enabled**.
- Press F6 to apply the change.
- Press Esc. After the Warning window opens, press Enter to restart the Remote Supervisor Adapter.
- Press Esc to return to the Configuration Settings window. If you need to configure the serial port, go to "Configuring the serial port for text-based remote access" on page 22.
- Press Esc to return to the Remote Supervisor Adapter Utility main window.
- Use the arrow keys to select **Exit Utility** from the menu, or press Esc to close the Remote Supervisor Adapter Utility program.
- Remove the CD from the server. The server restarts automatically.

- If you also want to configure the serial port, continue with “Configuring the serial port for text-based remote access.” Otherwise, go to “Installing Advanced System Management device drivers” on page 25.

Configuring the serial port for text-based remote access: Complete the following steps to configure the Remote Supervisor Adapter serial port for access using a modem or null modem. If you completed the procedure for configuring the Ethernet port and the Configuration Settings window is open, go to step 4.

- With the server turned off, insert the CD containing the EFI Remote Supervisor Utility program into the drive, and turn on the server.
- The utility starts automatically, displaying the Remote Supervisor Utility window.
- Use the Up Arrow and Down Arrow keys (↑ and ↓) to select **Configuration Settings**, and press Enter. The Configuration Settings window opens.
- Use the arrow keys to select **Modem Settings**, and press Enter. The Modem Settings window opens.

Note: The values in the window are only examples; your settings might be different.



- Verify the following serial port values:

Baud Rate

The default is 57600. Make sure that the baud rate matches the baud rate of the device you are connecting to the serial port on the Remote Supervisor Adapter.

Dedicated to ASM

The default setting is **Disabled**. If you are using point-to-point protocol (PPP), set this field to **Enabled**. If the value in this field is **Enabled** when the server is restarted, the serial port remains dedicated to system management and is not returned to the operating system.

Note: To use this serial port, you must first install the ASM device drivers as described in “Installing Advanced System Management device drivers” on page 25.

If the serial port is shared with the operating system, it is dedicated to the Remote Supervisor Adapter only while the server is turned off or

during POST. The port is returned to the operating system after POST completes. You can view the port using the operating system or any application. The Remote Supervisor Adapter takes over the port from the operating system only when information about a critical event is received. The Remote Supervisor Adapter dials out and transmits an alert and keeps the port dedicated until the server is restarted. The port is no longer available to the operating system or applications.

Parity The default setting is **None**.

Stop Bits

The default is 1.

Note: The data bits value is preset to 8 and cannot be changed.

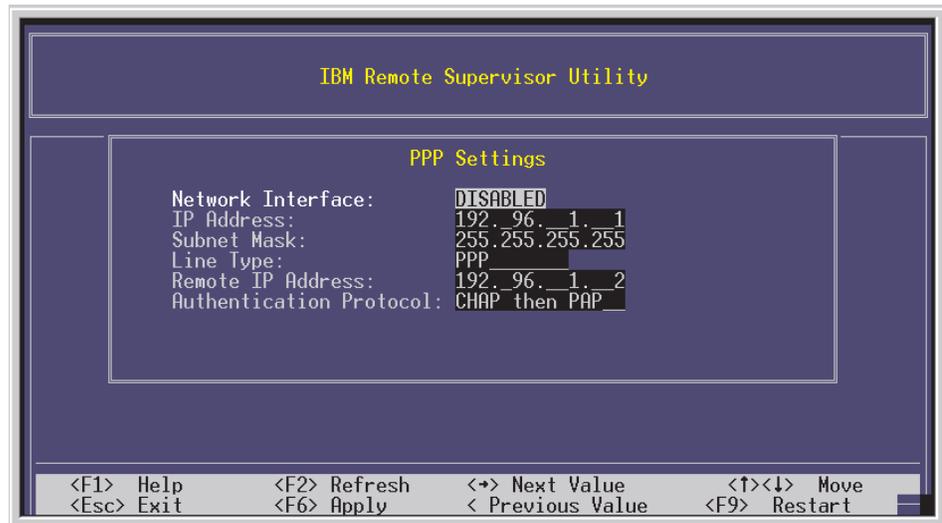
For detailed information about the serial port and modem settings, see the *Remote Supervisor Adapter User's Guide* on the IBM xSeries Documentation CD.

6. If you made changes to the serial port settings, press F6 to apply the change.
7. Press Esc to return to the Configuration Settings window. If you need to set up point-to-point protocol, go to "Setting up point-to-point protocol."
8. Press Esc to return to the Remote Supervisor Adapter Utility main window.
9. Use the arrow keys to select **Exit Utility** from the menu, or press Esc to close the Remote Supervisor Adapter Utility program.
10. Remove the CD from the drive. The Remote Supervisor Adapter restarts automatically.
11. Continue with "Setting up point-to-point protocol."

Setting up point-to-point protocol: The Remote Supervisor Adapter serial port supports PPP. PPP enables TCP/IP communication over the serial port, which enables Web-based management and TELNET sessions over a modem. To set up PPP, complete the following steps. If you completed the procedure for configuring the serial port and the Configuration Settings window is open, go to step 4.

1. With the server turned off, insert the CD containing the EFI Remote Supervisor Utility program into the drive, and turn on the server.
2. The utility starts automatically, displaying the Remote Supervisor Utility window.
3. Use the Up Arrow and Down Arrow keys (↑ and ↓) to select **Configuration Settings**; then, press Enter. The Configuration Settings window opens.
4. Use the arrow keys to select **PPP Settings**, and press Enter. The PPP Settings window opens.

Note: The values in the window are only examples; your settings might be different.



5. Use the arrow keys to navigate to each field. Verify the values in the following fields:

Network Interface

The default setting is **Disabled**. Change this field to **Enabled**.

IP Address

The default value is 192.96.1.1. You can use the default value or another value, but the server must be able to establish a connection to that address. The default IP address (local and remote) is easily reconfigurable.

Subnet Mask

The default value is 255.255.255.255.

Line Type

The value is set to PPP.

Remote IP Address

The default value is 192.96.1.2.

Authentication Protocol

The default is CHAP then PAP. Make sure that the value in this field matches your client settings.

For detailed information about the PPP settings, see the information about configuring PPP access over a serial port in the *Remote Supervisor Adapter User's Guide* on the IBM xSeries Documentation CD.

6. Press F6 to apply the changes.
7. Press Esc. After the Warning message displays, press Enter to restart the Remote Supervisor Adapter.
8. Press Esc to return to the Configuration Settings window. If you need to configure the serial port, go to "Configuring the serial port for text-based remote access" on page 22.
9. Press Esc to return to the Remote Supervisor Adapter Utility main window.
10. Use the arrow keys to select **Exit Utility** from the menu, or press Esc to close the Remote Supervisor Adapter Utility program.
11. Remove the CD from the drive. The server restarts automatically.

12. Continue with “Installing Advanced System Management device drivers.”

Installing Advanced System Management device drivers: You must install the ASM device drivers for the server to enable communication between the Remote Supervisor Adapter and the server in which it is installed. You can obtain the most current device drivers from <http://www.ibm.com/pc/support/> on the World Wide Web.

Note: If you are installing device drivers manually, note the following requirements:

- You must install the operating system on the server before you install the ASM device drivers. For information about installing the operating system, see the documentation that comes with the operating system.
- Before installing the ASM device drivers for the Remote Supervisor Adapter, stop any system-management application.

After you install the ASM device drivers, go to “Configuring the remote-control password” to set the remote-control password.

Configuring the remote-control password: If you want to use the remote-control features of the Remote Supervisor Adapter ASM Web interface, you must configure the remote-control password using the Configuration/Setup Utility program.

To set up a remote-control password, complete the following steps:

1. Start the server and watch the monitor screen.
2. From the EFI Boot Manager startup options, select the Configuration/Setup Utility program.
3. Use the Up Arrow and Down Arrow keys (↑ and ↓) to select **System Security**; then, press Enter. The System Security window opens.
4. Select **Remote Control Security Settings**, and press Enter. The Remote Control Security Settings window opens.
5. Type the remote-control password that you will use each time you log into the remote-control features of the Remote Supervisor Adapter ASM Web Interface.
6. Select **Save New Remote Control Password**, and press Enter.
7. In the System Security window, press Esc.
8. Select **Save Settings**, and press Enter.
9. Confirm your selection, and exit the Configuration/Setup Utility program.
10. Continue with “Completing the configuration.”

Completing the configuration: To complete the configuration of the Remote Supervisor Adapter, see the *Remote Supervisor Adapter User's Guide* on the IBM *xSeries Documentation* CD. The tasks include the following:

- Defining the login IDs and passwords
- Selecting the events that will receive alert notification
- Monitoring remote server status using the ASM Web interface or a text-based user interface
- Controlling the server remotely

If you want to set up an ASM interconnect network and have not already done so, continue with “Using the ASM interconnect network” on page 26. If you do not want to set up an ASM interconnect network, Remote Supervisor Adapter configuration is now complete. To start managing the server remotely, see the *Remote Supervisor Adapter User's Guide* on the IBM *xSeries Documentation* CD.

Using the ASM interconnect network

This section explains how to configure and connect the server to function within an ASM interconnect network.

The ASM interconnect network can include as many as 12 individual ASM connections in a single bus. These connections can include Remote Supervisor Adapters, ASM processors, and ASM PCI adapters. When the clients and servers are connected, they use the ASM interconnect network to share ASM resources, information, and alerts among multiple servers without having to add additional communications hardware or network interface adapters.

An ASM interconnect network provides two levels of functionality. First, the ASM interconnect network enables you to configure settings and to control the servers where other Remote Supervisor Adapters, ASM processors, and ASM PCI adapters on the network reside. Second, the ASM interconnect network enables other interconnect network devices to use the resources (Ethernet or modem) of other Remote Supervisor Adapters, ASM processors, and ASM PCI adapters in the ASM interconnect network for sending alerts. This interconnect network is used when Remote Supervisor Adapters, ASM processors, or ASM PCI adapters cannot send an alert and must forward the information to another one of these devices to send the alert.

Planning and cabling the interconnect network

To support the most recent ASM features, a Remote Supervisor Adapter must be the main gateway interconnect to the ASM interconnect bus if the bus also includes servers with ASM PCI adapters or ASM processors. The Remote Supervisor Adapter forwards the ASM information generated by the servers attached to the ASM interconnect bus to other servers on the Ethernet network. The connected ASM processors and ASM PCI adapters are managed through the new user interface and Web browser access of the Remote Supervisor Adapter.

Note: To ensure the stability of the system, you must have the most current level of firmware installed on the Remote Supervisor Adapter that is the main interconnect gateway for the ASM interconnect network. The most current level of firmware is available at <http://www.ibm.com/pc/support/> on the World Wide Web. For more information about updating firmware, see “Updating the firmware” on page 39 and the *Remote Supervisor Adapter User’s Guide* on the IBM xSeries Documentation CD.

You must connect an ASM Interconnect module to the Remote Supervisor Adapter and to each xSeries 450 server that you connect to the ASM interconnect network bus.

Attention: To avoid damage to the Ethernet connector on the Remote Supervisor Adapter, do not plug the ASM Interconnect module into the Remote Supervisor Adapter Ethernet connector.

To connect the servers, note the following setup and configuration considerations:

- Ensure that the ASM interconnect network is set up as a bus topology. You must connect the servers to the ASM interconnect network in a series, with terminated beginning and end points.
- Ensure that the total combined length of all Ethernet cables connecting the server in the ASM interconnect network does not exceed 91 m (300 ft).
- Each Remote Supervisor Adapter, ASM PCI adapter, or ASM processor that is connected to the ASM interconnect network bus counts as one connection. For

example, if an ASM PCI adapter is installed in a server that has an ASM processor, the processor and the adapter connect to each other using one ASM interconnect connection, but the processor and the adapter count as two connections on the ASM interconnect network bus.

Forwarding alerts

Remote Supervisor Adapters, ASM PCI adapters, and ASM processors that are connected to an ASM interconnect network share resources and system-management information. This section provides information on how alerts are forwarded in the ASM interconnect network.

During normal operation, each Remote Supervisor Adapter, ASM processor, or ASM PCI adapter on the ASM interconnect network communicates with the other processors and adapters on the network. Processors or adapters that have a modem or Ethernet connection notify the other processors and adapters that these communications resources are available for use by other servers on the ASM interconnect network. These resources are then used as ASM interconnect network resources, enabling Remote Supervisor Adapters, ASM processors, or ASM PCI adapters on the ASM interconnect network to send alerts using a modem or the network, even if they do not have a modem or network connection physically attached.

When alerts are generated, they are forwarded to the Remote Supervisor Adapter, ASM processor, or ASM PCI adapter on the ASM interconnect network that has the communication resources to forward the alert. If no system on the ASM interconnect network meets the requirements, the alert is set for transmission if the connection type is configured or becomes available later.

If multiple modems or network connections exist in the ASM interconnect network, you cannot specify which system will receive an alert or which will use its modem or network connection to forward the alert. If an alert is forwarded to a Remote Supervisor Adapter, ASM processor, or ASM PCI adapter that is unable to deliver the alert (for example, the modem it is configured to use has failed or the network cannot resolve the destination IP address), the processor or adapter attempts to forward the alert to another system on the ASM interconnect network that has the communication resources to forward the alert.

Alerts are typically sent once per connection type, but an alert is forwarded to another interconnect device if the resources exist on other interconnect devices in the network. For example, on a three ASM processor network where ASM processor 1 generates a modem alert, but does not have a modem and the other ASM processors have modems, the following might occur:

If ASM processor 1 generates an alert and the modem is unplugged from ASM processor 2 45 seconds prior to ASM processor 1 generating the alert, ASM processor 1 forwards the alert to ASM processor 2, having previously determined that ASM processor 2 has an available modem. When ASM processor 2 receives the forwarded alert, it determines that a modem is attached to ASM processor 3 and forwards the alert. Therefore, depending on the time frame (45 seconds) within which a resource (modem) fails, the alert might be forwarded multiple times until an interconnect device can send the alert.

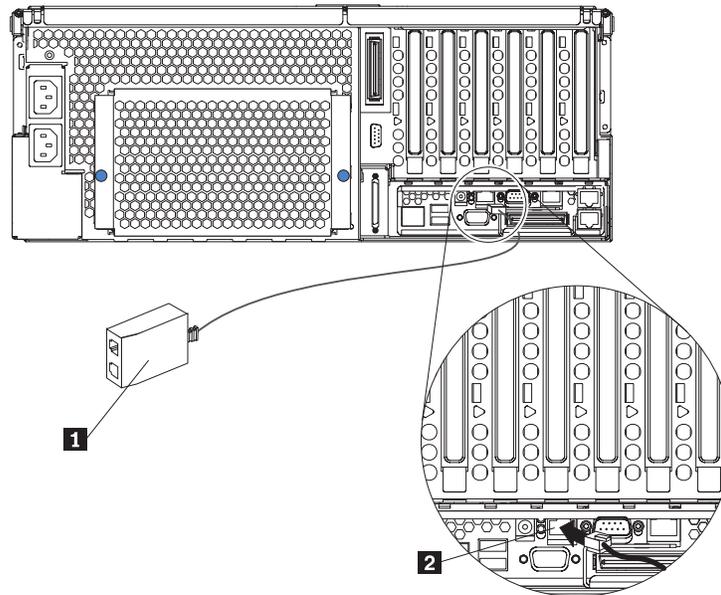
Connecting the ASM Interconnect module to the xSeries 450

The ASM Interconnect module connects the Remote Supervisor Adapter to the ASM interconnect network. This module must be purchased separately.

To connect the ASM interconnect module to the Remote Supervisor Adapter, complete the following steps.

Attention: To avoid damage to the Ethernet connector, do not plug the ASM interconnect module into the Remote Supervisor Adapter Ethernet port.

1. Connect the ASM Interconnect module **1** to the Remote Supervisor Adapter ASM interconnect (peer-to-peer) port **2**. This port is on the edge of the Remote Supervisor Adapter that is accessible from the rear of the server and is labeled RS485.

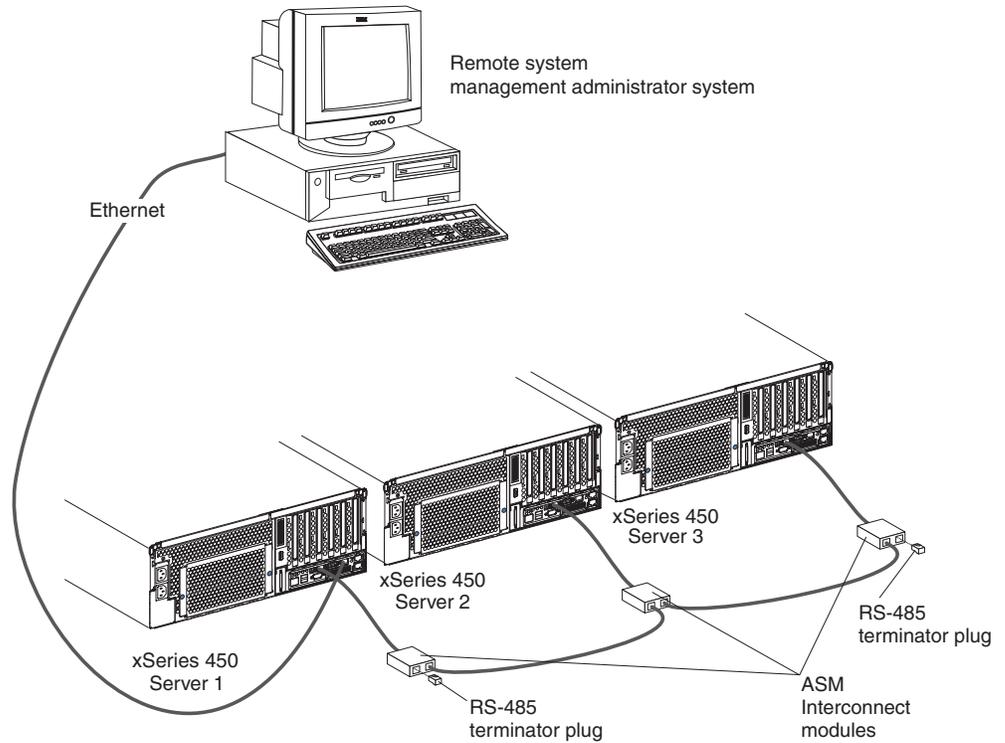


2. Connect one or two Category 3 or Category 5 Ethernet cables to the other end of the ASM Interconnect module.
3. Continue with “ASM interconnect network configuration examples.”

ASM interconnect network configuration examples

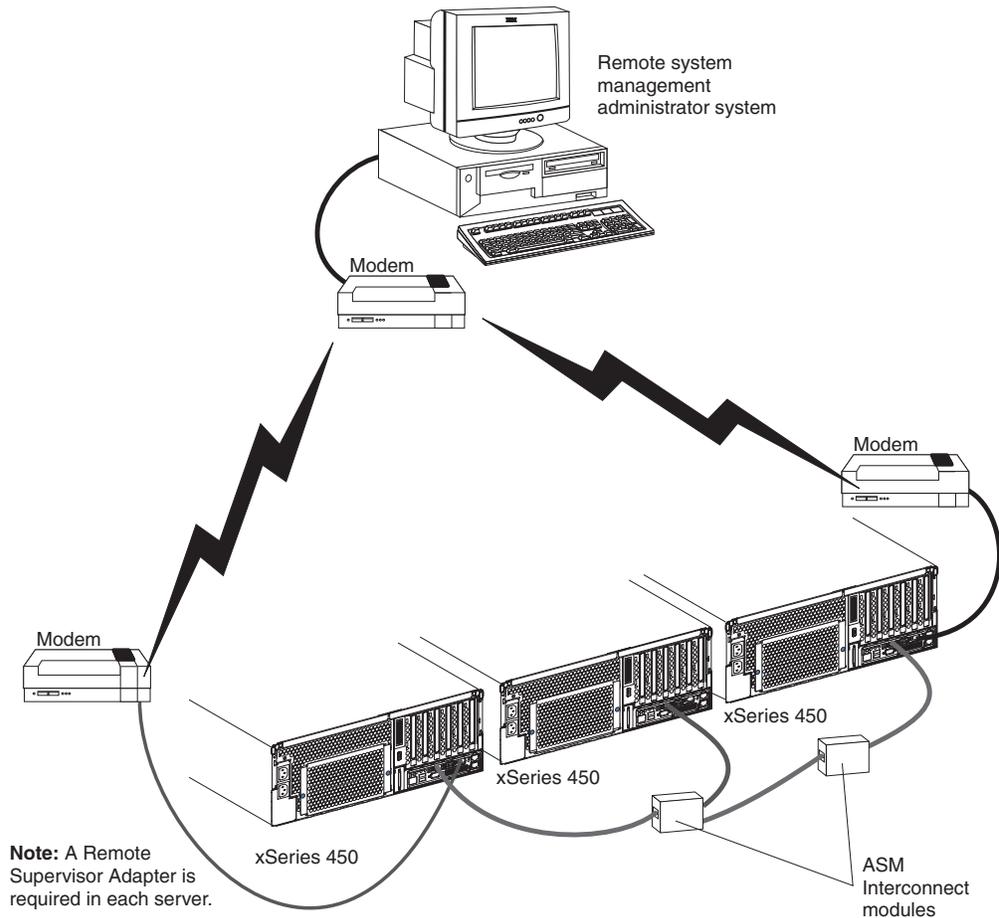
The illustrations in this section show sample ASM interconnect network configurations.

The following illustration shows an Ethernet cable connecting the remote administrator system to the Remote Supervisor Adapter that is installed in an xSeries 450. Server 1 uses the LAN connection to forward system-management data generated by the other xSeries 450s in the ASM interconnect network bus to the remote system-management administrator.



Note: The ASM Interconnect module is connected to the RS485 port on the back panel of the Remote Supervisor Adapter in each server.

The following illustration shows a modem connected to the serial port of the Remote Supervisor Adapter in the xSeries 450 on the left, a modem connected to the serial port of the Remote Supervisor Adapter in the xSeries 450 on the right, and a modem connected to the remote administrator system. Placing modems at opposite ends of the ASM interconnect network bus ensures that if an ASM interconnect connection in the bus fails, all of the servers on the ASM interconnect network have access to a modem to forward system-management data to the remote system-management administrator.



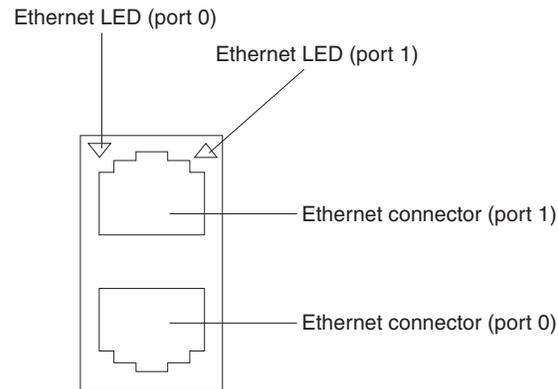
Note: The ASM Interconnect module is connected to the RS485 port on the back panel of the Remote Supervisor Adapter in each server.

Configuring the Gigabit Ethernet controller

The Ethernet controllers are integrated on the I/O board. They provide an interface for connecting to a 10-Mbps, 100-Mbps, or 1-Gbps network and provide full-duplex (FDX) capability, which enables simultaneous transmission and reception of data on the network. If the Ethernet ports in your server support auto-negotiation, the controllers detect the data-transfer rate (10BASE-T, 100BASE-TX, or 1000BASE-T) and duplex mode (full-duplex or half-duplex) of the network and automatically operate at that rate and mode.

You do not need to set any jumpers or configure the controllers. However, you must install a device driver to enable the operating system to address the controllers. For device drivers and information about configuring the Ethernet controllers, see the *Resource CD* that comes with your server. For updated information about configuring the controllers, go to <http://www.ibm.com/pc/support/> on the World Wide Web.

The following illustration shows the Ethernet controller port assignments, connectors, and LEDs.



Chapter 3. Diagnostics

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

If you cannot locate and correct the problem using the information in this section, see Appendix A, “Getting help and technical assistance,” on page 195 for more information.

General checkout

The server diagnostic programs are stored in the upgradeable electronically erasable programmable read-only memory (EEPROM) on the I/O board and on the *Resource* CD. These programs provide the primary methods of testing the major components of the server.

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

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

A failed server might be part of a shared hard disk drive cluster (two or more servers sharing one or more external storage devices). Before you run diagnostics, verify that the failing server is not part of a shared storage device cluster.

A server might be part of a cluster if:

- The server is identified as part of a cluster.
- One or more external storage units are attached to the server and at least one of the attached storage units is also attached to another server or unidentifiable source.
- One or more servers are located near the failing server.

If the failing server is suspected to be part of a shared hard disk drive cluster, run all diagnostic tests except those that test the storage unit (storage device residing in the storage unit) or the storage adapter attached to the storage unit.

Notes:

1. For servers that are part of a shared hard disk drive cluster, run one test at a time in looped mode. Do not run all tests in looped mode, because this could enable the hard disk drive diagnostic tests.
2. If multiple error codes are displayed, diagnose the first error code that is displayed.
3. If the server stops with a POST error, see “SAL/EFI messages” on page 150.
4. If the server stops and no error is displayed, see “Undetermined problems” on page 185.
5. For power supply problems, see “Power checkout” on page 74.
6. For safety information, see “Safety information” on page 197.
7. For intermittent problems, check the system-error log.

Follow the steps in this procedure to identify system problems.

001 IS THE SERVER PART OF A CLUSTER?

YES. Schedule maintenance for the system. Shut down all systems related to the cluster.

NO. Go to step **002** .

002 IF THE SERVER IS NOT PART OF A CLUSTER:

If the operating system is running, do the following:

1. Check the Light Path. Go to “Light Path Diagnostics feature” on page 36 for more information.
2. Check the service processor system-error logs.
 - a. If the system-error log indicates a damaged field replaceable unit (FRU), replace the FRU, and run the AMIDiag program to confirm that the problem has been solved.
 - b. If the system-error log does not indicate a damaged FRU, check the Light Path.

If the operating system is not running, do the following:

1. Check the Light Path. Go to “Light Path Diagnostics feature” on page 36 for more information.
2. Check the service processor system-error logs.
 - a. If the error log indicates a damaged field replaceable unit (FRU), replace the FRU, and run the AMIDiag program to confirm that the problem has been solved.
 - b. If the error log does not indicate a damaged FRU, see “Undetermined problems” on page 185
3. Turn off the server and all external devices.
4. Check all cables and power cords.
5. Set all display controls to the middle position.
6. Turn on all external devices.
7. Turn on the server.
8. Monitor the screen and the serial port for POST errors, and record any POST error messages that are displayed on the screen. If an error is displayed, look up the first error in the “SAL/EFI messages” on page 150.
9. When the EFI Boot Manager starts, select **Diagnostic** from the menu, and press Enter to start the AMIDiag program.

003 DID THE DIAGNOSTIC PROGRAM START?

NO. Find the failure symptom in “Error symptoms” on page 176.

YES. Run the diagnostic programs. If necessary, see “Diagnostic programs, error codes, and messages” on page 38.

If you receive an error, see Chapter 6, “Symptom-to-FRU index,” on page 147.

If the diagnostic programs were completed successfully and you still suspect a problem, see “Undetermined problems” on page 185.

If the server does not turn on, see “Error symptoms” on page 176.

Diagnostic tools overview

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

- **POST error messages**

The power-on self-test (POST) generates error messages to indicate the detection of a problem. See “POST error codes and messages” for more information.

- **System-error logs**

The system-error log contains all the error messages that were issued during POST. See “System-error logs” on page 36.

- **Light Path Diagnostics feature**

Use the Light Path Diagnostics feature to identify system errors quickly (see “Light Path Diagnostics feature” on page 36).

- **Diagnostic display**

If a problem is detected with system power on or during initialization, an error code might be present in the two-hex character diagnostic display on the midplane board. See “Diagnostic display error codes” on page 181 for more information.

- **Diagnostic programs and error messages**

The AMIDiag program is the primary method of testing the major components of the server. The AMIDiag program is stored in the EEPROM on the I/O board. You can download the latest version of this program and copy it to a CD so that you can update the AMIDiag program. See “Starting the AMIDiag program” on page 38 for more information.

The diagnostic program for the Ethernet controller is on the *Resource CD*. For instructions about using this CD, see “Troubleshooting the Ethernet controller” on page 75.

- **Product support page**

The IBM Web site has up-to-date information about IBM xSeries products, services, and support at <http://www.ibm.com/eserver/xseries/> on the World Wide Web.

You can find service information for your IBM products, including supported options, at <http://www.ibm.com/pc/support/>.

POST error codes and messages

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.

Notes:

1. This server does not produce beep codes.
2. Depending on system configuration, POST might run for several minutes before the video console is enabled. During this time, POST operation is indicated by the flashing blue locator LED on the front panel. Diagnostic display error codes track the startup progress until video is enabled.

If POST finishes without detecting any problems, the EFI Boot Manager screen appears. If POST detects a problem, an error message will be sent to either the serial port or the display screen. See “SAL/EFI messages” on page 150 for more information.

System-error logs

The system-error log contains all messages issued during system initialization or normal system operation.

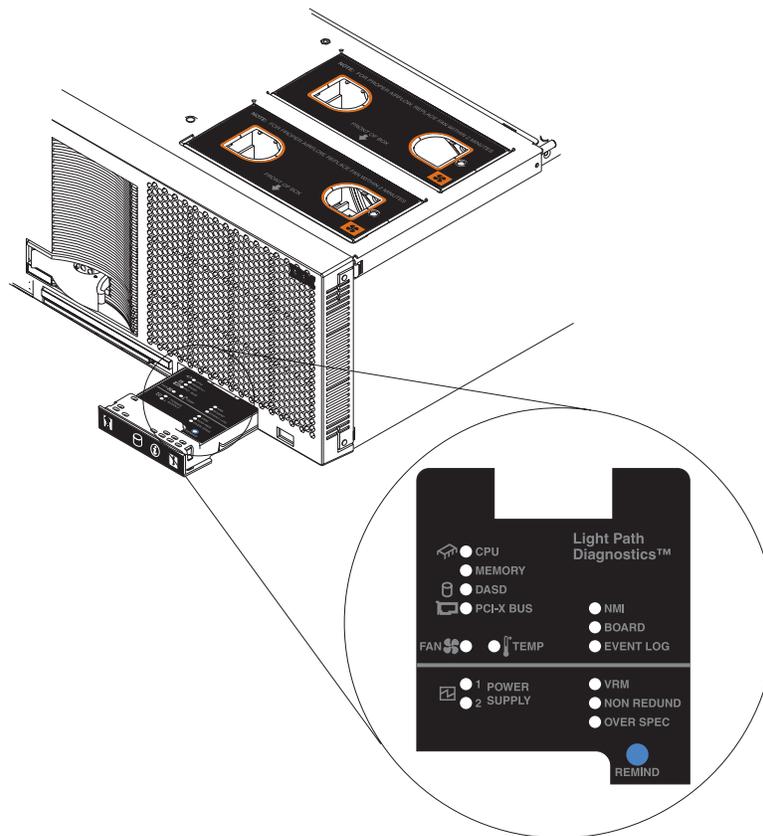
You can view the contents of the system-error log from the Configuration/Setup Utility program or from the service processor. To view error logs from the Configuration/Setup Utility program, start the Configuration/Setup Utility program; then, select **Error Logs** from the main menu. See “Starting the Configuration/Setup Utility program” on page 12 for more information.

You can also use the error-log viewer in the AMIDIag program. For information about viewing diagnostic program error logs from the AMIDIag program, see “Error-log viewer” on page 42.

Light Path Diagnostics feature

The Light Path Diagnostics panel is inside the Light Path Diagnostics drawer on the front right of the server. When you press on the front of the Light Path Diagnostics drawer, the Light Path Diagnostic panel is exposed.

The following illustration shows the location of the diagnostics panel. See “The diagnostics panel” on page 37 for information about identifying problems using the Light Path Diagnostic LEDs.



The system-error LED on the operator information panel is lit when certain system errors occur. If the system-error LED on the server is lit, one or more LEDs inside the server might be lit. Use the Light Path Diagnostics panel to identify the type of

error that occurred, and see “Light Path LED errors” on page 147 to help determine the cause of the error and the action you should take.

To view the LEDs on the various main boards, look at the board indicated by the diagnostic panel.

To acknowledge a system error but not take immediate action, press the REMIND button, and place the Light Path Diagnostics feature in Remind mode. The system-error LED flashes in Remind mode. If a new failure occurs, the system-error LED is lit again.

The diagnostics panel

The diagnostics panel should be the first place you look for help with identifying problems. If a system error occurs, the system-error LED on the front of this panel is lit. Press the front of the panel to open the diagnostics panel, and look for any lit LEDs. These lit LEDs can help you identify the possible cause of the error. Make a note of any LEDs that are lit, and then close the panel.

LEDs on the top of the server

You can also use the LEDs on the top of the server to find an error. If the BOARD LED on the diagnostics panel is lit, pull the server out, and view the top cover. In the center of the top cover is a set of six LEDs and the system service labels. The numbers next to the LEDs correspond to the numbers on the system service label. Note the lit LED, and see the numbered block on the system service label that corresponds to the lit LED. Then, follow the instructions, if any, in the numbered block.

LEDs on the system boards

To locate the actual component that caused the error, locate the lit LED next to that component.

For example:

A system error has occurred, and you have noted that the CPU LED is lit on the diagnostics panel. Referring to the LEDs on the top cover, you see that LED 2 is lit. You then locate the panel on the system service label with the number 2 on it. In this case, the instructions in the panel tell you that the problem occurred with one of the microprocessors. Follow the instructions to remove the processor-board assembly. See “Processor-board assembly” on page 119. Located on the circuit board is the light-path capacitor switch. Press and hold the switch until you locate the lit LED next to the defective microprocessor. Follow the instructions in “Microprocessor and power module” on page 121 and “Installing and replacing a microprocessor and power module” on page 100 to remove and replace the microprocessor.

For more information about LEDs and connectors, see “Connector and LED locations” on page 80.

Diagnostic display

If a problem is detected with system power on or during initialization, the two-hex character diagnostic display on the midplane board might show an error code. See “Midplane board connectors and LEDs” on page 84 and “Diagnostic display error codes” on page 181 for more information.

Diagnostic programs, error codes, and messages

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.

Chapter 6, “Symptom-to-FRU index,” on page 147 contains the error codes that might appear in the detailed test log and summary log when the diagnostic programs are run.

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) shown in the error code format in the previous section.

Result

can be one of the following:

- | | |
|----------------|--|
| Passed | This result occurs when the diagnostic test is completed without any errors. |
| Failed | This result occurs when the diagnostic test discovers an error. |
| Aborted | This result occurs when you stop the diagnostic test before it is complete. |

Starting the AMIDiag program

The AMIDiag program is stored in the EEPROM of the server. You can download the latest version from <http://www.ibm.com/eserver/xseries/> on the World Wide Web.

Starting the AMIDiag program from the server

Complete the following steps to start the AMIDiag program:

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

Note: To run the AMIDiag program, you must start the server with the highest level password that is set. That is, if an administrator password is set, you must type the administrator password, not the user password, to run the diagnostic programs.

2. When the EFI Boot Manager appears on the screen, select **Diagnostic**, and press Enter.
3. When the AMIDiag program screen appears, select the test you want to run from the menu that appears, and follow the instructions on the screen.

Notes:

- a. Press F1 while running the AMIDdiag program to obtain help information. Press F1 from within a help screen to obtain online documentation from which you can select different categories. To exit from the help information and return to where you left off, press Esc.
- b. If the server stops during testing and you cannot continue, restart the server and try running the AMIDdiag program again. If the problem remains, replace the component that was being tested when the server stopped.
- c. When you exit the AMIDdiag program, the server resets automatically. If the server does not reset automatically, manually reset the server before starting the operating system.

If the diagnostic programs do not detect any hardware errors but the problem persists during normal server operations, a software error might be the cause. If you suspect a software problem, see "Software problems" at "Error symptoms" on page 176 and the information that comes with the software package.

Updating the firmware

If you have downloaded the latest version of the AMIDdiag program from the World Wide Web, you can create a CD or save it to a valid file system on your server so that you can update the AMIDdiag program on the server.

Before you can create a CD, you might need to enable the CD creating feature. For instructions to enable the CD creating feature using Microsoft Windows Server 2003, see "Setup requirements" on page 16. For instructions using another operating system, see the documentation for the operating system.

To create a CD with the latest version of the AMIDdiag program, unzip the file that you downloaded from the World Wide Web, and copy it to a CD.

To use the service processor to update SAL/EFI, AMIDdiag, or service processor firmware, complete the following steps:

1. Open the Remote Supervisor Adapter Web browser, and click **Firmware Update**.
2. Click **Browse**, and select `flash2.efi`; then, click **Update**. A loader popup window is displayed.
3. When the **Confirm Firmware Update** window displays, click **Continue**. A message indicating that the update has completed displays when the update is finished.

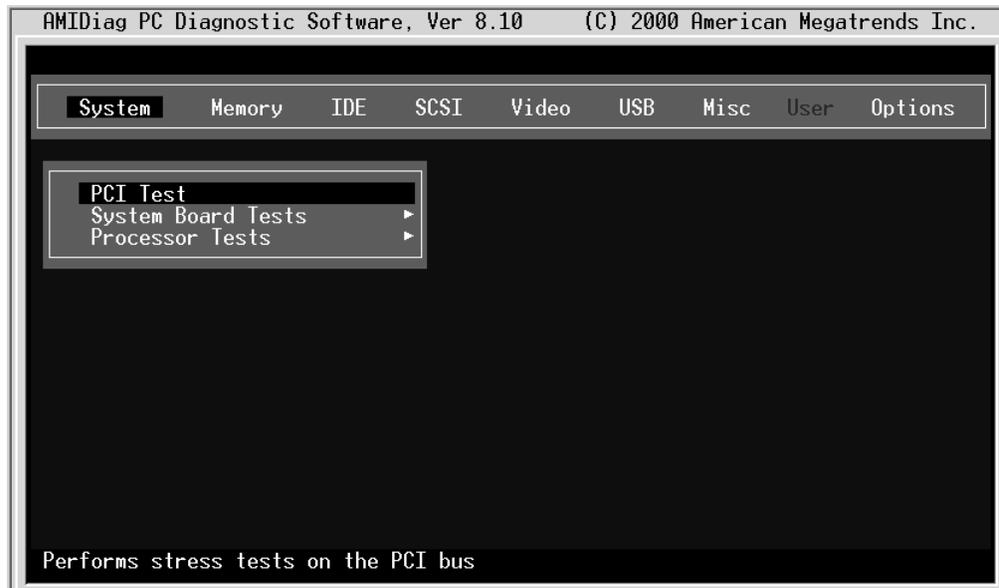
To update the firmware from the EFI Shell, complete the following steps:

1. Unzip the file you downloaded, and save all the components of the file package to a valid file system.
2. From the EFI Boot Manager, select **EFI Shell [Built-In]**, and press Enter.
3. Locate the file system on which the file you downloaded was saved, and type `cd fsn:`, where *n* is the file system number where the file is saved.
4. Locate the directory where the file is saved, and go to that directory.
5. Type `flash2`, and press Enter. A menu is displayed.
6. Select **Update System Firmware**, and press Enter. A Warning screen is displayed.
7. Press Enter to continue. The Firmware Update Options Menu is displayed.
8. Select **Normal Flash - All Subsystems**, and press Enter. Follow the instructions on the screen.

- Restart the server.

AMIDdiag menus

The following figure shows the AMIDdiag main menu:



Press the Up Arrow (↑) or Down Arrow (↓) keys to select a menu choice, and press Enter. Press the Right Arrow (→) or Left Arrow (←) keys to display a different AMIDdiag menu.

Using AMIDdiag keys

The following table shows the AMIDdiag keys and a brief description of their function.

Key	Description
Esc	Halt a currently running test. Exits the AMIDdiag program if no test is running.
Enter	Run the selected AMIDdiag test.
F1	Display Help screens.
F2	Edit batch parameters.
F3	Load batch parameters.
F4	Save batch parameters.
F5	Select or deselect the current test.
F6	Select or deselect the tests on a specific AMIDdiag menu.
F7	Select or deselect all AMIDdiag tests.
F8	Select or deselect all tests necessary to run a system quick test.
F9	Display a list of the AMIDdiag function keys.
F10	Run the selected test or tests.

Running AMIDiag tests

To run this test or test group...	Do the following
Run all AMIDiag tests.	Press F7, then F10.
Run a complete overall system quick test .	Press F8, then F10.
Run all processor board diagnostic tests.	<ol style="list-style-type: none"> 1. Select System, and press Enter. 2. Press F6, then press F10.
Run all memory diagnostic tests.	<ol style="list-style-type: none"> 1. Select Memory, and press Enter. 2. Press F6, and then press F10.
Run all IDE drive diagnostic tests.	<ol style="list-style-type: none"> 1. Select IDE, and press Enter. 2. Press F6, and then press F10.
Run all USB diagnostic tests.	<ol style="list-style-type: none"> 1. Select USB, and press Enter. 2. Press F6. 3. Press F10.
Run all video diagnostic tests.	<ol style="list-style-type: none"> 1. Select Video, and press Enter. 2. Press F6. 3. Press F10.
Run all serial, expansion port, and ASM diagnostic tests.	<ol style="list-style-type: none"> 1. Select the Misc. menu, and press Enter. 2. Press F6. 3. Press F10.
Enable logging of test session.	<ol style="list-style-type: none"> 1. Select Options, and press Enter. 2. Select Generate Reports, and press Enter. 3. Select the output device, and press Enter. <p>Note: Logging to a file requires a writeable file system to be available from the EFI environment.</p>
Exit the AMIDiag program.	Press Esc, and select Yes at the prompt.

Running the AMIDiag program in Batch Mode

When your server is experiencing an intermittent problem that no diagnostic software test has been able to identify, run AMIDiag tests over an extended period of time. Many server problems (especially memory problems) are not evident when a test is run only once. You can use the AMIDiag program to run diagnostic tests on only a certain part of the server, a specific part of memory, or a specific part of a disk drive. You can also use the AMIDiag program to build script (.INI) files that contain test configuration information. After you have created an AMIDiag script file, you can run the diagnostic tests listed in the .INI file automatically.

To run the AMIDiag program in batch mode, complete the following steps:

1. Select the AMIDiag tests to be run.
2. Select the test parameters, such as the drives and the I/O ports. These parameters differ for each test.
3. Press F10 to run the tests.
4. Save the current AMIDiag test configuration to a .INI file. You can then run this set of AMIDiag tests at any time.

Error-log viewer

If you have enabled logging with the **Generate Report** option, you can display the log while still running the AMIDiag program. The AMIDiag error log contains all diagnostic errors that the AMIDiag program has found during the current AMIDiag session. The error-log viewer offers some text search capability.

To display the error log, select **Display Error Log File** on the AMIDiag **Options** menu. Type the name of the error log file. The default error log filename is amiddiag.log. The AMIDiag error log file will be displayed.

If you get a message that says that the log file is damaged, complete the following steps to correct the problem:

1. From the main menu, select **Options**, and press Enter.
2. Select **Generate Report**, and press Enter.
3. Select **Report Destination**, and press Enter.

Note: You must be able to write to the file system to which you are saving the report.

4. Select **File**, and press Enter.

To access Help for more information about an error, browse to the error that you want to see in the error window (on the right side of the screen), and press F1.

Quitting tests

Press Esc to quit the testing process. Testing stops after any test in progress has been completed.

System diagnostic tests

This section describes individual system diagnostic tests.

Note: Each test on the System menu can generate error codes. For system-error codes, see “System-error codes” on page 159.

Processor test

Use the processor test to make sure that all microprocessors are functioning properly.

Use the CPU Functionality Test to make sure that microprocessors in the server are operating correctly and efficiently in all address modes. To run the CPU Functionality Test, complete the following steps:

1. From the AMIDiag main menu, select **System**, and press Enter.
2. Select **Processor Test**, and press Enter.
3. Select **CPU Functionality Test**, and press Enter.

Use the CPU Speed Test to check the microprocessor speed. When you run this test, the screen displays the expected processor speed and the actual microprocessor clock speed. To run the CPU Speed Test, complete the following steps:

1. From the AMIDiag main menu, select **System**, and press Enter.
2. Select **Processor Tests**, and press Enter.
3. Select **CPU Speed Test**, and press Enter.

4. Set the test parameters:
 - a. Select **YES** for the **CPU Speed Comparison**, and press Enter.
 - b. Select **Expected CPU Speed**, and press Enter.
 - c. Select **Run Test** parameters, and press Enter.

To make sure the system configuration is not damaged, complete the following steps:

1. From the AMIDdiag main menu, select **System**, and press Enter.
2. Select **Processor Tests**, and press Enter.
3. Select **CMOS Validity Test**, and press Enter.

To make sure that the PCI adapter slots are functioning correctly, complete the following steps:

1. From the AMIDdiag main menu, select **System**, and press Enter.
2. Select **Processor Tests**, and press Enter.
3. Select **PCI Test**, and press Enter.

System Board Test

Select this choice to run a DMA controller test or a CMOS validity test.

DMA controller test: This test is a series of read and write tests on the memory address registers and page registers of direct memory address (DMA) controllers 1 and 2. The DMA controller manages the flow of information directly to and from system memory and an "intelligent" peripheral device, without passing through the microprocessor. On error, the AMIDdiag program displays the register number, data written, and data read. To perform this test, complete the following steps:

1. From the main menu, select **System**, and press Enter.
2. Select **DMA Controller Test**, and press Enter.

CMOS Validity Test: Use this test to check the validity of the data in CMOS RAM, to make sure that the CMOS RAM checksums are correct, and to make sure that the battery is in good condition. To perform this test, complete the following steps:

1. From the main menu, select **System**, and press Enter.
2. Select **CMOS Validity Test**, and press Enter.

PCI System Test

Use the PCI System Test to make sure that the PCI bus and all PCI devices in the server are working properly.

Multiprocessor Test

Select this test when running the AMIDdiag program in a server that has more than one microprocessor. This test performs a variety of diagnostic tests on all microprocessors. To perform this test, select **Multiprocessor Test** from the System menu, and press Enter. Follow the directions on the screen.

Memory diagnostic tests

Use the memory diagnostic tests to make sure that the memory board and installed memory are properly seated and functioning correctly. You can test all memory and the memory board, or you can isolate a single memory bank to verify that it functions correctly. The following test modes are available:

- Quick test runs a single test pattern through the entire free, installed memory space of the banks selected.
- Full test runs 18 patterns, including pseudo-random patterns through the entire free, installed memory space of the banks selected.

To run the Quick Memory Test over all memory banks, complete the following steps:

1. From the AMIDiag main menu, select **Memory**, and press Enter.
2. Select **Quick Memory Test**, and press Enter.
3. Select **All Banks, Quick Test**, and press Enter.

To run full diagnostic tests over all memory banks, complete the following steps:

1. From the AMIDiag main menu, select **Memory**, and press Enter.
2. Select **Full Memory Test**, and press Enter.
3. Select **All Banks, Full Test**, and press Enter.

To run the Quick Memory Test over a single memory bank, complete the following steps:

1. From the AMIDiag main menu, select **Memory**, and press Enter.
2. Select **Quick Memory Test**, and press Enter.
3. Select the individual bank you want to test or select **Bank *n*, Quick Test**, and press Enter.

To run the Full Memory Test over a single memory bank, complete the following steps:

1. From the AMIDiag main menu, select **Memory**, and press Enter.
2. Select **Full Memory Test**, and press Enter.
3. Select the individual banks you want to test or select **Bank *n*, Full Test**, and press Enter.

IDE device diagnostic tests

The IDE device diagnostic tests work only with CD-ROM, DVD, and removable devices that use the ATAPI interface.

IDE CD-ROM tests

Use the IDE CD-ROM tests to make sure that the IDE CD-ROM drive is functioning properly. You can test the functionality of the CD-ROM drive tray and the data and audio read functions of the CD-ROM drive. The IDE CD-ROM tests include the following:

- **IDE CD Tray Test**

Select this test to make sure that the CD-ROM drive auto-eject feature can eject a CD. The CD tray should open and close.

To run the CD tray test for an IDE CD-ROM drive, complete the following steps:

1. From the main menu, select **IDE**, and press Enter.
2. Select **CD Tray Test**, and press Enter.

- **IDE CD Data Test**

Use the IDE CD data test to make sure that the CD-ROM drive is reading correctly. This test reads all logical blocks on a CD if the starting and ending block are not specified. Place any CD in the CD-ROM drive before running this test, and follow the screen instructions. This test does not play audio CDs.

To run the IDE CD data test to diagnose an IDE CD-ROM drive, complete the following steps:

1. From the main menu, select **IDE**, and press Enter.
2. Select **CD Data Test**, and press Enter.

- **IDE CD Audio Test**

A speaker must be attached to the CD-ROM drive before running this test. This test plays all logical blocks if the starting and ending block are not specified.

To run the IDE CD audio test, complete the following steps:

1. Place an audio CD in the CD-ROM drive.
2. From the main menu, select **IDE**, and press Enter.
3. Select **CD Audio Test**, and press Enter.

For the IDE CD test error codes, see “IDE CD test error codes” on page 161.

IDE DVD tests

The IDE DVD-ROM drive tests include the following:

- **IDE DVD Seek Test**

Select this test to make sure that the DVD-ROM drive can seek to all sectors of the DVD. You can change the size to seek by adjusting the Block Interleave parameter value.

- **IDE DVD Read Test**

Select this test to make sure that the DVD-ROM drive can read to all sectors of the DVD. This test works with both encrypted and unencrypted DVDs.

For the IDE DVD-ROM drive test error codes, see “IDE DVD-ROM drive test error codes” on page 164.

ATAPI removables test

This test verifies that the removable disk drive, such as an Iomega ZIP drive, is operating correctly. The tests include:

- **Format test**

The format test verifies that the removable drive is properly formatted for operation.

Attention: This test formats the media in the device being tested. Use this test only if you want to format the media.

- **Write test**

This test verifies the ability of the removable disk drive to write data correctly to a disk. Use a disk that you know is good for this test. This test is normally hidden from view because it erases the data on the disk. To make this menu item viewable so that you can run this test, complete the following steps:

1. From the AMIDiag main menu, select **Options**, and press Enter.
2. Select **Toggle Hidden Test Display**, and press Enter.

Attention: This test erases all data on the disk.

3. Select the drive or drives to be tested, and run the test.

- **Read test**

Use this test to verify the ability of the removable media drive to read data correctly in both block and random sequential format from a removable disk. Use a disk that you know is good for this test. Select the drive or drives to be tested, and run the test. You can select the starting and ending clocks of data to be read, or you can select the percentage of the drive to be read in a sequential or random order. You can also run a random or sequential read test.

- **Seek test**

Use this test to verify the ability of the removable media drive to seek blocks of data sequentially or randomly. Select the test parameters, and run the test. You can specify the number of times this test is to be run (repeat count), or you can specify Quick Test to test only 1% of the disk.

- **Eject test**

Use this test to verify that the auto-eject feature of the removable media drive is working properly. You can set the Execution Count parameter to run this test a number of times. Select the test parameters, and select **Continue** to run the test.

For the ATAPI removables test error codes, see “ATAPI removables test error codes” on page 162.

SCSI diagnostic tests

The AMIDiag program tests all SCSI devices installed in your server. The SCSI tests detect and test a combination of up to 120 SCSI hard disk drives.

SCSI diagnostic tests consists of the following tests:

- SCSI Disk Buffer Test
- SCSI Disk Self Diagnostic Test
- SCSI Disk Read Test
- SCSI Disk Write Test
- SCSI Disk Format Test
- SCSI Disk Spin Down Test
- SCSI Disk Quick Test

For the SCSI test error codes, see “SCSI test error codes” on page 164.

SCSI Disk Buffer Test

This test writes logical blocks of data to the internal buffer on the disk drive. The same logical blocks of data are then read from the drive buffer and compared to the original data. If the SCSI hard disk drive does not have an internal buffer, you cannot select this test.

SCSI Disk Self Diagnostic Test

Select this choice to run the diagnostic tests on the SCSI disk drive.

To run the test, complete the following steps:

1. Select **SCSI Disk Self Diagnostic Test**, and press Enter.
2. Choose the parameters on the screen, and select **Continue**.

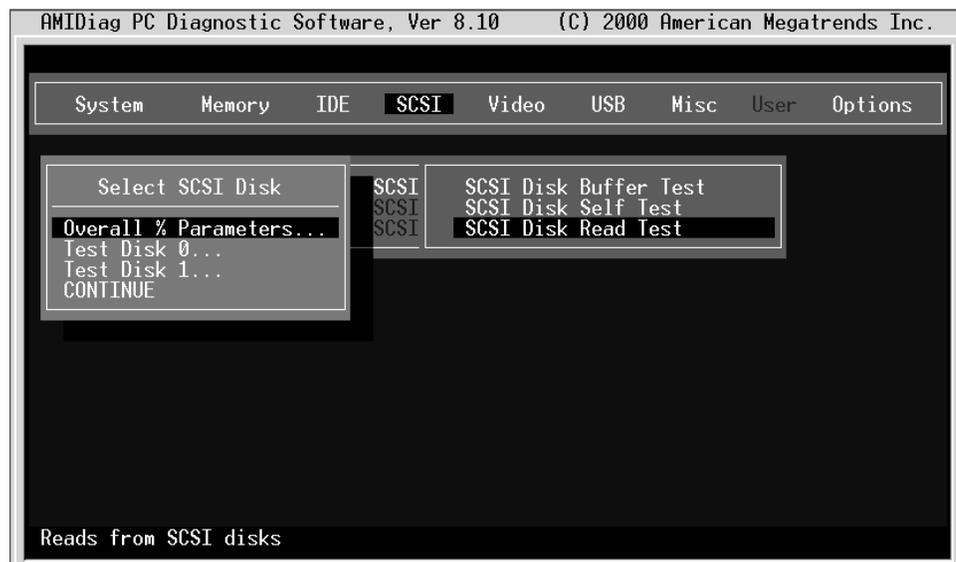
Note: You cannot quit the SCSI Disk Self Diagnostic Test. You must wait until the entire disk self test completes.

SCSI Disk Read Test

Use this test to make sure that the SCSI drive is reading correctly. This test sequentially and randomly reads logical blocks from the SCSI hard disk drive. If you do not specify a starting and ending block number, block 0 through the last block are tested.

To run the SCSI disk read test, complete the following steps:

1. From the main menu, select **SCSI**, and press Enter.
2. Select **SCSI Disk Read Test**, and press Enter. A default parameter screen appears.



3. Set the parameters that you want.

Parameter	Description
overall %	Specifies the drivewise % or common % as set for each drive. If Drivewise is selected, the drive parameters are specified for each drive used. If Common is selected, all drive parameters use the % parameters, which are entered in the % for Common fields. This reduces the need to set each drive parameter if the server has a large number of drives.
Common:	Use the term % to specify all drives
SCSI Disk n	Specify an individual drive parameter.

4. Select **Continue**, and press Enter.

The start and end block number fields are 0 and the last block on the disk or the values set the last time this test was run. As the test runs, the current block number, number of blocks tested, and number of blocks left are updated. Also, the block tested is marked with a different character. The random test is performed on the specified percentage of blocks between the specified start and end blocks.

SCSI Disk Write Test

Use this test to verify the ability of the SCSI disk drive to write data correctly to a disk. Use a disk that you know is good for this test. This test is normally hidden from view because it erases the data on the disk. To make this menu item viewable so that you can run this test, complete the following steps:

1. From the AMIDiag main menu, select **Options**, and press Enter.
2. Select **Toggle Hidden Test Display**, and press Enter.

Attention: This test erases all data on the disk.

3. Select the drive or drives to be tested, and run the test.

SCSI Disk Format Test

Use this test to verify that the SCSI device is properly formatted for operation. This test is normally hidden from view because it erases the data on the disk. To make this menu item viewable so that you can run this test, complete the following steps:

1. From the AMIDiag main menu, select **Options**, and press Enter.
2. Select **Toggle Hidden Test Display**, and press Enter.

Attention: This test formats the media in the device being tested. Use this test only if you want to format the media.

SCSI Disk Spin Down Test

This test issues a spin down command to the disk being tested.

Note: This action cannot be reversed easily without restarting the server.

SCSI Disk Quick Test

Use this test to perform an abbreviated read test on all SCSI disks installed in the server.

SCSI CD-ROM tests

Use the SCSI CD-ROM tests to diagnose SCSI CD-ROM drive functions. SCSI CD-ROM tests include the following subtests:

- **SCSI CD-ROM Buffer Test**

Use this diagnostic test to make sure that the memory buffer on the CD-ROM drive is working correctly.

- **SCSI CD-ROM Self Test**

Select this choice to run the diagnostic tests on the disk.

To run the test, complete the following steps:

1. From the main menu, select **SCSI**, and press Enter.
2. Select **SCSI CD-ROM Self Diagnostics Test**, and press Enter.
3. Select the parameters on the screen; then, select **Continue**, and press Enter.

Note: You cannot quit this test. You must wait until the entire test completes.

- **SCSI CD-ROM Tray Test**

Select this test to make sure that the CD-ROM drive auto-eject feature can eject a CD. The CD tray should open and close.

To test the CD-ROM drive tray, complete the following steps:

1. From the main menu, select **SCSI**, and press Enter.
2. Select **SCSI Tray Test**, and press Enter.

- **SCSI CD-ROM Read Test**

Select this test to make sure that the CD-ROM drive can read to all sectors of the CD. This test supports multi-format CDs with data and audio tracks, but it fails if an audio CD is placed in the drive.

To run the SCSI CD-ROM Read test, complete the following steps:

1. From the main menu, select **SCSI**, and press Enter.
2. Select **SCSI CD-ROM Read Test**, and press Enter. A parameter screen appears:

Select SCSI Disk	
Overall % Parameters	100
SCSI Disk 0	
CONTINUE	

Parameter	Description
overall %	Specifies drivewise % as set for each drive.
Common:	Use the term % to specify all drives
SCSI CD-ROM n	Specify an individual drive parameter.

SCSI CD-ROM Read Test	
Test CDROM0	: YES
Start Block	: 000000000
End Block	: 002028000
Sequential Test	
Random Test	
CONTINUE	

In the **Sequential Test** or **Random Test**, you are prompted for the percentage of the drive to be tested.

Sequential Test	
Sequential Test	: YES
% to test	: 100
CONTINUE	

If the starting and ending block are not specified, this test reads from block 0 to the last block. The random test is performed on the specified blocks between the start and end blocks.

3. Choose a percentage, select **CONTINUE**, and press Enter.

• **SCSI CD-ROM Play Test**

Use this test to make sure that the CD-ROM drive can play audio CDs.

To run the SCSI CD-ROM Play test, complete the following steps:

1. Attach a speaker to the CD-ROM drive, and insert an audio CD in the CD-ROM drive.
2. From the main menu, select **SCSI**, and press Enter.
3. Select **SCSI CD-ROM Play Test**, and press Enter. A default parameter screen appears:

Select SCSI Disk	
Overall % Parameters	100
SCSI Disk 0	
CONTINUE	

Parameter	Description
overall %	Specifies drivewise % as set for each drive.
Common:	Use the term % to specify all drives
SCSI CD-ROM n	Specify an individual drive parameter.

The following appears if you specify an individual drive:

SCSI CD-ROM Play Test	
Test CDROM0	: YES
Start Block	: 00000000
End Block	: 020280000
CONTINUE	

SCSI Tape Test

Use the SCSI Tape Test to diagnose functions of a SCSI tape device. The SCSI Tape tests include the following:

• **SCSI Tape Buffer Test**

This test writes logical blocks of data to the internal buffer on the tape drive. The same logical blocks of data are then read from the tape drive buffer and compared to the original data. If the tape drive does not have an internal buffer, you cannot select this test.

• **SCSI Tape Read Test**

Use this test to make sure that the SCSI tape drive is reading correctly. This test reads sequential logical blocks from the SCSI tape. With default parameters, this

test requires fully written media to be installed in the device being tested. Partially written media will result in a read error at the end of data. If only blank media is available, use the SCSI Tape Write Test to write a test pattern onto the blank media.

To run the SCSI Tape Read Test, complete the following steps:

1. From the main menu, select **SCSI**, and press Enter.
2. Select **SCSI Tape Read Test**, and press Enter. A default parameter screen appears:

Select SCSI Disk	
Overall % Parameters	100
SCSI Disk 0	
CONTINUE	

Parameter	Description
overall %	Specifies drivewise % as set for each drive.
Common:	Use the term % to specify all drives
SCSI Tape n	Specify an individual drive parameter.

The following screen appears when you specify an individual drive:

SCSI Tape Read Test	
Test Tape 0	: YES
Start Block	: 000000000
End Block	: 002028000
CONTINUE	

A prompt for the percentage of the drive to be tested appears.

3. Specify the percentage of the drive to be tested, select **CONTINUE**, and press Enter.

If the tape is not positioned at the beginning of the starting block, a tape rewind command is issued before the test begins.

- **SCSI Tape Rewind Test**

Use this test to make sure that the SCSI tape drive can rewind a tape.

To run the SCSI tape rewind test, complete the following steps.

Note: A fully written tape must be installed to run this test.

1. From the main menu, select **SCSI**, and press Enter.
2. Select **SCSI Tape Rewind Test**, and press Enter.

- **SCSI Tape Write Test**

Use this test to verify the ability of the SCSI tape drive to write data correctly to a tape. Use a tape that you know is good for this test. This test is normally hidden from view because it erases the data on the tape. Select the tape drives to be tested, and run the test.

Attention: This test erases all data on the disk.

Video diagnostic tests

Select this choice to run diagnostic tests on the display and the video controller.

To diagnose video display problems, complete the following steps:

1. From the main menu, select **Video**, and press Enter.
2. Select **Video Memory Test**, and press Enter.

For the video test error codes, see “Video test error codes” on page 167.

Running video tests

The video test you run depends on the type of monitor installed on your server.

Video Monitor Test

These tests verify the video controller output in addition to the communication between the controller and the display device.

Attribute Test: Use this test to make sure that the video display attributes, such as blinking, bold, and reverse video, are working correctly. You can run this test on all monochrome and all color monitors.

To run the attribute test, complete the following steps:

1. From the main menu, select **Video**, and press Enter.
2. Select **Attribute Test**, and press Enter.

Color Test: This test displays the possible colors in foreground, background, and border. You can run this test on all color monitors.

Text Mode Test: Use the Text Mode test to make sure that text displays correctly. The text mode tests are shown on the following table:

Test Name	Test Description	Type of Monitor
80 x 25 Display Test	Tests the 80 x 25 character set of the display adapter, displaying the entire character set in black and white, then in reverse video in video mode 3 (mode 7 if monochrome).	All monochrome and all color monitors.
40 x 25 Display Test	Tests the 40 x 25 character set of the display adapter in black and white, displaying the entire character set in black and white, then in reverse video.	All monochrome and all color monitors.

Graphics mode tests: Use the graphics mode tests to make sure that graphics display correctly. The following subtests appear in all Graphics Mode Tests (320 x 200, 640 x 200, 640 x 350, 640 x 480):

Subtest	Description
Text and Attribute Test	Makes sure all characters are displayed in the proper color.
Grid Test	Verifies the graphic dot spacing for each mode.
Aspect Ratio and Display Centering	Centers the monitor display.
Circular Pattern Test	Centers the monitor display.
Resolution	Reports the screen resolution.
Animation and Flicker	Reports the video controller speed.

Subtest	Description
Pixel Throughput	Reports the speed at which complex patterns are drawn on the screen.

These video tests might not appear correctly when displaying high-resolution VESA video modes on a multisync monitor. The monitor must be adjusted for each individual video mode. After the video mode you will be using appears, you must run the Aspect Ratio and Display Centering subtest to center the monitor.

The graphics mode tests are:

Test Name	Test Description	Type of Monitor
320 x 200 Graphics Test	Displays a black and white 9 x 13 window and redisplay it in reverse video. Then displays a three-color screen, a screen of random colors, then a black and white screen, and finally 256 colors	All color monitors.
640 x 200 Graphics Test	Displays three black and white boxes, then goes from a black screen to a white screen, and back to a black screen.	All color monitors
640 x 350 Graphics Test	Displays a 16-color screen, then fills the screen with random colors, then returns to a blank screen.	EGA and VGA adapters only.
640 x 480 Graphics Test	Displays a 16-color screen, then fills the screen with random colors, then returns to a blank screen.	Only VGA adapters.

Video Controller Test

This test verifies the functionality of the graphics controller in VGA mode. The video controller test verifies vertical synchronization, horizontal synchronization, the graphics controller, the attribute controller, and the DAC register.

USB diagnostic tests

The USB tests diagnose problems with USB devices.

For the USB test error codes, see “USB test error codes” on page 167.

USB Functionality Test

Select USB Test from the USB menu to diagnose problems with USB devices and to make sure that USB support is provided in the SAL/EFI.

USB Keyboard Test

Use this test to diagnose USB keyboard hardware functionality and to determine the data transfer rate between the USB host controller and the USB keyboard. This procedure tests the USB keyboard key codes and keystrokes.

To run the test, complete the following steps:

1. Select **Device Test** from the USB menu, and press Enter.
2. Select **USB Keyboard Test**, and press Enter.

The following test parameters appear:

Parameter	Action
Test This Device	To run the USB Keyboard Test, select YES , and press Enter.
PnP Test	Select YES to run the USB Keyboard Plug and Play (PnP) Test. This test makes sure that the USB keyboard Plug and Play feature works properly. The Plug and Play feature automatically configures the USB device when the device is attached to the server.

USB Keyboard Control Test: To test the USB keyboard controller, complete the following steps:

1. Select **USB** from the main menu, and press Enter.
2. Select **USB Keyboard Test**, and press Enter.
3. Select **USB Keyboard Control Test**, and press Enter.

USB Keyboard Code Test: The USB Keyboard Code test determines if a pressed key matches the Scan and ASCII codes for that key. Every time you press a key to verify its code, both the scan code and ASCII code of the pressed key is displayed. The key symbol is also displayed.

Perform this test to identify faulty keys.

To run the test, complete the following steps:

1. Select **USB** from the main menu, and press Enter.
2. Select **USB Keyboard Test**, and press Enter.
3. Select **USB Keyboard Code Test**, and press Enter to display a keyboard layout. Scan code and ASCII code appear above the keyboard layout.
4. Press the keys on the keyboard. The scan codes and ASCII codes display in the appropriate fields for each key as it is pressed. Use this test to verify the codes with their respective keys. Use the tables on pages 54 through 59 for the correct scan and ASCII codes.
5. Press Ctrl+Break to exit this test.

Use the following tables to verify that the displayed scan and ASCII codes are correct.

Table 3. Lower case keyboard scan/ASCII codes

Keystroke	Scan Code	ASCII Code	Keystroke	Scan Code	ASCII Code
Esc	01	1B	1	02	31
2	03	32	3	04	33
4	05	34	5	06	35
6	07	36	7	08	37
8	09	38	9	0A	39
0	0B	30	-	0C	2D
=	0D	3D	Backspace	0E	08
Tab	0F	09	q	10	71

Table 3. Lower case keyboard scan/ASCII codes (continued)

Keystroke	Scan Code	ASCII Code	Keystroke	Scan Code	ASCII Code
w	11	77	e	12	65
r	13	72	t	14	74
y	15	79	u	16	75
i	17	69	o	18	6F
p	19	70	[1A	5B
}	1B	5D	Return	1C	0D
Ctrl	†	†	a	1E	61
s	1F	73	d	20	64
f	21	66	g	22	67
h	23	68	j	24	6A
k	25	6B	l	26	6C
;	27	3B	'	28	27
,	29	60	Shift	†	†
\	2B	5C	z	2C	7A
x	2D	78	c	2E	63
v	2F	76	b	30	62
n	31	6E	m	32	6D
,	33	2C	.	34	2E
/	35	2F	*	37	2A
Alt	†	†	Space	39	20
Caps Lock	†	†	F1	3B	00
F2	3C	00	F3	3D	00
F4	3E	00	F5	3F	00
F6	40	00	F7	41	00
F8	42	00	F9	43	00
F10	44	00	F11	85	00
F12	86	00	Num Lock	†	†
Scroll Lock	†	†	Home	47	00
	48	00	PgUp	49	00
_	4A	2D		4B	00
Center key	4C	00		4D	00
+	4E	00		4F	00
	50	00	PgDn	51	00
Ins	52	00	Del	53	00
SysReq	no key	no key	Key 45	56	5C
Enter	E0	0D	/	E0	2F
Print Screen	†	†	Pause	†	†
Home	47	E0		48	E0
PgUp	49	E0		4B	E0

Table 3. Lower case keyboard scan/ASCII codes (continued)

Keystroke	Scan Code	ASCII Code	Keystroke	Scan Code	ASCII Code
‡ Combination provides no keystroke for the application; performs another action.					
-- No function is assigned to this combination.					

Table 4. Upper case (shift) keyboard scan/ASCII codes

Keystroke	Scan Code	ASCII Code	Keystroke	Scan Code	ASCII Code
Shift+Esc	01	1B	!	02	21
@	03	40	#	04	23
\$	05	24	%	06	25
^	07	5E	&	08	26
*	09	2A	(0A	28
)	0B	29	_	0C	5F
+	0D	2B	Shift+ Backspace	0E	08
Shift+Tab	0F	00	Q	10	51
W	11	57	E	12	45
R	13	52	T	14	54
Y	15	59	U	16	55
I	17	49	O	18	4F
P	19	50	{	1A	7B
}	1B	7D	Shift+Return	1C	0D
Shift+Ctrl	‡	‡	A	1E	41
S	1F	53	D	20	44
F	21	46	G	22	47
H	23	48	J	24	4A
K	25	4B	L	26	4C
:	27	3A	"	28	22
~	29	7e		2B	7C
Z	2C	5A	X	2D	58
C	2E	43	V	2F	56
B	30	42	N	31	4E
M	32	4D	<	33	3C
>	34	3E	?	35	3F
*	37	2A	Shift+Alt	‡	‡
Shift+Space	39	20	Shift+Caps Lock	‡	‡
Shift+F1	54	00	Shift+F2	55	00
Shift+F3	56	00	Shift+F4	57	00
Shift+F5	58	00	Shift+F6	59	00
Shift+F7	5A	00	Shift+F8	5B	00
Shift+F9	5C	00	Shift+F10	5D	00

Table 4. Upper case (shift) keyboard scan/ASCII codes (continued)

Keystroke	Scan Code	ASCII Code	Keystroke	Scan Code	ASCII Code
Shift+F11	87	00	Shift+F12	88	00
Shift+Num Lock	†	†	Shift+Scroll Lock	†	†
Shift+7	47	37	Shift+8	48	38
Shift+9	49	39	Shift+ -	4A	2D
Shift+4	4B	34	Shift+5	4C	35
Shift+6	4D	36	Shift++	4E	2B
Shift+1	4F	31	Shift+2	50	32
Shift+3	51	33	Shift+0	52	30
Shift+.	53	2E	Shift+Sys Req	no key	no key
Shift+key 45	56	7C	Shift+Enter	E0	0D
Shift+ /	E0	2F	Shift+Print Screen	†	†
Shift+Pause	†	†	Shift+Home	47	E0
Shift	48	E0	Shift+PgUp	49	E0
Shift	4B	E0	Shift	4D	E0
Shift+End	4F	E0	Shift	50	E0
Shift+PgDn	51	E0	Shift+Ins	52	E0
Shift+Del	53	E0			
† Combination provides no keystroke for the application; performs another action. -- No function is assigned to this combination.					

Table 5. Ctrl keyboard ASCII/scan codes

Keystroke	Scan Code	ASCII Code	Keystroke	Scan Code	ASCII Code
Ctrl+Esc	01	1B	Ctrl+1	--	--
Ctrl+2 (NUL)	03	00	Ctrl+3	--	--
Ctrl+4	--	--	Ctrl+5	--	--
Ctrl+6 (RS)	07	1E	Ctrl+7	--	--
Ctrl+8	--	--	Ctrl+9	--	--
Ctrl+0	--	--	Ctrl+_	0C	1F
Ctrl+ Backspace (Del)	0E	7F	Ctrl+Tab	94	00
Ctrl+Tab	0F	00	Ctrl+Q	10	51
Ctrl+q (DC1)	10	11	Ctrl+w (ETB)	11	17
Ctrl+e (ENQ)	12	05	Ctrl+r (DC2)	13	12
Ctrl+t (DC4)	14	14	Ctrl+y (EM)	15	19
Ctrl+u (NAK)	16	15	Ctrl+i (HT)	17	9
Ctrl+o (SI)	18	0F	Ctrl+p (DLE)	19	10
Ctrl+[(ESC)	1A	1B	Ctrl+] (GS)	1B	1D

Table 5. Ctrl keyboard ASCII/scan codes (continued)

Keystroke	Scan Code	ASCII Code	Keystroke	Scan Code	ASCII Code
Ctrl+Return	1C	0A	Ctrl+a	1E	01
Ctrl+s (DC3)	1F	13	Ctrl+d (EOT)	20	04
Ctrl+f (ACK)	21	06	Ctrl+g (BEL)	22	07
Ctrl+h (Backspace)	23	08	Ctrl+j (LF)	24	0A
Ctrl+k (VT)	25	0B	Ctrl+l	26	0C
Ctrl+;	--	--	Ctrl+'	--	--
Ctrl+`	--	--	Ctrl+Shift	†	†
Ctrl+\ (FS)	2B	1C	Ctrl+z (SUB)	2C	1A
Ctrl+x (CAN)	2D	18	Ctrl+c (ETX)	2E	03
Ctrl+v (SYN)	2F	16	Ctrl+b (STX)	30	02
Ctrl+n (SO)	31	0E	Ctrl+m (CR)	32	0D
Ctrl+.	--	--	Ctrl+.	--	--
Ctrl+/ Ctrl+Alt	--	--	Ctrl+*	96	00
Ctrl+Alt	‡	‡	Ctrl+Space	39	20
Ctrl+Caps Lock	--	--	Ctrl+F1	5E	00
Ctrl+F2	5F	00	Ctrl+F3	60	00
Ctrl+F4	61	00	Ctrl+F5	62	00
Ctrl+F6	63	00	Ctrl+F7	64	00
Ctrl+F8	65	00	Ctrl+F9	66	00
Ctrl+F10	67	00	Ctrl+F11	89	00
Ctrl+F12	8A	00	Ctrl+Num Lock	--	--
Ctrl+Scroll Lock	--	--	Ctrl+Hme	77	00
Ctrl	8D	00	Ctrl+PgUp	84	00
Ctrl+Keypad -	8E	00	Ctrl	73	00
Ctrl+Center	8F	00	Ctrl	74	00
Ctrl+Keypad +	90	00	Ctrl+End	75	00
Ctrl	91	00	Ctrl+PgDn	76	00
Ctrl+Ins	92	00	Ctrl+Del	93	00
Ctrl+Sys Req	(no key)	(no key)	Ctrl+Key 45	--	--
Ctrl+Enter	E0		Ctrl+/ Ctrl+Enter	95	00
Ctrl+Print Screen	72	00	Ctrl+Break	00	00
Ctrl+Home	77	E0	Ctrl	8D	E0
Ctrl+PgUp	84	E0	Ctrl	73	E0
Ctrl	74	E0	Ctrl+End	75	E0
Ctrl	91	E0	Ctrl+PgDn	76	E0
Ctrl+Ins	92	E0	Ctrl+Del	93	E0

Table 5. Ctrl keyboard ASCII/scan codes (continued)

Keystroke	Scan Code	ASCII Code	Keystroke	Scan Code	ASCII Code
‡ Combination provides no keystroke for the application; performs another action.					
-- No function is assigned to this combination.					

Table 6. Alt keyboard scan/ASCII codes

Keystroke	Scan Code	ASCII Code	Keystroke	Scan Code	ASCII Code
Alt+Esc	01	00	Alt+1	78	00
Alt+2	79	00	Alt+3	7A	00
Alt+4	7B	00	Alt+5	7C	00
Alt+6	7D	00	Alt+7	7E	00
Alt+8	7F	00	Alt+9	80	00
Alt+0	81	00	Alt+ -	82	00
Alt+=	83	00	Alt+ Backspace	0E	00
Alt+Tab	A5	00	Alt+q	10	00
Alt+w	11	00	Alt+e	12	00
Alt+r	13	00	Alt+t	14	00
Alt+y	15	00	Alt+u	16	00
Alt+l	17	00	Alt+o	18	00
Alt+p	19	00	Alt+[1A	00
Alt+]	1B	00	Alt+Return	1C	00
Alt+Ctrl	‡	‡	Alt+a	1E	00
Alt+s	1F	00	Alt+d	20	00
Alt+f	21	00	Alt+g	22	00
Alt+h	23	00	Alt+j	24	00
Alt+k	25	00	Alt+l	26	00
Alt+;	27	00	Alt+'	28	00
Alt+`	29	00	Alt+Shift	‡	‡
Alt+\	2B	00	Alt+z	2C	00
Alt+x	2D	00	Alt+c	2E	00
Alt+v	2F	00	Alt+b	30	00
Alt+n	31	00	Alt+m	32	00
Alt+,	33	00	Alt+.	34	00
Alt+/,	35	00	Alt+*	37	00
Alt+Space	39	00	Alt+Caps Lock	‡	‡
Alt+F1	68	00	Alt+F2	69	00
Alt F3	6A	00	Alt+F4	6B	00
Alt+F5	6C	00	Alt+F6	6D	00
Alt+F7	6E	00	Alt+F8	6F	00
Alt+F9	70	00	Alt+F10	71	00

Table 6. Alt keyboard scan/ASCII codes (continued)

Keystroke	Scan Code	ASCII Code	Keystroke	Scan Code	ASCII Code
Alt+F11	7B	00	Alt+F12	8C	00
Alt+Num Lock	†	†	Alt+Scroll Lock	†	†
Alt+Keypad -	4A	00	Alt+Keypad +	4E	00
Alt+Keypad Numbers	#	00	Alt+Del	--	--
Alt+SysReq	(no key)	(no key)	Alt+key 45	--	--
Alt+Enter	A6	00	Alt+/,	A4	00
Alt+Print Screen	†	†	Alt+Pause	†	†
Alt+Home	97	00	Alt	98	00
Alt+PgUp	99	00	Alt	9B	00
Alt	9D	00	Alt+End	9F	00
Alt	A0	00	Alt+PgDn	A1	00
Alt+Ins	A2	00	Alt+Del	A3	00
† Combination provides no keystroke for the application; performs another action. -- No function is assigned to this combination.					

USB Mouse Test

Select the USB Mouse Test to test the USB mouse on your server.

To run the test, complete the following steps:

1. From the main menu, select **USB**, and press Enter.
2. Select **Device Test**, and press Enter.
3. Select **USB Mouse Test**, and press Enter.

Parameter	Action
Test This Device	Select YES to run the USB Mouse Test.
Sensitivity Test	Select YES to run the Sensitivity test.
PnP Test	Select YES to run the USB Mouse Plug and Play (PnP) test. This test makes sure that the USB mouse Plug and Play feature works properly. The Plug and Play feature automatically configures the USB device when the device is attached to the server.

Miscellaneous diagnostic tests

The Miscellaneous diagnostic tests include the Serial Port Test, the LED Test, the RXE Port Test, and the Advanced System Management Test.

Serial port test

The Serial Port test checks to see if the serial port is functioning properly.

To diagnose serial port problems, complete the following steps:

1. From the main menu, select **Miscellaneous**, and press Enter.
2. Select **Serial Port Test**, and press Enter.

The test routines check all serial port controllers at speeds from 300 to 115,200 bps (up to 460,800 bps if a 16550 UART is installed).

3. Select the number of data bits, number of stop bits, and parity type for the serial port.
4. Select a field using the – and + keys and set the parameters.
5. Select **Continue**, and press Enter.

The serial port tests include the following:

- **Serial Port Hardware Test**

The serial port hardware test diagnoses hardware attached to the serial port.

- **Internal Loopback Test**

This test verifies the proper functionality of the transmitter and receiver register in the serial port using the internal loopback mechanism.

Attention: Running this test with console redirection might slow down the server.

- **External LoopBack Test**

This test verifies the proper functionality of the transmitter and receiver register in the serial port. This test requires an external loopback connector to be physically connected to the serial port.

Attention: Running this test with console redirection might slow down the server.

- **FIFO Test**

This test verifies that the first-in first-out (FIFO) function in the serial port is functioning properly. This test is enabled only for UART 16550 and above.

- **Baud Rate Test**

This test verifies the accuracy of the data being transferred by the serial port at different baud rates.

For the serial port test error codes, see “Serial port test error codes” on page 169.

LED Test

Use this test to diagnose all LEDs that can be set using software and visible after the server is assembled. This test lights all LEDs in the server and prompts you to check that they are all lit; then, it turns off all LEDs and prompts you to check that they have been turned off.

RXE Port Test

Use this test to diagnose problems with the RXE ports. The RXE Port Test consists of the following sub-tests:

- **RIOG (RXE) Status**

This test displays the status of the RXE ports and the attached RXE-100 units.

- **RIOG Port A Test**

This test verifies the quality of the connection from the RXE Expansion Port (A) connector to a remote I/O enclosure.

- **RIOG Port B Test**

This test verifies the quality of the connection from the RXE Expansion Port (B) connector to a remote I/O enclosure.

- **RXE-100 Side A Port Test**

This test verifies the quality of the connection from the RXE-100 Side A connector to the RXE Expansion Port.

- **RXE-100 Side A → Side B Test**

This test verifies the quality of the connection from the RXE-100 Side A to the RXE-100 Side B.

- **RXE-100 Side B → Side A Test**

This test verifies the quality of the connection from the RXE-100 Side B to the RXE-100 Side A.

- **RXE-100 Side B Port Test**

This test verifies the quality of the connection from the RXE-100 Side B Port connector to the RXE Expansion Port.

Advanced System Management Test

The Advanced System Management (ASM) Test consists of the following sub-tests:

- **ASM/ISMP I2C Bus Test**

This test queries the status of the I2C subsystem within the x450 node. It reports back on any internal integrated circuit (I2C) radials that either are untested or tested bad.

- **ASM Built-In Self Test (BIST)**

This test queries the ASM for the status of its last-run BIST. Non-disruptive portions of BIST are run periodically on the ASM adapter. Failing BIST results will be reported so that you can determine which, if any, of the major subsystems of the ASM adapter are malfunctioning.

- **ASM Restart Test**

Use this test to restart the ASM adapter without disconnecting ac power from the xSeries 450 server.

- **RXE I2C Bus Test**

This test queries the status of the I2C subsystem within attached RXE-100 units. It reports back on any I2C radials that are either untested or tested bad.

Note: To run this test, the ASM adapter must be cabled correctly to the RXE-100 unit using the RS-485 bus and appropriate Category 3 and Category 5 cables with proper termination.

- **RXE ISMP Self Test**

This test queries the ISMP controllers of attached RXE-100 units for the last BIST status. Failing RXE-100 BIST results will be reported so that you can determine if the ISMP subsystem is malfunctioning due to microcontroller problems.

Note: To run this test, the ASM adapter must be cabled correctly to the RXE-100 unit using the RS-485 bus and appropriate Category 3 and Category 5 cables with proper termination.

Options menu

The Options menu items are as follows:



Edit Batch Parameters

You can customize a set of diagnostic tests to run on your server and save it as a batch file to be run later. You can set the type of AMIDIag test to be run, the number of times each test is run, and the test parameters (for example, you can specify the starting and ending hard disk drive heads and cylinders to be tested).

To set or display AMIDIag runtime parameters, complete the following steps:

1. From the AMIDIag main menu, select **Options**, and press Enter.
2. Select **Edit Batch Parameters**, and press Enter. The Edit Batch Parameters menu appears:



3. Select **Batch Parameters**, and press Enter. The following menu is displayed:



Cycle Mode

Specifies the number of test cycle scripts in the file. In each cycle there can be a different set of test parameters.

Cycle Number

Specifies whether to test through all of the cycles or just one cycle. This field can be set to **All** or **One**.

Test Mode

The Test mode refers to the overall control, not individual cycles. The test modes are:

Mode	Description
Continuous	The specified tests run until Esc or Ctrl+Break is pressed.
Timebound	Specify how long the test is to run. Type the hours in the Time Limit Hrs field and the minutes in the Time Limit Min field, and press Enter. The maximum setting for number of hours is 999. The maximum setting for number of minutes is 59.
Passbound	Set the number of passes (up to 65,535) for the selected AMIDIAG tests in the Number of Passes field, or press Enter to accept the default (run each selected diagnostic test once).

Test Limit Hrs

Specifies the time period in hours in case of cycle Timebound test mode.

Test Limit Min

Specifies the time period in minutes in case of cycle Timebound test mode.

Number of Passes

Specifies the number of passes of cycles in case of Passbound test mode.

Break All on Error

This field can be set to **YES** or **NO**. If set to **YES**, the AMIDIAG program stops running all tests after it finds an error.

Cycle Test Mode

Specifies the test mode in a cycle. The cycle test modes are:

Mode	Description
Timebound	Specify how long the test is to run. Type the hours in the Time Limit Hrs field and the minutes in the Time Limit Min field, and press Enter. The maximum setting for the number of hours is 999. The maximum setting for the number of minutes is 59.
Passbound	Set the number of passes (up to 65,535) for the selected AMIDiag tests in the Number of Passes field, or press Enter to accept the default (run each selected diagnostic test once).

Cycle TLimit Hrs

Specifies the time period in hours in case of Timebound test mode.

Cycle TLimit Min

Specifies the time period in minutes in case of Timebound test mode.

Passes in Cycle

Specifies the number of passes in a cycle, in case of cycle Passbound test mode. Individual tests also have a count specifying how many times they are to be run.

Test Order

The test order parameters are:

Parameter	Description
Default	The selected AMIDiag tests are run in exactly the same order in which they were selected.
Random	The selected AMIDiag tests are run in a random manner.
Testwise	The selected AMIDiag tests are run in the order in which they appear on the AMIDiag menus.

Wait on Error

This field can be set to **YES** or **NO**. If set to **YES**, the AMIDiag program waits for you to press any key after finding every error.

Break Test on Error

This field can be set to **YES** or **NO**. If set to **YES**, the AMIDiag program stops running after it finds an error.

Interactive

Select this parameter to run the interactive tests in interactive mode. Your input is required in an interactive test. The default value for this parameter is No.

If this parameter is set to **NO**, all diagnostic tests that support the interactive flag and cannot be run without your input will not run. If the test can be run without your input but it is impossible to decide if the test has passed or failed without your input, the test will run, but it will always pass.

If this parameter is set to **YES** and the test cannot be run without your input, it runs and will wait for your input as appropriate. If the test can be run without your input but it is impossible to decide if the test has passed or failed without your input, the test runs and it will wait for your decision whether the test passed.

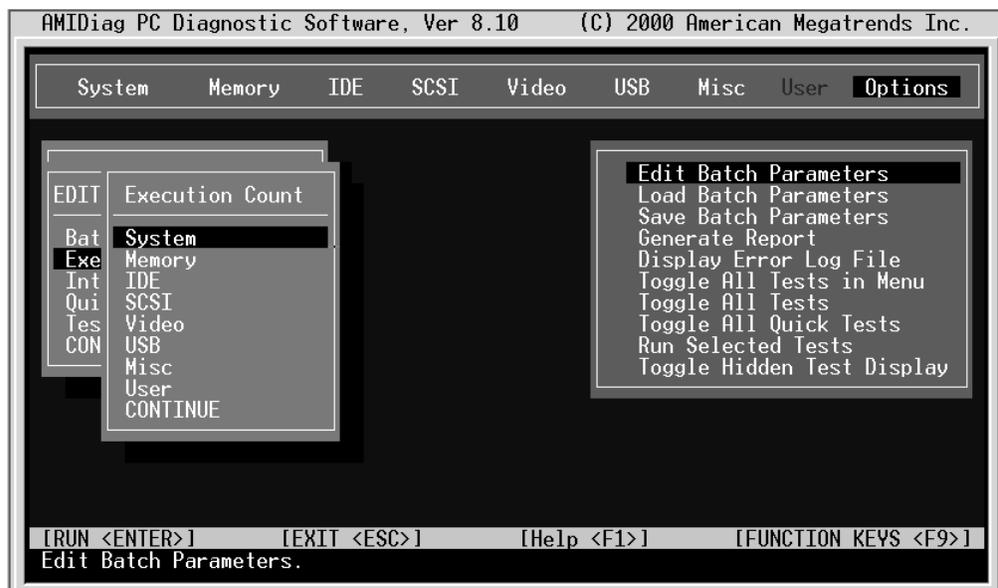
Quick test

This parameter specifies that tests must be run in quick test mode.

Abbreviated versions of the diagnostic tests are run in quick test mode. The selected tests are run in quick test mode if the tests support quick mode. You can use the quick test parameter in two ways:

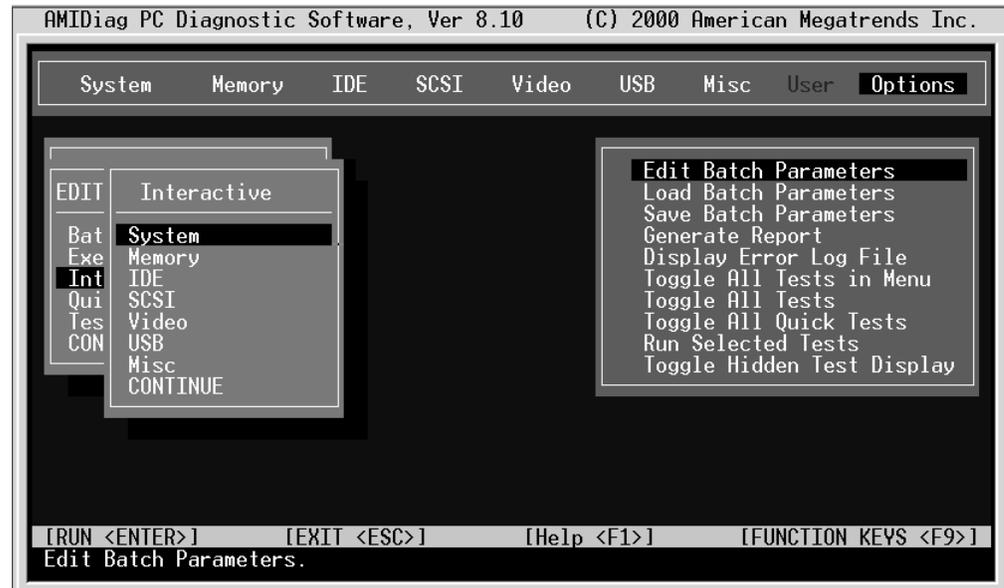
Quick Test use	Description
Complete a system test in a shorter time.	Select the diagnostic tests you want to run, or press F7 to select all diagnostic tests on an AMIDiag menu. Set the Quick Test parameter to Yes . If you press F10 to run the tests, all tests except the tests that support Quick Test will run normally. The tests that support Quick Test run in quick mode. If your server has several IDE and SCSI hard disk and CD-ROM drives, testing all drives will take a long time. When you select Quick Test, the IDE and SCSI devices will be tested quickly, saving time.
Use quick test mode for fast system verification	Press F8 when the AMIDiag main menu is displayed to set this parameter to Yes and to select the tests defined as System Quick Test Components. You can either press F4 to script this test, or press F10 to run the tests in batch mode.

Execution count: The Execution Count menu appears when you select **Execution Count** from the Edit Batch Parameters menu.



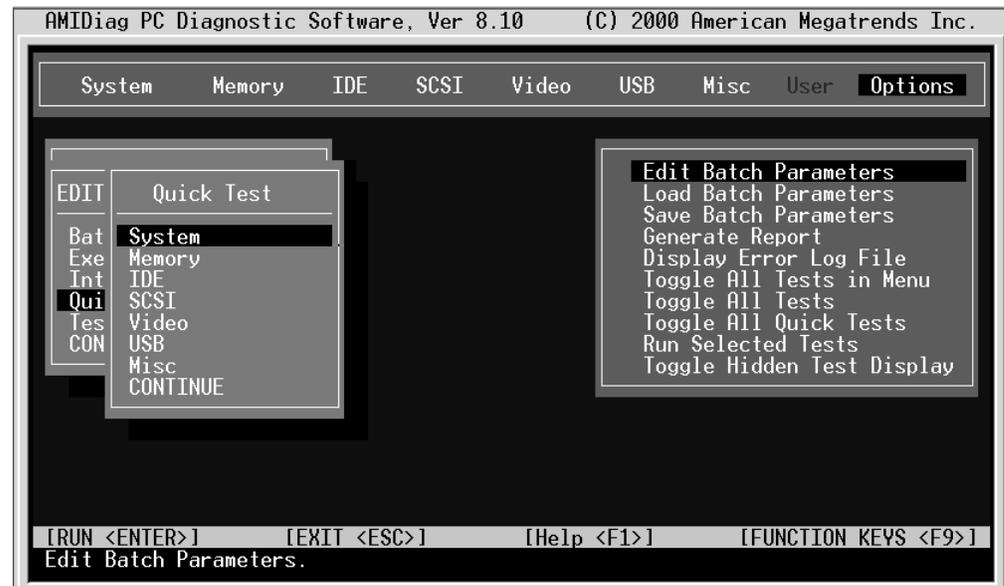
Choose the number of times that you want to run the AMIDiag tests on the associated AMIDiag menus. You can run each test up to 255 times. If you have set the Passbound parameters (see the previous screen) to 5 and you set the repeat count to 5, the test will be run a total of 25 times.

Interactive Test: When you select **Interactive Test**, and press Enter, the following screen is displayed:



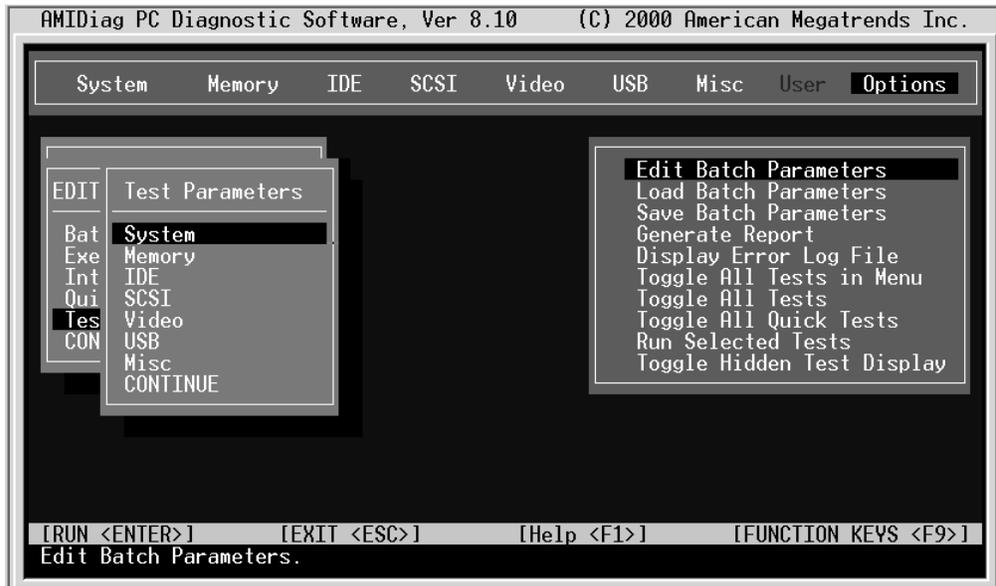
Select the test group. A list of all tests appears. Tests that support interactive test have **Yes** beside them. Select the tests to run, and press Enter.

Quick Test: When you select **Quick Test**, the following **Quick Test** menu is displayed:



Select the test group. A list of all tests appears. Tests that support Quick Test have **Yes** beside them. Select the tests to run, and press Enter.

Test Parameters: The Test Parameters menu is displayed when you select **Edit Batch Parameters** from the Options menu.

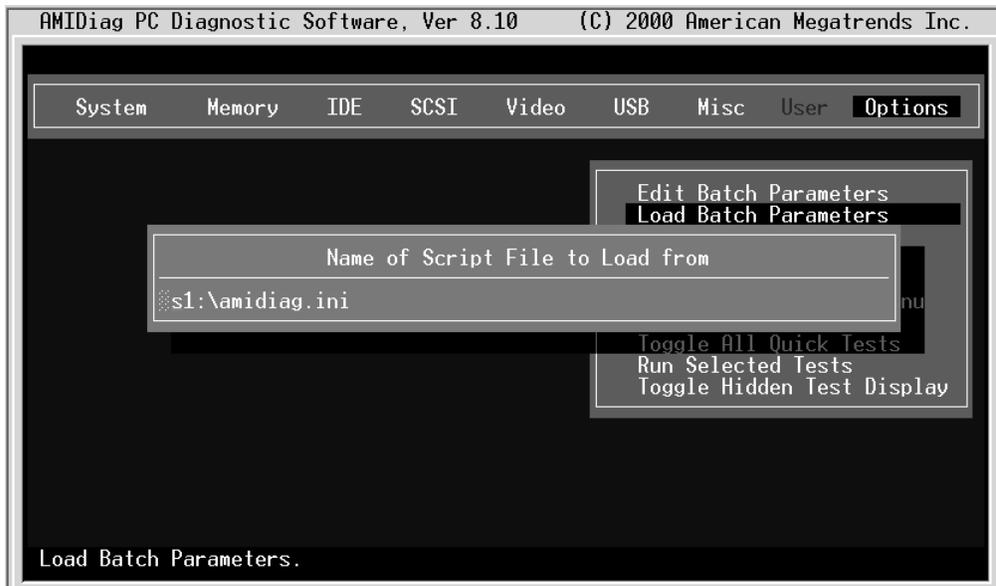


Each item in this menu is the name of an AMIDIag menu. When you select an AMIDIag menu choice, all AMIDIag tests on the menu are listed. Select the tests to run in batch mode, and press Enter.

If you select a test, the parameters for that test are displayed. Set the parameters, and select another diagnostic test. Select **CONTINUE**, and press Enter when you have set all test parameters for the AMIDIag test to be run in batch mode.

Load Batch Parameters

Choose this option to load previously saved AMIDIag batch diagnostic test parameters. The Load Batch Parameters dialogue box appears:



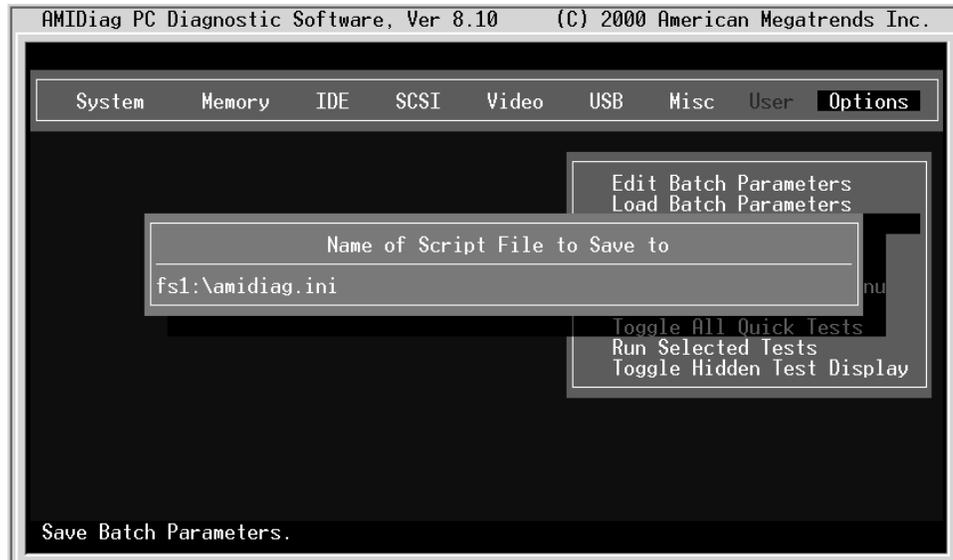
Press Enter to accept the default batch parameter file (Diagnostic Utility.INI), or type the appropriate AMIDIag batch parameter filename. You can use any valid filename.

The filename extension does not have to be .INI. You can then press F10 to run the AMIDdiag tests that are specified in this file.

Save Batch Parameters

Select this choice to save all batch mode parameters, selected tests, selected devices, and error logging information to an AMIDdiag batch parameter file. You can then load this ASCII file later and use the same saved options and test parameters every time you perform a AMIDdiag session. To save batch parameters, complete the following steps:

1. From the AMIDdiag main menu, select **Options**, and press Enter.
2. Select **Save Batch Parameters**, and press Enter. The following appears:



3. Press Enter to accept the default batch parameter file (Diagnostic Utility.INI), or type the appropriate AMIDdiag batch parameter filename.

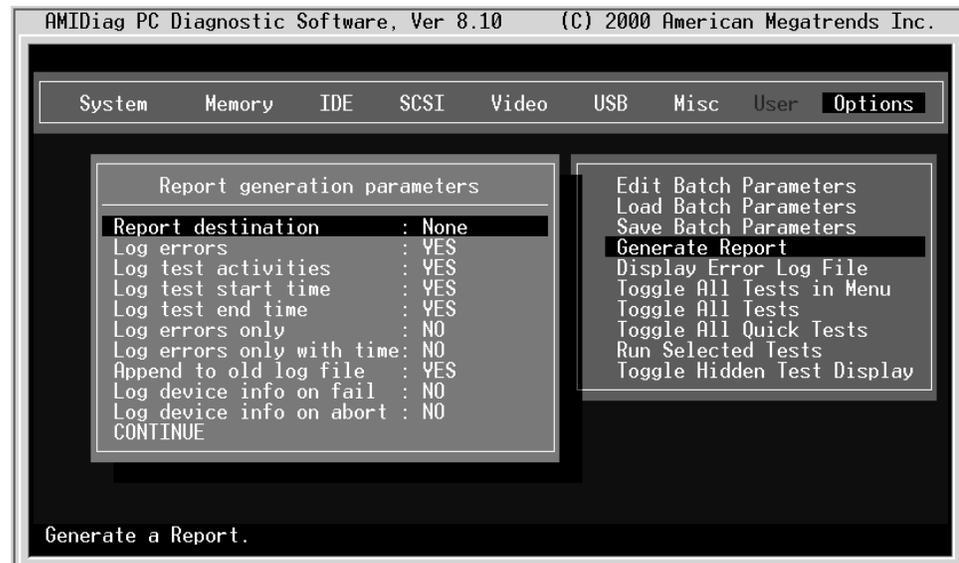
Generate Report

To generate a report of the diagnostic test and all errors found, complete the following steps:

1. From the main menu, select **Options**, and press Enter.
2. Select **Generate Report** to specify the output device: disk file or serial port.

Note: If a file is selected as an output device, you must ensure that a writeable file system is available to write the report to from EFI.

The report generation parameters are as follows:



3. Select **CONTINUE** after setting report parameters, and press Enter.

You can customize how the errors are logged and where the logs are saved using the choices in this menu. You can define the destination for the output, log which tests are conducted, when the test is started, when the test completes, and whether the test will log only errors.

Toggle All Tests in Menu

Select this choice to display the list of test menus and to select a menu. When you select a menu, the tests for that menu display. Select **Toggle all tests** to select all tests. Select **Toggle all quick tests** to select all quick tests. Quick tests are abbreviated versions of the complete test.

Run Selected Tests

Select this choice to run the tests that you have selected.

Toggle Hidden Test Display

Select this choice to display all hidden tests.

Ethernet diagnostic tests

Ethernet diagnostic programs are stored on the *Resource* CD. To use this CD, complete the following steps:

1. Insert the CD into the DVD/CD-ROM drive, and restart the server.
2. Go to the EFI shell; then, change to the file system on the CD, and navigate to the x450 subdirectory on the CD.
3. Type `enet_diag.nsh`, and press Enter to run the program from the CD.

See the documentation on the *Resource* CD for more information about Ethernet diagnostic tests and error codes.

Diagnostic error code tables

For descriptions of the error codes that might appear when you run the AMIDIag program, see “Diagnostic error codes” on page 159.

Notes:

1. Depending on your server configuration, some of the error codes might not appear when you run the diagnostic programs.
2. If diagnostic error codes appear that are not listed in the tables, make sure that your server has the latest levels of SAL/EFI code, Remote Supervisor Adapter, and diagnostics microcode installed.

Small computer system interface (SCSI) messages

If you receive a SCSI error message, see “SCSI error messages” on page 184.

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

Recovering SAL/EFI code

If the SAL/EFI code has become damaged, such as from a power failure during a flash update, you can recover the SAL/EFI code using the SAL/EFI code page jumper (J28 on the I/O board) and the recovery program on the *Resource* CD that comes with the xSeries 450 server.

You can download the latest version of the SAL/EFI flash utility program from the World Wide Web. Go to <http://www.ibm.com/eserver/xseries/>, click **IBM Server Support**, and make the selections for the server.

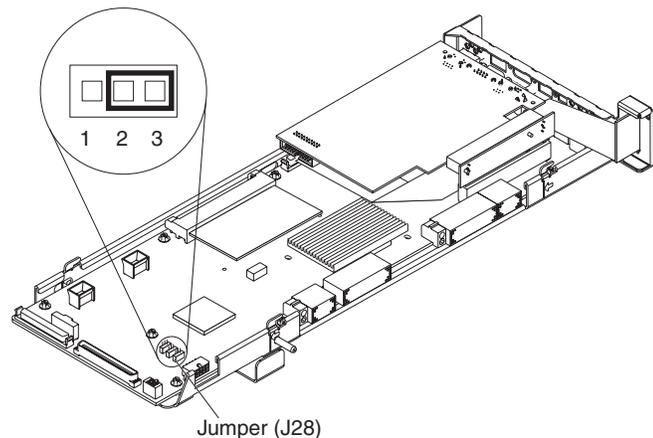
To perform a full recovery of the SAL/EFI code, complete the following steps:

1. Review the safety information beginning on page 197.

Attention: When you handle static-sensitive devices, take precautions to avoid damage from static electricity. For details about handling these devices, see “Handling static-sensitive devices” on page 78.

Note: You will not see anything displayed on the monitor when you perform this procedure.

2. Insert the *Resource* CD into the DVD/CD-RW drive.
3. Turn off the server and peripheral devices, and disconnect all external cables and power cords; then, open the cover (see “Opening the cover” on page 88).
4. Remove fans 3 and 4. For instructions, see “Replacing fan 3 or 4” on page 108.
5. Locate the SAL/EFI code page jumper (J28) on the I/O board.



6. If there is a jumper on J28, move the jumper from pins 1 and 2 to pins 2 and 3 to enable the SAL/EFI backup code page. If there is no jumper, add one to J28 pins 2 and 3.
7. Replace fans 3 and 4, and reconnect all external cables and power cords; then, turn on the peripheral devices.
8. Start up the server. After 5-10 seconds, the blue Attention LED on the Light Path card blinks.
9. If the green access LED on the DVD/CD-RW drive does not blink to indicate that the recovery flash image is being read within 2 minutes, press the reset button on the front of the server to retry the update. If the LED fails to blink again, the SAL/EFI backup code page might be damaged, and you might need to replace the I/O board to correct the problem. Run the AMIDiag program to test the I/O board; then, see “I/O board, riser card, and Remote Supervisor Adapter” on page 130 for instructions.
10. When the DVD/CD-RW LED stops blinking, wait at least 5 minutes for the flash update to complete.
11. Remove the *Resource* CD from the drive, and repeat steps 3 on page 71 through 5 on page 71. Then, continue with step 12.
12. Move the jumper on J28 to pins 1 and 2 to return to normal startup mode.
13. Replace the fans, and close the cover (see “Closing the cover” on page 111).
14. Reconnect all external cables and power cords, and turn on the peripheral devices.
15. Turn on the server.

Note: You might need to update the system firmware to the current level. For instructions, see “Updating the firmware” on page 39.

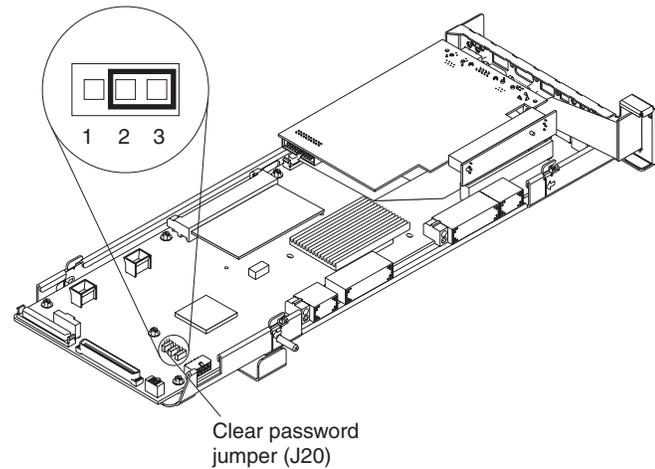
Clearing a power-on password

This section applies to lost or forgotten passwords. For more information about lost or forgotten passwords, see “Using the Configuration/Setup Utility program” on page 12.

Complete the following steps to clear the power-on password:

1. Review the safety information beginning on page 197.
Attention: When you handle static-sensitive devices, take precautions to avoid damage from static electricity. For details about handling these devices, see “Handling static-sensitive devices” on page 78.
2. Turn off the server and all attached devices.
3. Unplug the power cord, and disconnect all external cables.
4. Open the top cover (see “Opening the cover” on page 88).
5. Remove fans 3 and 4. For instructions, see “Replacing fan 3 or 4” on page 108.

6. Locate the clear password jumper (J20) on the I/O board. The following illustration shows the location of the jumper on the I/O board.



7. Move the clear password jumper from pins 1 and 2 to pins 2 and 3.
8. Replace fans 3 and 4, and reconnect all external cables and power cords; then, turn on the peripheral devices.
9. Turn on the server. The EFI Boot Manager program starts.
10. Follow the instructions to create a new password.
11. Repeat steps 1 on page 72 through 5 on page 72.
12. Return the clear password jumper to pins 1 and 2.

Note: The password will be cleared on every startup until the jumper is replaced to pins 1 and 2.

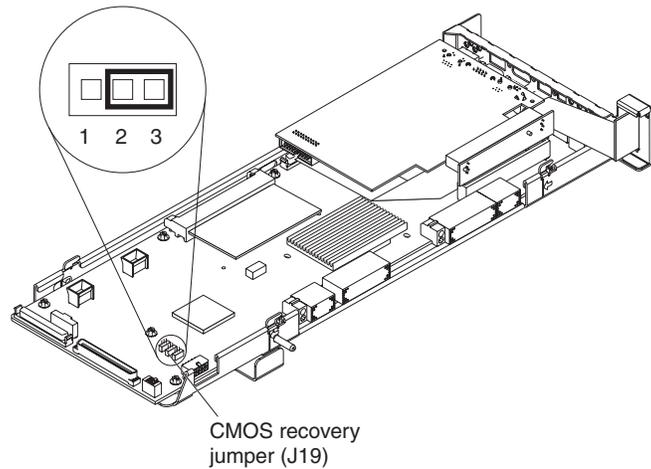
13. Repeat steps 8 through 10.
14. Close the cover (see “Closing the cover” on page 111).
15. Connect the server to a power source, keyboard, monitor, and mouse.
16. Turn on the server.

Clearing CMOS

Complete the following steps to set the CMOS recovery jumper:

1. Review the safety information beginning on page 197.
Attention: When you handle static-sensitive devices, take precautions to avoid damage from static electricity. For details about handling these devices, see “Handling static-sensitive devices” on page 78.
2. Turn off the server and all attached devices.
3. Unplug the power cord, and disconnect all external cables.
4. Open the top cover (see “Opening the cover” on page 88).
5. Remove fans 3 and 4. For instructions, see “Replacing fan 3 or 4” on page 108.

6. Locate the CMOS recovery jumper (J19) on the I/O board. The following illustration shows the location of the jumper on the I/O board.



7. Move the CMOS recovery jumper from pins 1 and 2 to pins 2 and 3.
8. Wait 60 seconds; then, return the CMOS recovery jumper to pins 1 and 2.
9. Replace fans 3 and 4.
10. Close the cover (see “Closing the cover” on page 111).
11. Connect the server to a power source, keyboard, monitor, and mouse.
12. Turn on the server. The EFI Boot Manager program starts.
13. Follow the instructions to erase the existing password or create a new password.
14. Select **Save Settings**, and press Enter.

Power checkout

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

Follow this general procedure for troubleshooting power problems:

1. Turn off the server, and disconnect all ac power cords.
2. Check for loose cables in the power subsystem. Also check for short circuits; for example, a loose screw might be 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 the server is at the minimum configuration required to start the server (see the note about minimum operating requirements on page 180).
4. Reconnect all ac power cords, and turn on the server. If the server starts successfully, replace adapters and devices one at a time until the problem is isolated. If the server does not start up from the minimal configuration, replace FRUs of the 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 start (see the minimum configuration requirements at “Undetermined problems” on page 185).

Troubleshooting the Ethernet controller

If a problem occurs with the 10/100/1000 Mbps Ethernet controller, use the Ethernet diagnostic program on the *Resource* CD to diagnose the problem. For more information about this CD, see “Ethernet diagnostic tests” on page 70. For information about the Ethernet error codes and actions to take, see the documentation on the *Resource* CD.

Network connection problems

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

- 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 remains, try a different cable.

If you set the Ethernet controller to operate at either 100 Mbps or 1000 Mbps, you must use Category 5 or higher cabling.

- Determine whether the hub supports auto-negotiation. If it does not, try configuring the integrated Ethernet controller manually to match the speed and duplex mode of the hub.
- Check the Ethernet controller LEDs on the rear of the server.

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

- The Ethernet transmit/receive activity LED on the rear of the server is lit when the Ethernet controller sends or receives data over the Ethernet network. If the Ethernet transmit/receive activity LED is off, make sure that the hub and network are operating and that the correct device drivers are installed.
- The Ethernet link status LED on the rear of the server is lit when the Ethernet controller receives a LINK pulse from the hub. If the LED is off, there might be a defective connector or cable or a problem with the hub.
- Make sure that you are using the correct device drivers, which are supplied with your 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.

The way the Ethernet controller is tested depends on which operating system you are using (see the Ethernet controller device driver README files).

Ethernet controller troubleshooting chart

Use the following troubleshooting chart to find solutions to 10/100/1000 Mbps Ethernet controller problems that have definite symptoms.

Ethernet controller problems	FRU/actions
The server stops running when loading device drivers.	Check the following: <ul style="list-style-type: none">• Make sure that you are using the most recent device driver available from the World Wide Web.• Reseat or replace the adapter.
Ethernet link status LED does not work.	Check the following: <ul style="list-style-type: none">• Make sure that the hub is turned on.• Check all connections at the Ethernet controller and at the hub.• Use another port on the hub.• If the hub does not support auto-negotiation, manually configure the Ethernet controller to match the hub.• If you manually configured the Duplex mode, make sure that you also manually configure the speed.• Reseat or replace the adapter.
The Ethernet transmit/receive activity LED does not work.	Check the following: <ul style="list-style-type: none">• Make sure that you have loaded the network device drivers.• The network might be idle. Try sending data from this server.
Data is incorrect or sporadic.	Check the following: <ul style="list-style-type: none">• Make sure that you are using Category 5 or higher cabling when operating the server at 100 Mbps or at 1000 Mbps.• Make sure that the cables do not run close to noise-inducing sources like fluorescent lights.

Ethernet controller messages

The integrated Ethernet controller might display messages from certain device drivers. The latest information available concerning these messages will be made available at the IBM Support Web site at <http://www.ibm.com/eserver/xseries>.

Chapter 4. Installing options

This chapter provides detailed instructions for installing hardware options in your server.

Installation guidelines

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

- Read the safety information beginning on page 197 and the guidelines in “Handling static-sensitive devices” on page 78. This information will help you work safely with your server or options.
- Make sure that you have an adequate number of properly grounded electrical outlets for your server, monitor, and any other devices that you will connect to the server.
- Back up all important data before you make changes to disk drives.
- For a list of supported options for your server, go to <http://www.ibm.com/pc/us/compat/>.

Note: Some preconfigured servers have a unique list of supported options. See the software documentation provided with those servers for more information.

System reliability considerations

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

- Each of the drive bays has either a drive or a filler panel installed.
- There is space around the server to allow the cooling system to work properly.
- Cables for optional adapters are routed according to the instructions that are provided with the adapters.
- All microprocessors have the same cache size and type and the same clock speed.
- For proper cooling, do not leave the cover open for more than 15 minutes.
- A failed fan is replaced within 48 hours.
- The top cover is closed during normal operation.
- Do not remove a defective power supply until a replacement is available.
- For redundant and hot-swappable operation, the power supplies are connected to 200-240 V ac.

Working inside a server with power on

Your server supports hot-swap devices and is designed to operate safely while turned on with the cover removed. 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 or scarf to hang inside the server.
- Remove jewelry, such as bracelets, rings, necklaces, 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.

Handling static-sensitive devices

Attention: Static electricity can damage electronic devices and your system. To avoid damage, keep static-sensitive devices in their static-protective package until you are ready to install them.

To reduce the possibility of electrostatic discharge, observe the following precautions:

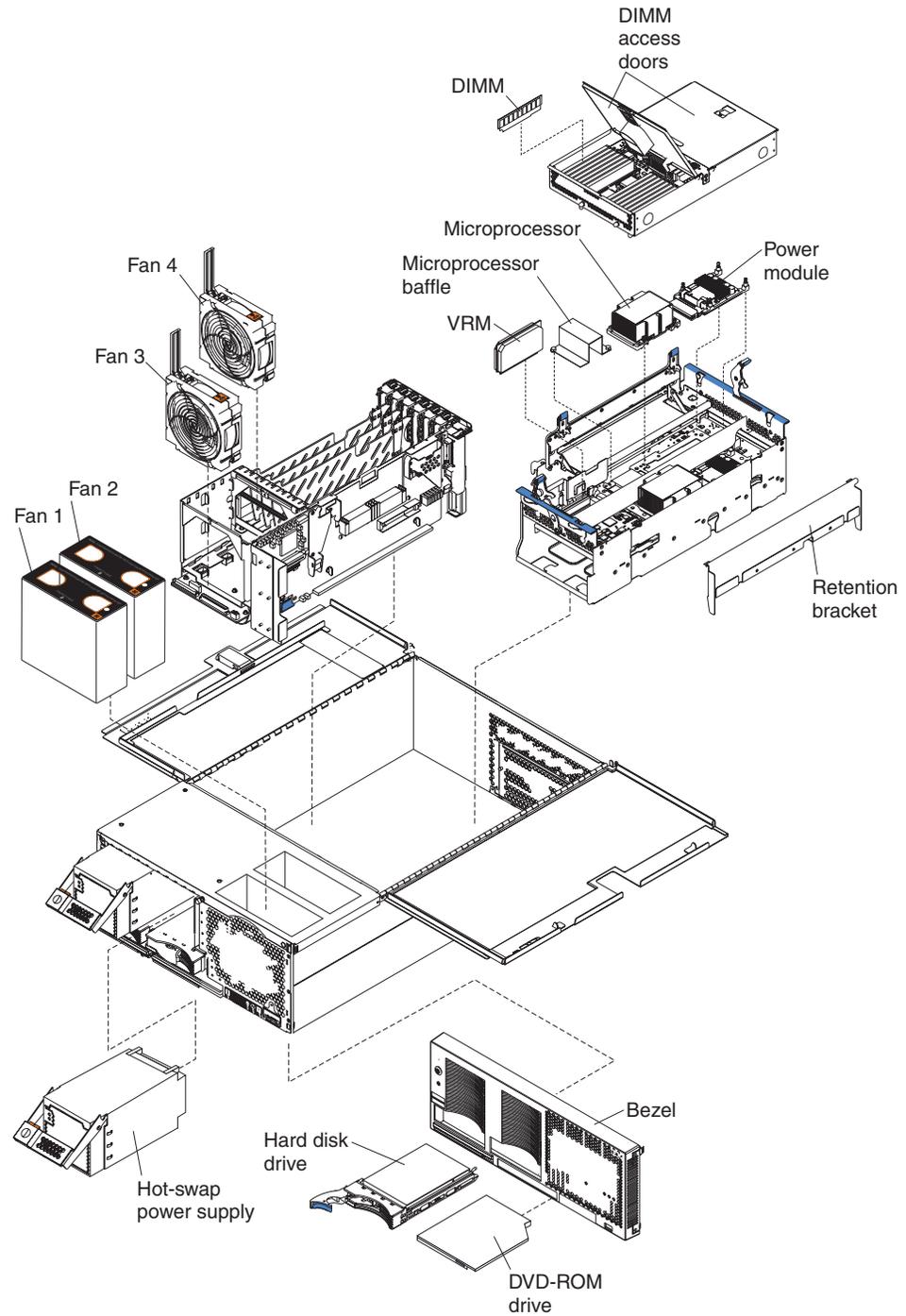
- Limit your movement. Movement can cause static electricity to build up around you.
- Handle the device carefully, holding it by its edges or its frame.
- Do not touch solder joints, pins, or exposed printed circuitry.
- Do not leave the device where others can handle and damage it.
- While the device is still in its anti-static package, touch it to an unpainted metal part of the system unit for at least 2 seconds. This drains static electricity from the package and from your body.
- Remove the device from its package, and install it directly into the system unit without setting down the device. If it is necessary to set down the device, place it in its static-protective package. Do not place the device on your system unit cover or on a metal surface.
- Take additional care when handling devices during cold weather. Heating reduces indoor humidity and increases static electricity.
- Wear a properly grounded wrist strap against your skin to help eliminate static electricity from your body.

Major components of the xSeries 450 server

The orange color on components and labels in the server indicates hot-swap or hot-plug components. You can install or remove these components while the server is running, provided that the server is configured to support hot-swap and hot-plug components.

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

The following illustration shows the locations of major components in your server.

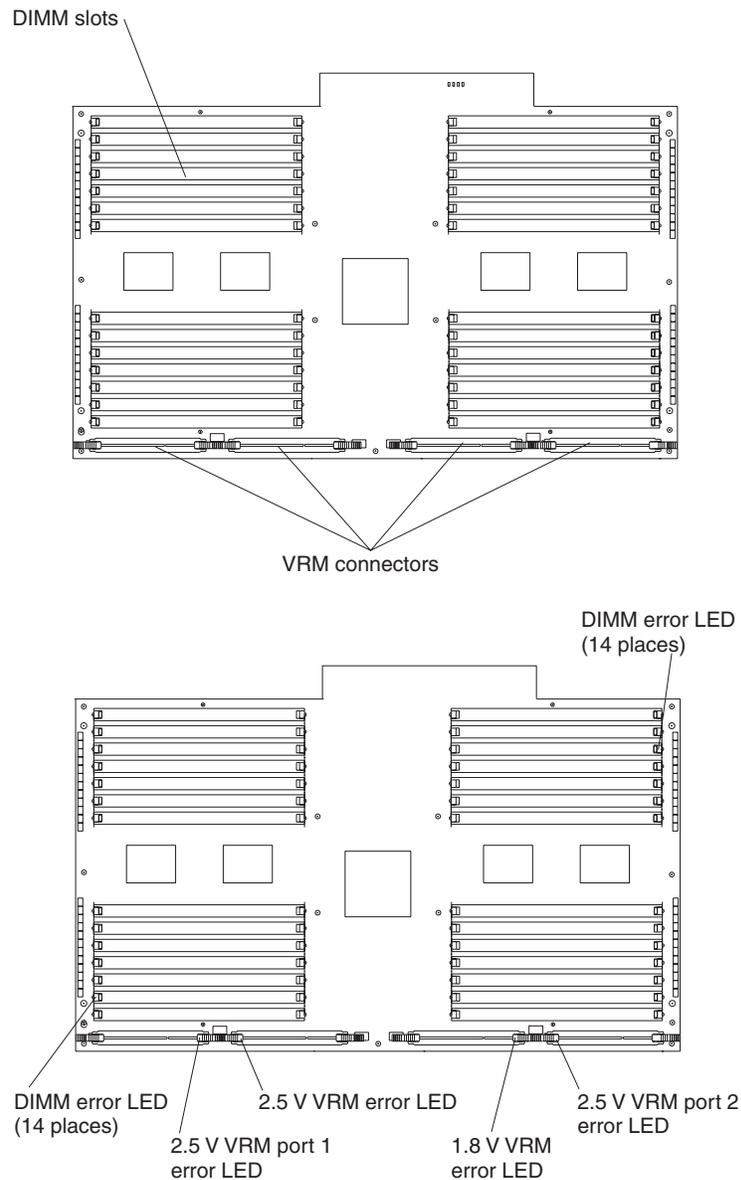


Connector and LED locations

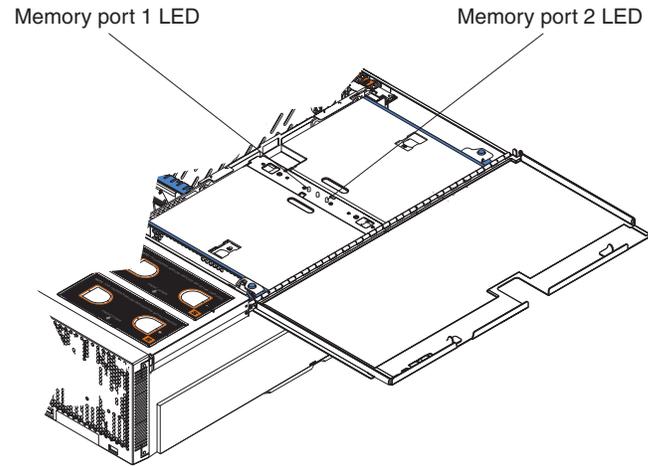
The illustrations in this section show the locations of connectors, switch and jumper blocks, and LEDs.

Memory board internal connectors and LEDs

The following illustrations show the internal connectors and LEDs on the memory board.

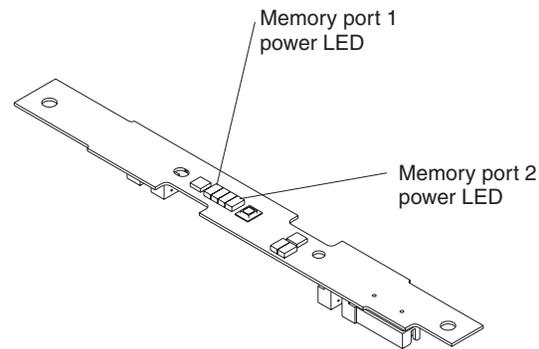


The following illustration identifies the LEDs on the memory-board assembly.



Memory switch card LEDs

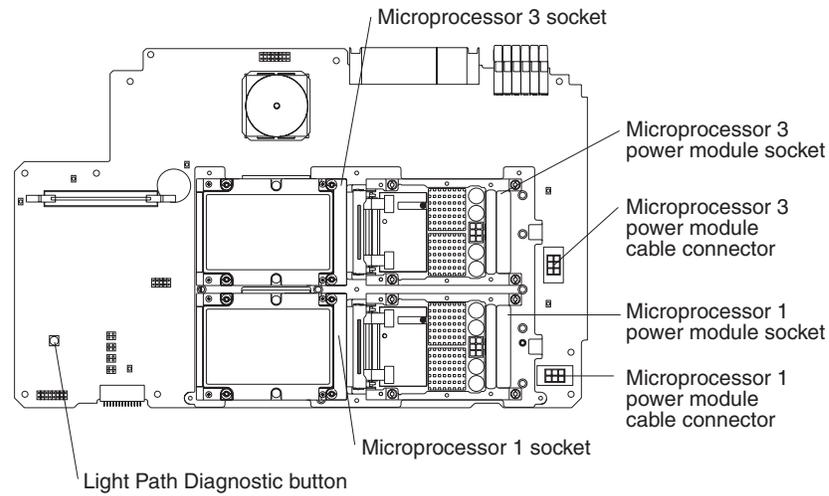
The following illustration shows the LEDs on the memory switch card.



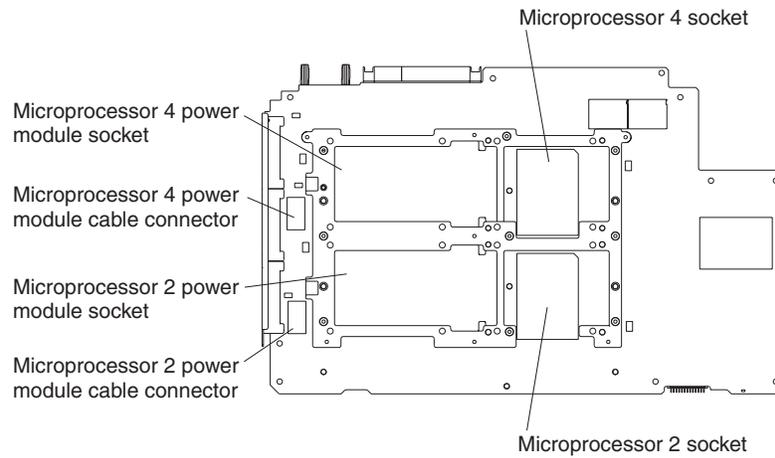
Processor board internal connectors and LEDs

The following illustrations show the internal connectors on the processor board.

Front side

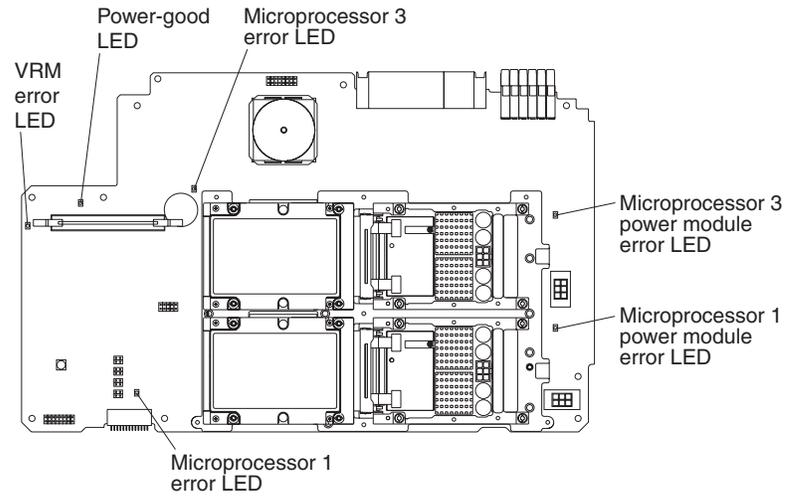


Reverse Side

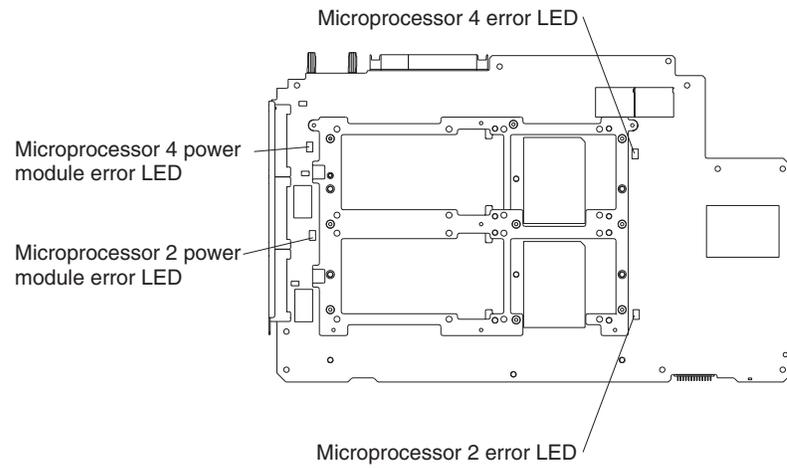


The following illustrations show the LEDs on the processor board.

Front side

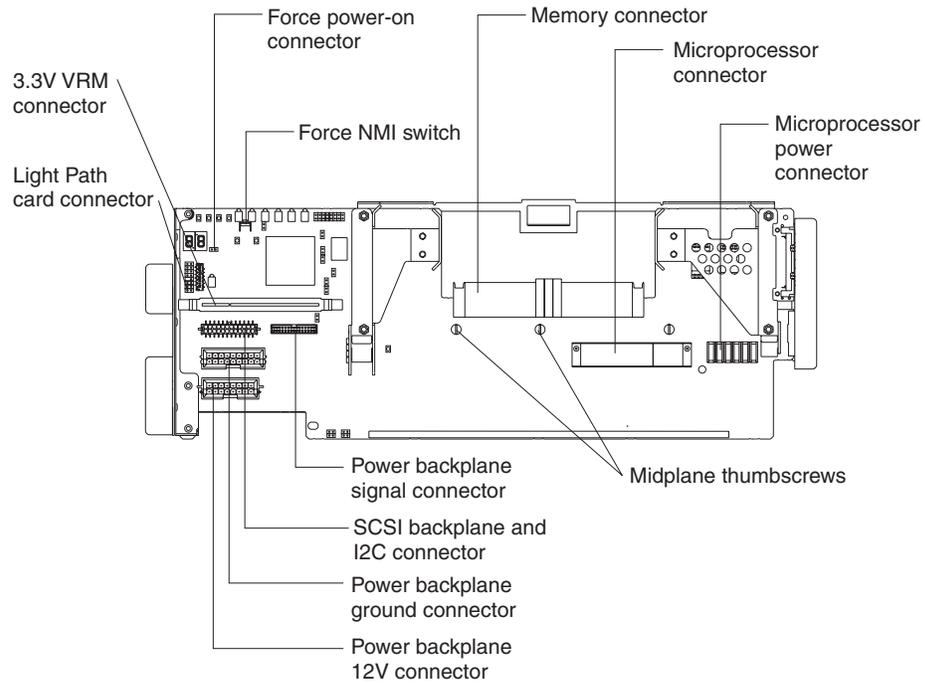


Reverse side

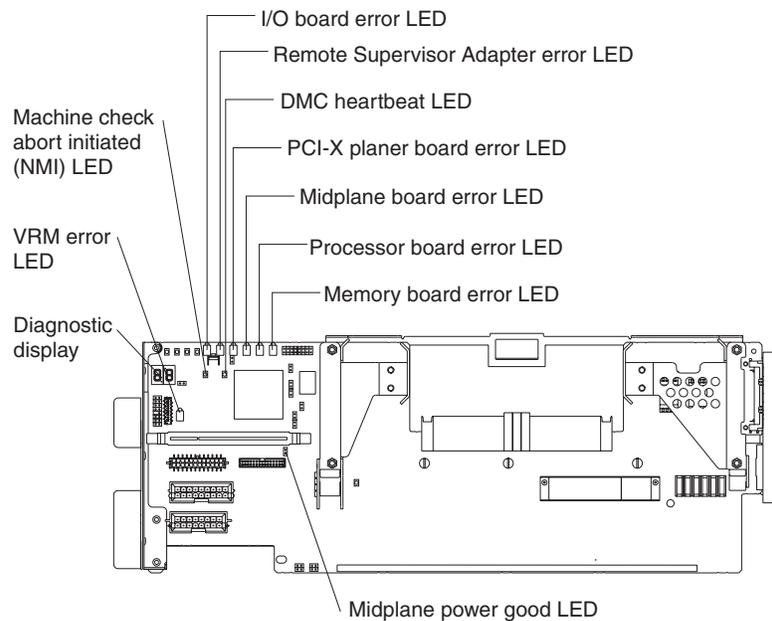


Midplane board connectors and LEDs

The following illustration shows the connectors on the midplane board.



The following illustration shows the LEDs on the midplane board.



You can see the midplane board LEDs on the top of the server. These LEDs are numbered from 1-6 and indicate the board on which an error has been detected.

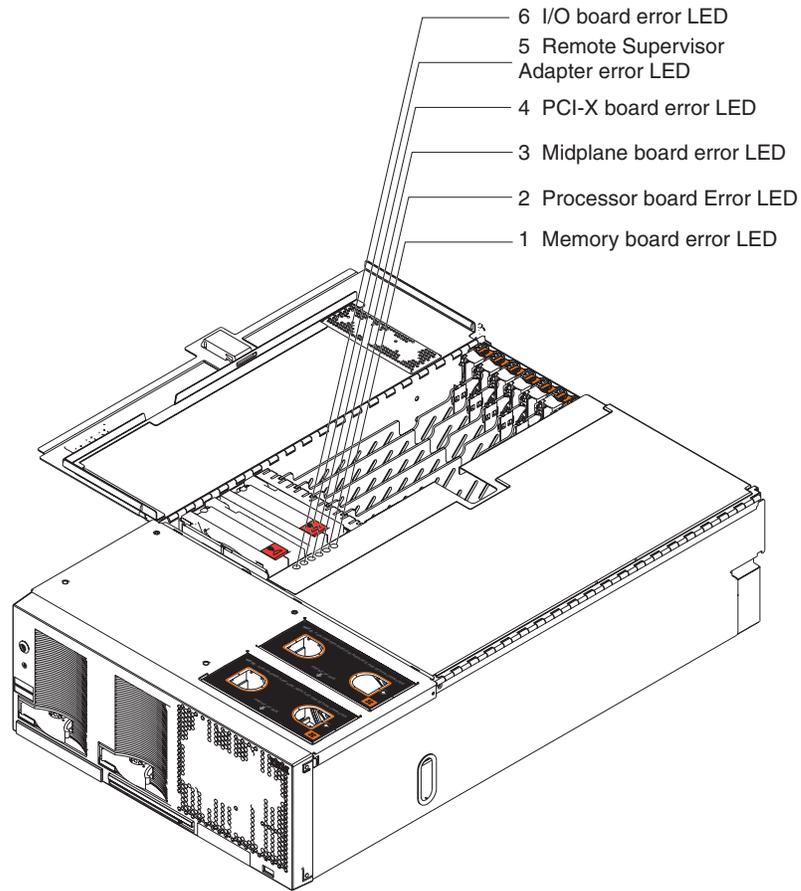
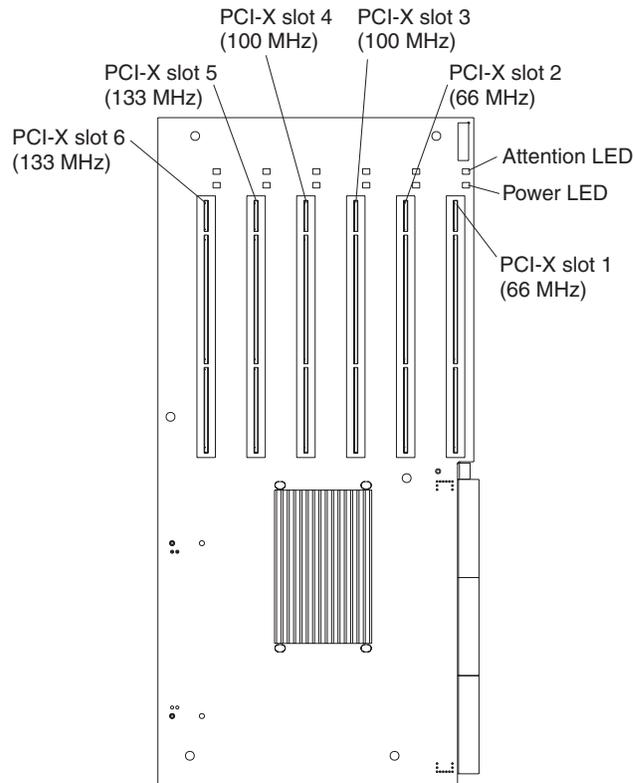


Table 7. Midplane board LEDs

LED number	Board
1	Memory-board error LED
2	Processor-board error LED
3	Midplane-board error LED
4	PCI-X board error LED
5	Remote Supervisor Adapter error LED
6	I/O-board error LED

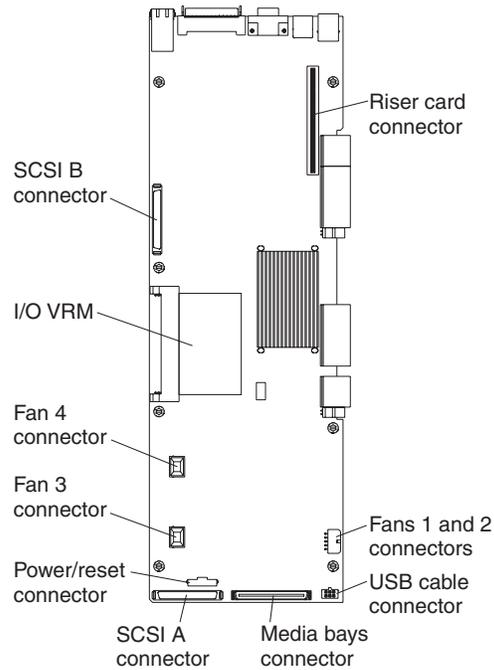
PCI-X board internal connectors and LEDs

The following illustration shows the internal connectors and LEDs on the PCI-X board.



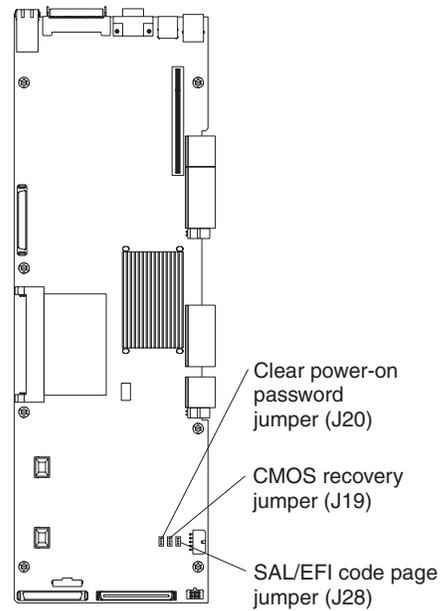
I/O-board internal connectors

The following illustration shows the internal connectors on the I/O board.



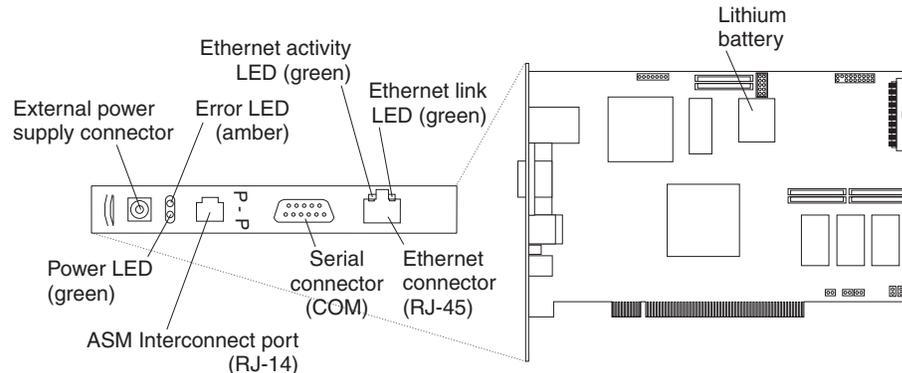
I/O-board jumpers

The following illustration identifies the jumpers on the I/O board.



Remote Supervisor Adapter connectors and LEDs

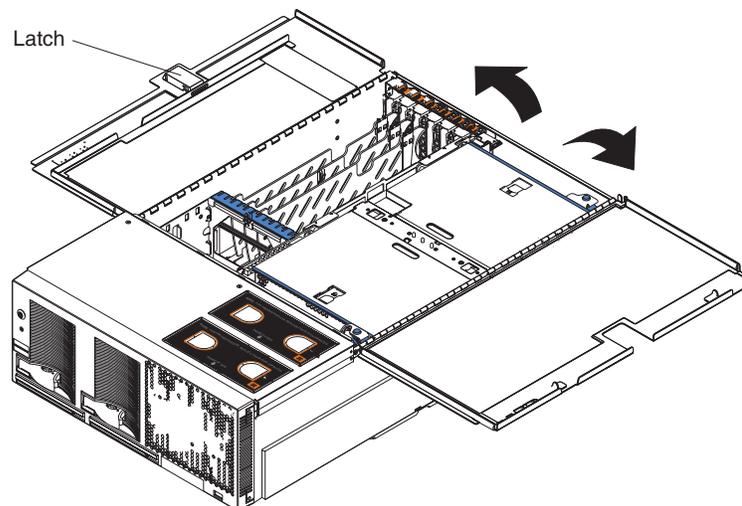
The following illustration identifies the connectors and LEDs on the Remote Supervisor Adapter.



Opening the cover

Complete the following steps to open the server cover:

1. Read the safety information beginning on page 197 and “Installation guidelines” on page 77.
2. Slide the server out from the rack.
3. Pull the release latch on the left side of the top cover to the right.
4. Using the finger hole in the release latch, open the left side of the cover; then, open the right side of the cover.

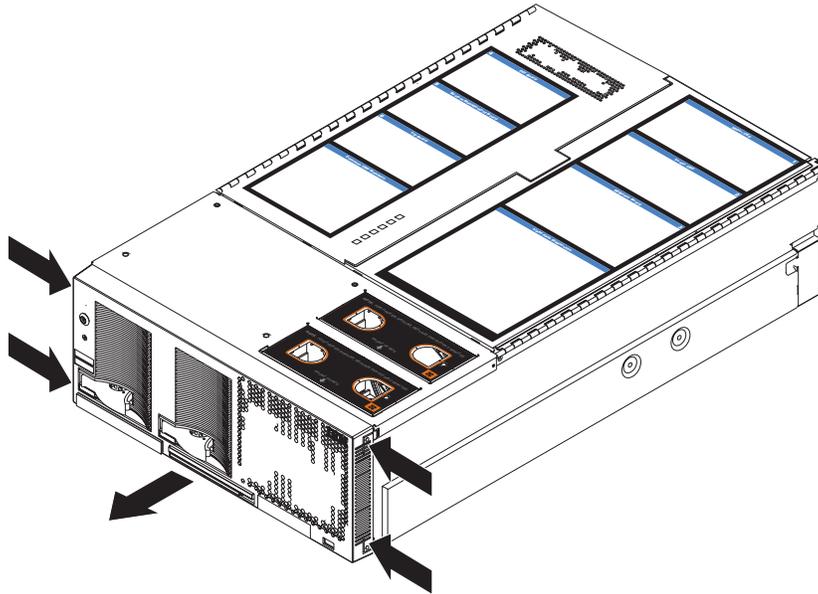


Attention: For proper cooling and airflow, close the cover before turning on the server. Operating the server for extended periods of time (over 15 minutes) with the cover open might damage server components.

Removing and replacing the bezel

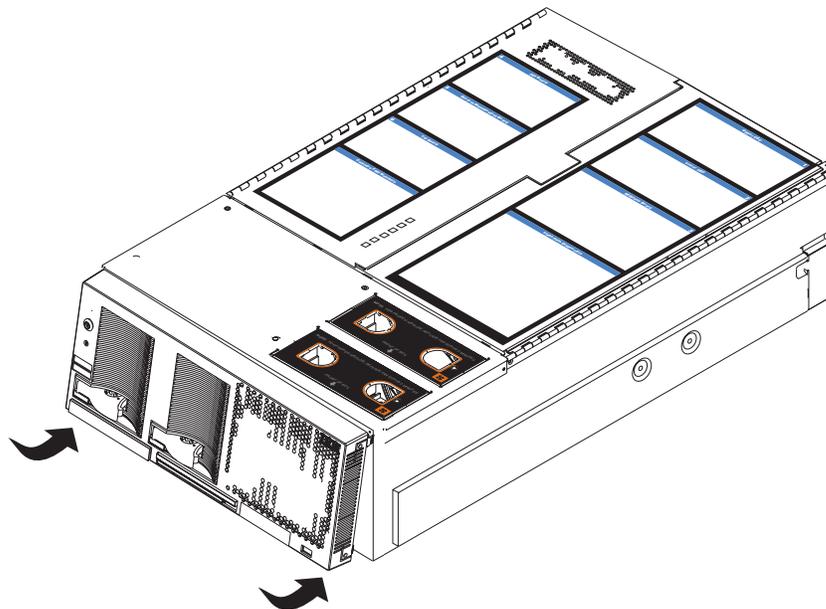
Complete the following steps to remove the bezel:

1. Press on the two tabs at the top edge of the bezel, and pull the top of the bezel slightly away from the server.
2. Press on the two tabs at the bottom edge of the bezel, and pull the bezel off the server. Store the bezel in a safe place.



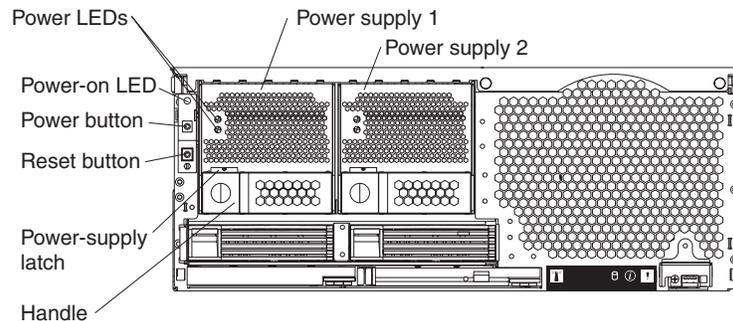
Complete the following steps to replace the bezel:

1. Align the four tabs on the bezel with the slots in the server chassis.
2. Press firmly against the front of the bezel until it snaps into place.



Removing and replacing a hot-swap power supply

Your server comes with two hot-swap power supplies, which you can remove and replace without turning off the server. The following illustration shows the locations of the power supplies on the front of the server.



Before you remove or replace a power supply, review the following information.

Notes:

1. The power supplies are hot-swappable and redundant only at 200-240 V ac.
2. Both power supplies must be connected to the power source for operation at 100-127 V ac.
3. During normal operation, both power supplies must be installed for proper operation and cooling.

If you install or remove a power supply, observe the following precautions.

Statement 8:



CAUTION:

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

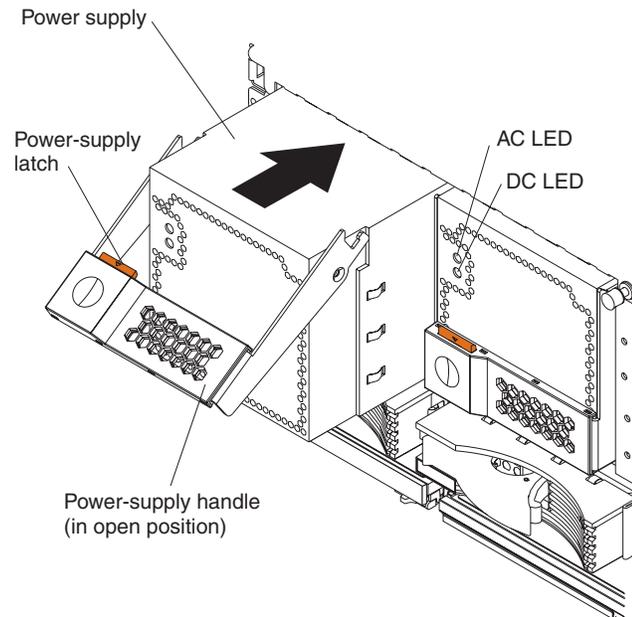


Hazardous voltage, current, and energy levels are present inside any component that has this label attached. There are no serviceable parts inside these components. If you suspect a problem with one of these parts, contact a service technician.

Complete the following steps to remove and replace a power supply:

1. Read the safety information beginning on page 197 and “Installation guidelines” on page 77.
2. Remove the front bezel (see “Removing and replacing the bezel” on page 89 for instructions about removing the front bezel).

3. To remove the power supply from the server, press the latch; then, lift the handle on the power supply to the open position and pull the power supply out from the server.
4. Install the new power supply:
 - a. Place the handle on the power supply in the open position.
 - b. Slide the power supply into the chassis and press the handle to the closed position.

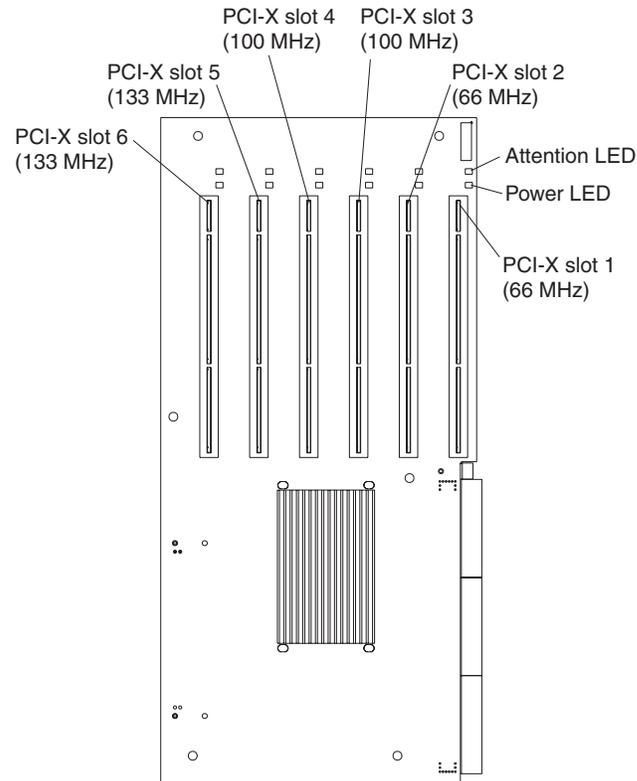


5. Verify that the dc power LED and the ac power LED on the power supply are lit, indicating that the power supply is operating properly.
6. Replace the front bezel on the server (see “Removing and replacing the bezel” on page 89 for instructions).

Installing an adapter

The following notes describe the types of adapters that your server supports and other information that you must consider when installing an adapter:

- The following illustration shows the location and bus speeds of the PCI-X expansion slots on the PCI-X board.



- Locate the documentation that comes with the adapter, and follow those instructions in addition to the instructions in this section. If you need to change the switch settings or jumper settings on your adapter, follow the instructions that come with the adapter.
- Video adapters are not supported.
- Some full-length adapters have extension handles or brackets installed. Before installing the adapter, you must remove the extension handle or bracket.
- Your server supports six hot-plug 64-bit adapters in the expansion slots on the PCI-X board, as shown in the following table.

Bus	Slot	Supported adapter speed (MHz)
A (2)	1	66
	2	66
B (9)	3	100 (133 if slot 4 is empty)
	4	100 (133 if slot 3 is empty)
C (7)	5	133
D (5)	6	133

- You can install both PCI and PCI-X adapters on the same bus. However, if you install a PCI adapter and a PCI-X adapter on the same bus, the PCI-X features of the PCI-X adapter will be disabled, and the adapter will function as a PCI adapter.
- You can install PCI or PCI-X adapters of speeds faster than what is labeled for a particular PCI-X bus. For example, if you install two 133 MHz adapters into slots that are labeled as 100 MHz slots, the adapters will operate at 100 MHz.
- If you install a 33 MHz and a 66 MHz adapter on the same bus, the bus speed will match that of the slowest adapter.
- If a single 133 MHz adapter is installed on PCI-X bus B (slots 3 and 4) and the other slot on PCI-X bus B is empty, the adapter will operate at 133 MHz.
- The server scans PCI-X slots in the following order: the xSeries 450 integrated devices are scanned first; then, PCI-X slots 1, 2, 6, 5, 3, and 4. If an RXE-100 enclosure is attached to an xSeries 450 server, the scan order is as follows: the xSeries 450 integrated devices are scanned first; then, PCI-X slots 1, 2, 6, 5, 3, and 4; then, the RXE-100 PCI slots 11, 12, 9, 10, 7, 8, 17, 18, 15, 16, 13, and 14.
- Your server supports 3.3 V and universal adapters; it does not support 5.0 V adapters.

Complete the following steps to install an adapter:

1. Read the safety information beginning on page 197 and “Installation guidelines” on page 77.

Attention: When you handle static-sensitive devices, take precautions to avoid damage from static electricity. For details about handling these devices, see “Handling static-sensitive devices” on page 78.

2. Disable the PCI-X slot through your operating system before you insert or remove a PCI or PCI-X adapter.

Note: Some operating systems do not support the enabling and disabling of a PCI-X slot. If your operating system does not support this function, turn off the server and peripheral devices, and disconnect the power cords and all external devices from the back of the server before proceeding.

3. Open the top cover.
4. Follow the cabling instructions, if any, that come with the adapter. Route the adapter cables before you install the adapter.
5. Follow the instructions that come with the adapter to set jumpers or switches, if any.

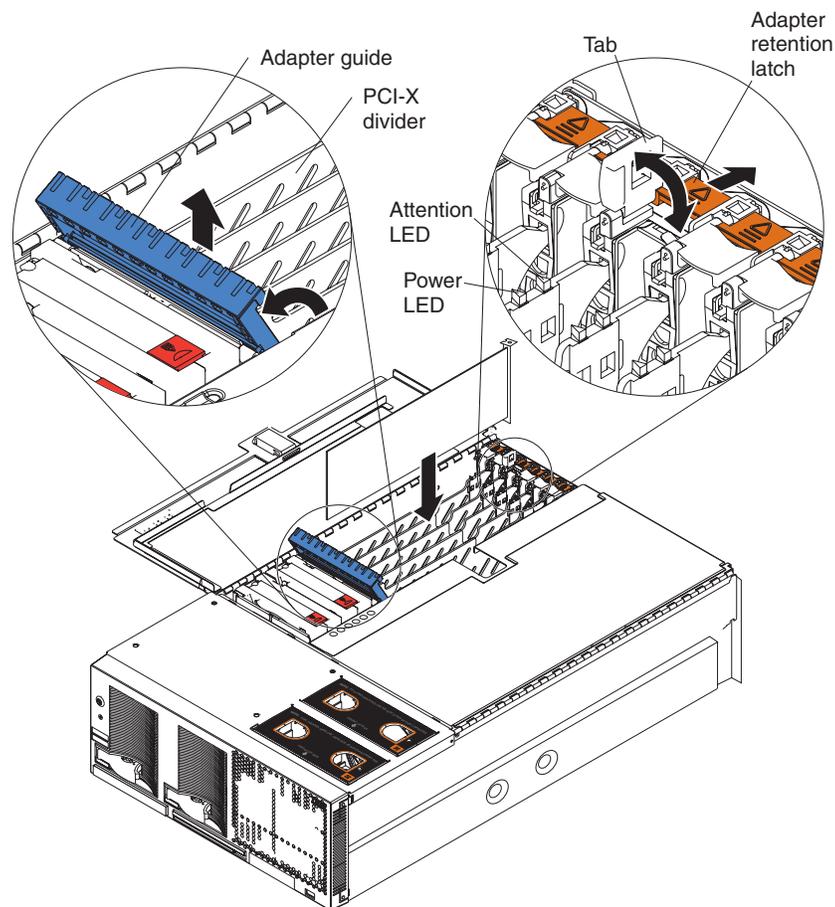
6. Install the adapter:
 - a. If you are installing a full-length adapter, open the blue adapter guide by lifting the front edge, as shown in the illustration.
 - b. Push the orange adapter-retention latch toward the rear of the server, and open the tab.
 - c. Remove the expansion-slot cover.
 - d. Carefully grasp the adapter by its top edge or upper corners, and align it with the connector on the PCI-X board.

Note: Some long adapters have extension handles or brackets. Before installing a long adapter, you must remove the extension handle or bracket.

- e. Press the adapter *firmly* into the adapter connector.

Attention: When you install an adapter, be sure the adapter is correctly seated in the connector. Improperly seated adapters might cause damage to the PCI-X board or to the adapter.

- f. Push down on the blue adapter guide to keep the adapter steady.
 - g. Close the tab; then, push down on the blue adapter-retention latch until it clicks into place, securing the adapter.



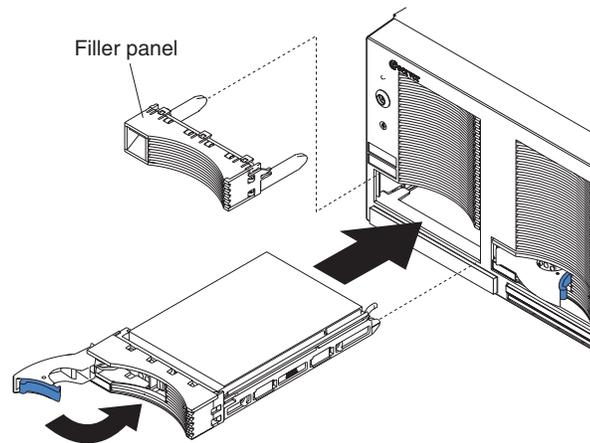
7. Connect the internal cables to the adapter.
8. If you disabled the slot in step 2 on page 93, enable the slot.
9. If you have other options to install or remove, do so now. Otherwise, go to "Completing the installation" on page 111.

Installing a hot-swap hard disk drive

Complete the following steps to install or replace a hot-swap hard disk drive.

Attention:

- When you handle static-sensitive devices, take precautions to avoid damage from static electricity. For details about handling these devices, see “Handling static-sensitive devices” on page 78.
 - Before you hot-swap a drive, make sure that the drive you are replacing is defective. If you partially or completely remove a good drive instead of a defective one, your server might lose valuable data.
1. Inspect the drive for any signs of damage.
 2. Read the safety information beginning on page 197 and “Installation guidelines” on page 77.
 3. Check the instructions that come with the drive for more information about installing your drive.
 4. Remove the filler panel or defective hard disk drive from the hard disk drive bay.
 5. Install the new hard disk drive in the drive bay:
 - a. Ensure that the handle on the hard disk drive tray is in the open position.
 - b. Slide the drive into the bay until it stops.
 - c. Push the handle on the front of the hard disk drive closed.



- d. Check the hard disk drive status LED to verify that the hard disk drive is operating properly.
If the amber hard disk drive error LED for a drive is lit continuously, that individual drive is damaged and needs to be replaced. If the green hard disk drive activity LED is flashing, the drive is being accessed.
6. If you have other options to install or remove, do so now.

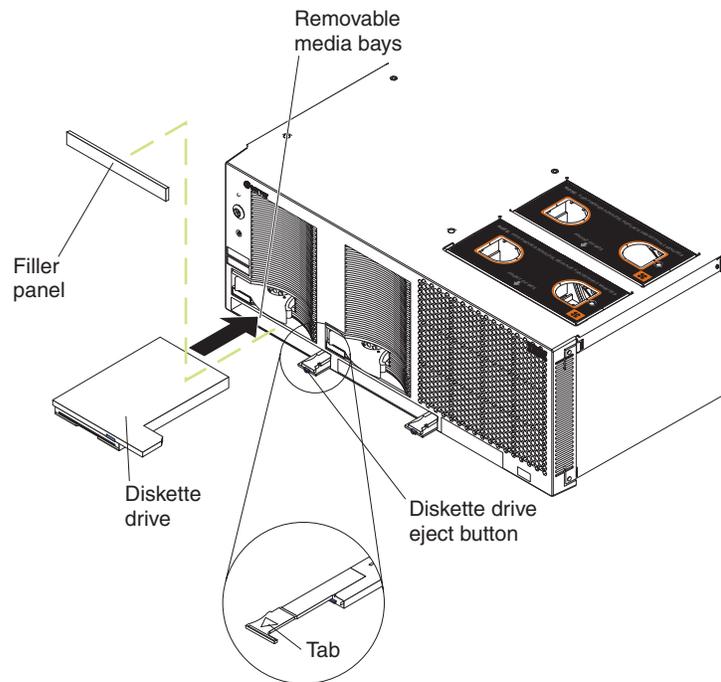
Installing a 1.44 MB diskette drive

The following notes describe the type of diskette drive that your server supports and other information that you must consider when installing a diskette drive:

- Your xSeries 450 server supports one diskette drive.
- The diskette drive must be installed in the left drive bay.
- The IDE drives installed in your server are not hot-swappable.
- Your operating system must support a diskette drive.

Complete the following steps to install a diskette drive in your server:

1. Review the information in “Safety information” on page 197, and “Installation guidelines” on page 77.
2. Turn off the server and peripheral devices, and disconnect the power cords and all external devices from the back of the server.
3. Inspect the drive for any signs of damage.
4. Slide the drive into the left drive bay until it stops.



5. If you have other options to install or remove, do so now. Otherwise, connect the power cords and turn on the server.

Complete the following steps to remove a diskette drive from your server:

1. Read the safety information beginning on page 197 and “Installation guidelines” on page 77.
2. Turn off the server and peripheral devices, and disconnect the power cords and all external devices from the back of the server.
3. Push the drive-eject button to the right.
4. Using the tab, pull the diskette drive partially out of the server; then, grasp the drive and remove it from the server.
5. If you have other options to install or remove, do so now. Otherwise, connect the external devices and power cords, and turn on the server.

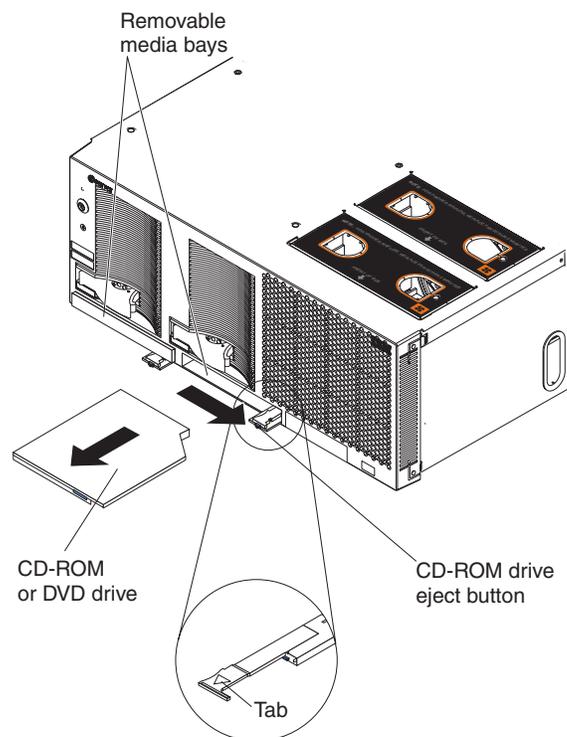
Installing a CD-ROM or DVD-ROM drive

The following notes describe the types of CD-ROM or DVD-ROM drives that your server supports and other information that you must consider when installing a CD-ROM or DVD-ROM drive:

- Your xSeries 450 server supports up to two CD-ROM drives, or two DVD-ROM drives, or a combination.
- If you have only one IDE device installed, it must be installed in the right removable-media bay. CD-ROM or DVD-ROM drives can be installed in either removable-media bay.

Complete the following steps to install a CD-ROM or DVD-ROM drive in your server:

1. Read the safety information beginning on page 197 and “Installation guidelines” on page 77.
2. Turn off the server and peripheral devices, and disconnect the power cords and all external devices from the back of the server.
3. Push the drive-eject button to the right.
4. Inspect the drive for any signs of damage.
5. Slide the CD-ROM or DVD-ROM drive into the drive bay until it stops.



6. If you have other options to install or remove, do so now. Otherwise, connect the power cords and turn on the server.

Complete the following steps to remove a CD-ROM or DVD-ROM drive from the server:

1. Read the safety information beginning on page 197 and “Installation guidelines” on page 77.
2. Turn off the server and peripheral devices, and disconnect the power cords and all external devices from the back of the server.
3. Push the drive-eject button to the right.

4. Using the tab, pull the CD-ROM or DVD-ROM drive partially out of the server; then, grasp the drive and remove it from the server.
5. If you have other options to install or remove, do so now. Otherwise, connect the external devices and power cords and turn on the server.

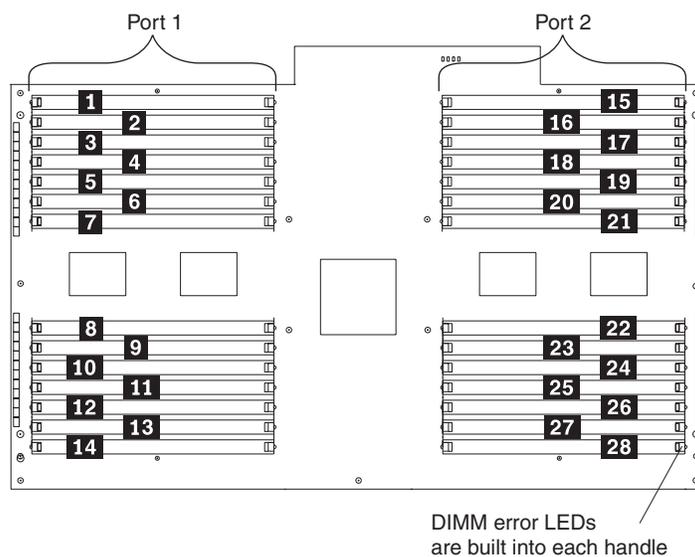
Installing memory

The following notes describe the types of dual inline memory modules (DIMMs) that your server supports and other information that you must consider when installing DIMMs:

- Your server supports 512 MB, 1 GB, and 2 GB DIMMs, for a maximum of 40 GB of system memory. Your server supports up to twenty-eight 2.5 V, 184 pin, PC2100, ECC DDR SDRAM, 133 MHZ DIMMs. Go to the ServerProven® list at <http://www.ibm.com/pc/compat/> for a list of memory modules you can use with your server.
- Your server supports a maximum of only 20 DIMMs (10 per port) if any connector contains a 2 GB DIMM. Your server supports a maximum of 28 DIMMs (14 per port) if only 512 MB and 1 GB DIMMs are installed.
- Your server comes with a minimum of two 512 MB DIMMs, installed in slots 1 and 14. When installing additional DIMMs, you must install two DIMMS at a time, in the order shown in the following table to maintain performance.

Table 8. DIMM installation sequence

Pair	DIMM connectors (Port 1)	Pair	DIMM connectors (Port 2)
1	1 and 14	2	15 and 28
3	4 and 11	4	18 and 25
5	2 and 13	6	16 and 27
7	5 and 10	8	19 and 24
9	3 and 12	10	17 and 26
11	6 and 9	12	20 and 23
13	7 and 8	14	21 and 22



- Each DIMM in a pair must be of the same size and technology to ensure that the server will operate properly.

- When using memory mirroring, you must install two pairs of DIMMs at a time. The four DIMMs in each bank must be identical. The following table shows the pairs that are in each bank. See Table 8 on page 98 for the DIMM connector pair assignments.

Table 9. Memory mirroring DIMM installation sequence

Set	DIMM pairs	Set	DIMM pairs
1	1 and 2	5	9 and 10
2	3 and 4	6	11 and 12
3	5 and 6	7	13 and 14
4	7 and 8		

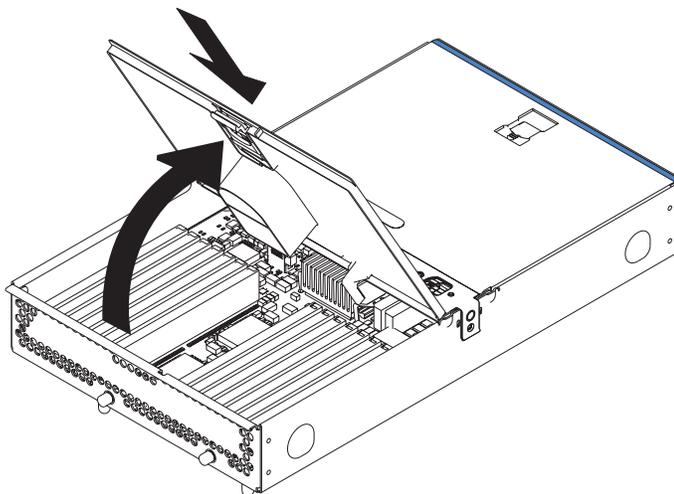
- When you install or remove DIMMs, the server configuration information changes. When you restart the server, the system displays a message indicating that the memory configuration has changed.

Complete the following steps to install a DIMM in your server:

1. Read the safety information beginning on page 197 and “Installation guidelines” on page 77.
2. Turn off the server and peripheral devices, and disconnect the power cords and all external cables; then, open the server cover.

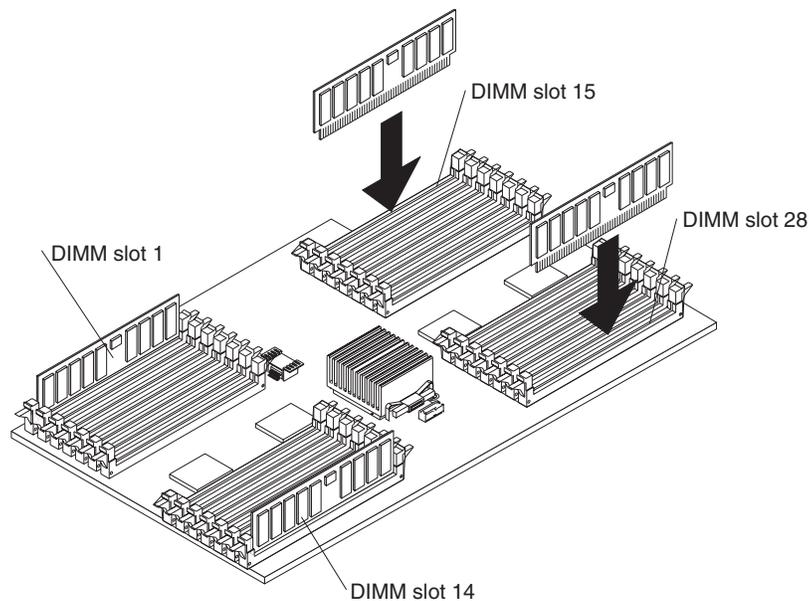
Attention: When you handle static-sensitive devices, take precautions to avoid damage from static electricity. For details about handling these devices, see “Handling static-sensitive devices” on page 78.

3. Open the DIMM access door that covers the DIMM connector into which you will be installing the DIMM.



4. Install the new DIMM:
 - a. Open the retaining clip on each end of the DIMM connector.
 - b. Touch the static-protective package containing the DIMM to any unpainted metal surface on the server. Then, remove the DIMM from the package.

Attention: To avoid breaking the retaining clips or damaging the DIMM connectors, open and close the clips gently.
 - c. Turn the DIMM so that the DIMM keys align correctly with the slot.
 - d. Insert the DIMM into the connector by aligning the edges of the DIMM with the slots at the ends of the DIMM connector. Firmly press the DIMM straight down into the connector by applying pressure on both ends of the DIMM simultaneously. The retaining clips snap into the locked position when the DIMM is firmly seated in the connector. If there is a gap between the DIMM and the retaining clips, the DIMM has not been correctly inserted; open the retaining clips, remove the DIMM, and then reinsert it.



5. Close the DIMM access door.
6. If you have other options to install or remove, do so now.
7. Close the server cover. See “Completing the installation” on page 111.

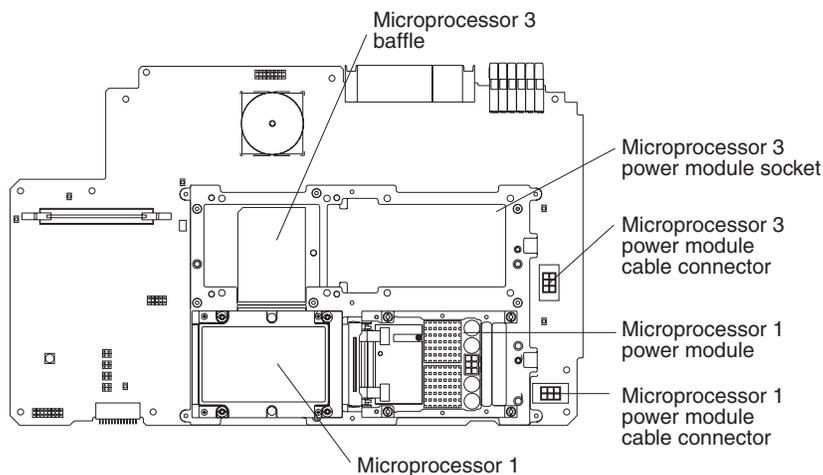
Installing and replacing a microprocessor and power module

Consider the following when installing and replacing a microprocessor into the xSeries 450 server:

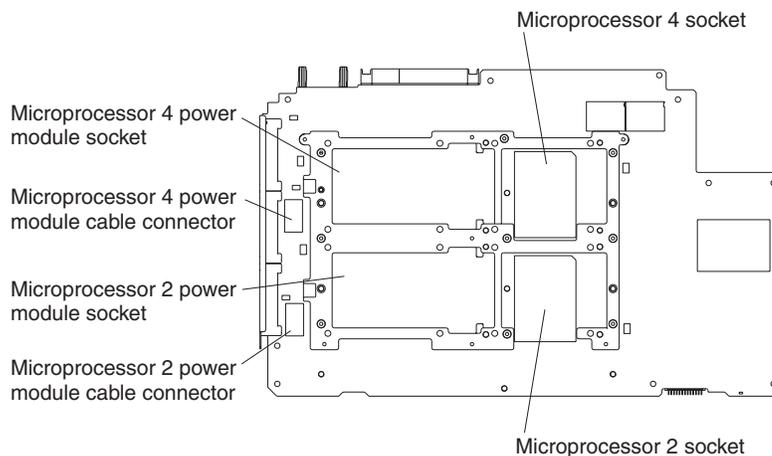
- Your server supports up to four Intel Itanium 2 microprocessors.
- Read the documentation that comes with the microprocessor to determine whether you need to update the server SAL/EFI code. To download the most current level of SAL/EFI code for the server, go to <http://www.ibm.com/pc/support/> on the World Wide Web.
- (Optional) Obtain an SMP-capable operating system. For a list of supported operating systems, go to <http://www.ibm.com/pc/us/compat/> on the World Wide Web.
- You will need the following tools:
 - Flat-blade screwdriver
 - 2.5-mm hex (Allen) wrench (provided with the microprocessor option)

- T15 Torx wrench (provided with the microprocessor option)
- To order additional microprocessor options, contact your IBM marketing representative or authorized reseller.
- Populate the microprocessor sockets in numeric order. Install the first microprocessor in microprocessor socket 1, the second microprocessor in microprocessor socket 2, and so on.
- The following illustrations show the locations of the microprocessor connectors on the processor board.

Front side



Reverse side



Important: To ensure proper server operation after you install replacement or additional microprocessors, install only microprocessors that have the same cache size and type and the same clock speed. For a list of microprocessors supported by your server, go to the ServerProven list at <http://www.ibm.com/pc/us/compat/> on the World Wide Web.

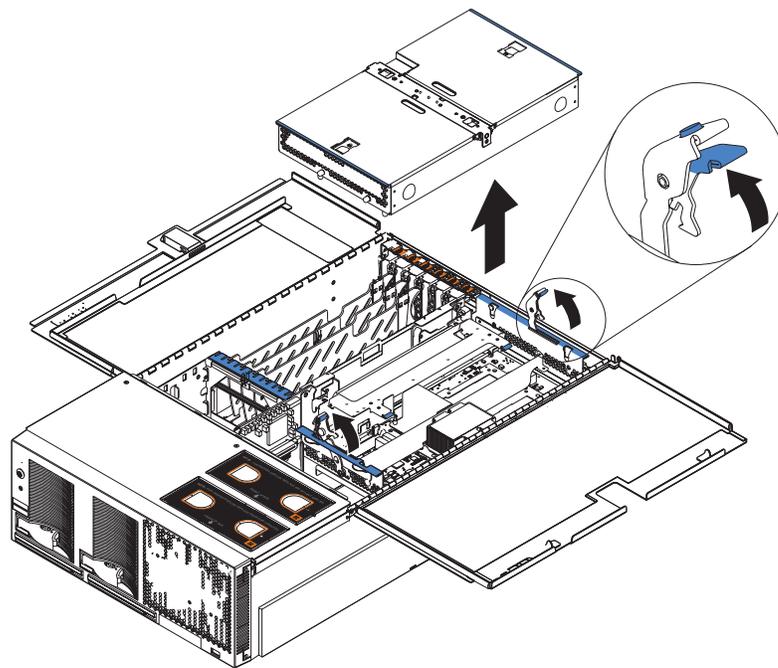
Complete the following steps in the prescribed order to install and replace a microprocessor.

Attention: Failure to complete the following steps in the prescribed order might cause damage to the microprocessor pins and cause the microprocessor to fail.

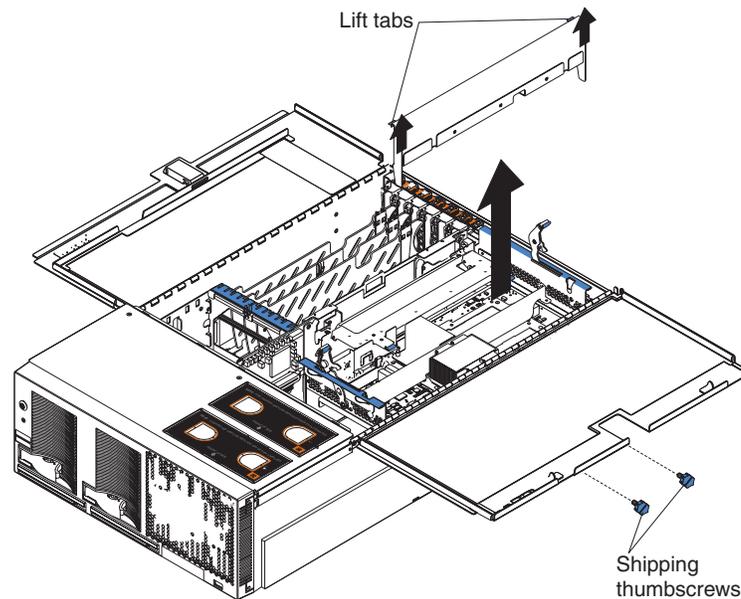
1. Read the safety information beginning on page 197 and “Installation guidelines” on page 77.
2. Turn off the server and peripheral devices, and disconnect the power cords and all external cables; then, open the cover.
3. Remove the memory-board assembly from the server:

Attention: When you handle static-sensitive devices, take precautions to avoid damage from static electricity. For details about handling these devices, see “Handling static-sensitive devices” on page 78.

- a. Pull up on the levers to detach the memory-board assembly.
- b. Carefully remove the memory-board assembly from the server, and set it aside.



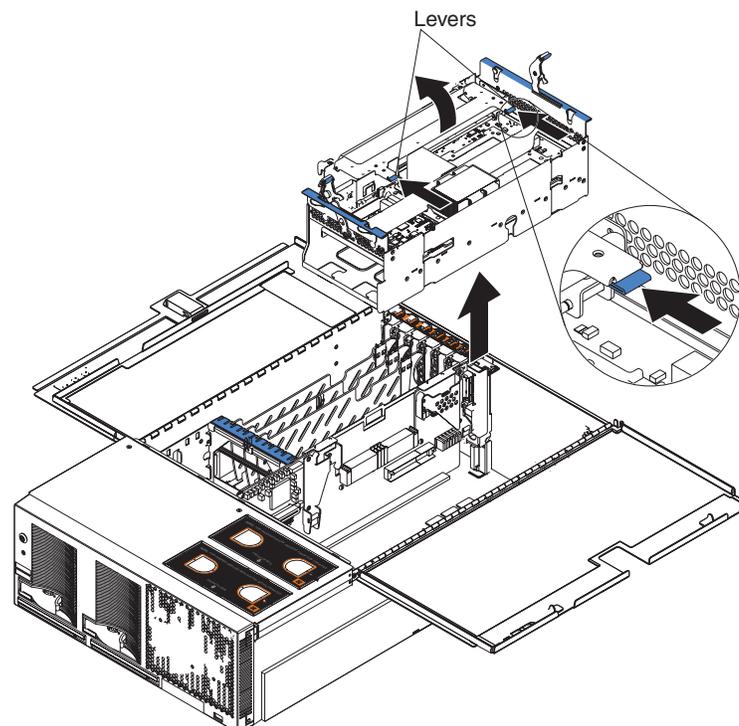
4. Remove the shipping thumbscrews from the right side of the server, and lift the retention bracket from the server.



5. Remove the processor-board assembly from the server:

Attention: When you handle static-sensitive devices, take precautions to avoid damage from static electricity. For details about handling these devices, see “Handling static-sensitive devices” on page 78.

- a. Press to unlock the levers securing the processor-board assembly and pull up on the levers to release the processor-board assembly.
- b. Carefully remove the processor-board assembly from the server, and place it on a flat, level, non-conductive surface.

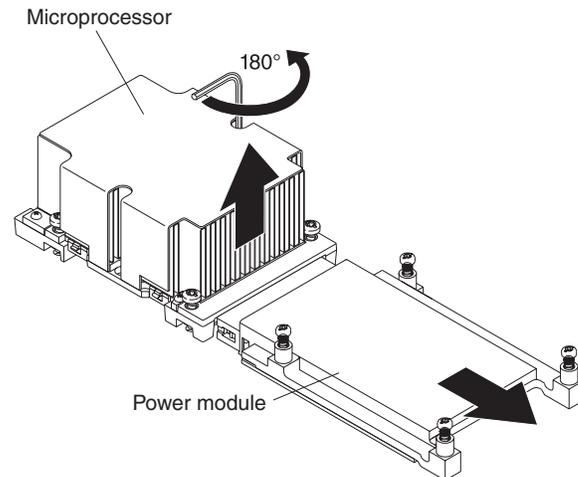


Note: Before you install a microprocessor in the socket, use the hex wrench provided with the microprocessor option to close and open the socket lock to observe the locking flag in the closed position. Also note the resistance of the locking mechanism in the locked position. When installing the microprocessor, do not force the socket lock clockwise beyond the locked position.

6. If you are installing a new microprocessor, go to step 7 on page 105; otherwise, continue:

Attention: Failure to complete the instructions in the prescribed order might cause damage to the microprocessor pins and cause the microprocessor to fail.

- a. Using the T-handled Torx wrench provided with the microprocessor option, completely loosen the power-module screws.
- b. Slide the power module from the microprocessor, and remove the power module.
- c. Completely loosen the heat-sink screws.
- d. Use the hex wrench provided with the microprocessor option to open the socket lock, and remove the microprocessor.

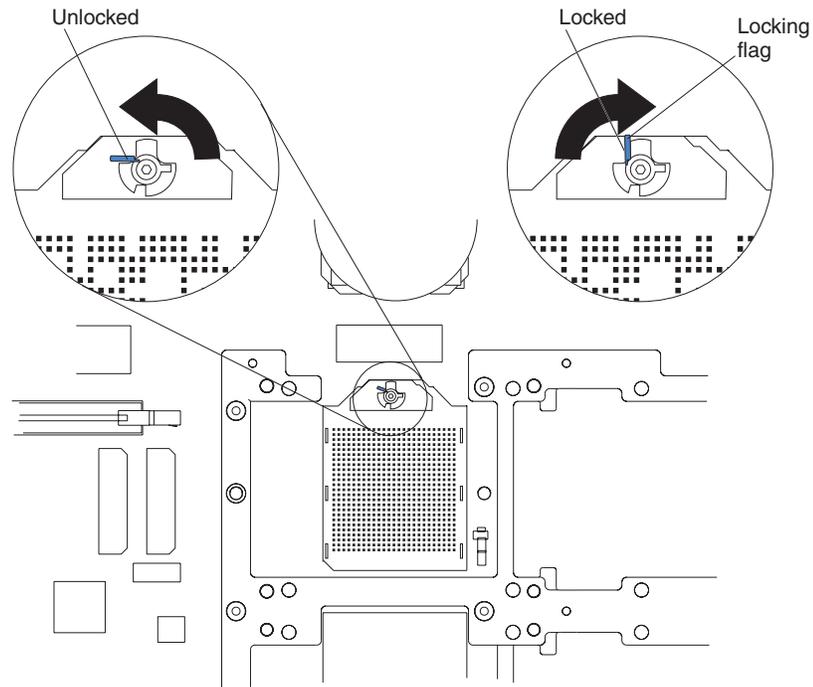


7. Install the microprocessor and power module:
 - a. Remove the microprocessor baffle from the microprocessor socket. Keep the microprocessor baffle for future use.
 - b. Remove the protective tape covering the microprocessor socket, if present.

Attention: Inserting the microprocessor in a locked connector might damage the pins and cause the microprocessor to fail.

- c. Ensure that the socket lock is in the fully unlocked position to permit plugging in the microprocessor. Use the hex wrench provided with the microprocessor option to open the lock, if necessary.

Note: Examine the socket lock of an installed microprocessor to identify the locking flag in the locked position.

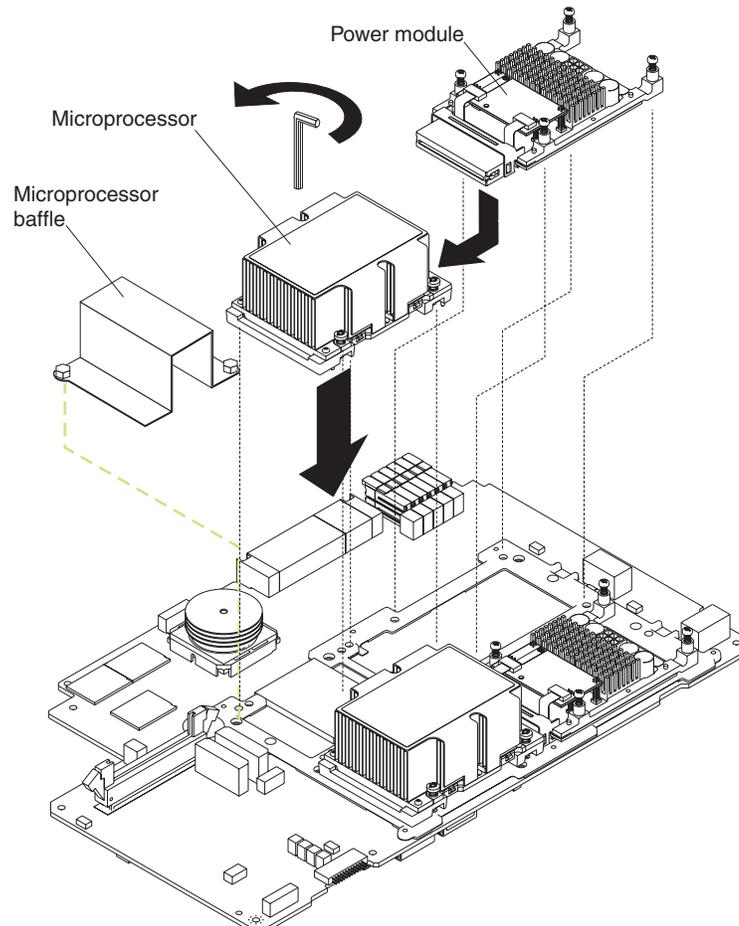


Attention: When you handle static-sensitive devices, take precautions to avoid damage from static electricity. For details about handling these devices, see “Handling static-sensitive devices” on page 78.

- d. Touch the static-protective package containing the microprocessor to any unpainted metal surface on the server. Then, remove the microprocessor and power module from the package.

Attention:

- 1) Forcing the microprocessor socket lock clockwise beyond the locked position might damage the socket locking mechanism. Before you install a microprocessor in the socket, use the hex wrench provided with the microprocessor option to close and open the socket lock to observe the locking flag in the locked position. Also, note the resistance of the locking mechanism in the locked position. If you need better light to see the microprocessor socket lock clearly, shine a flashlight over the microprocessor connector. When installing the microprocessor, do not force the socket lock clockwise beyond the locked position.
- 2) Ensure that the microprocessor is aligned and seated correctly before you proceed. To avoid bending the pins on the microprocessor, do not use excessive force when pressing it into the socket.
- e. Insert the microprocessor gently into the connector. The microprocessor rests flat on the retention mechanism when properly seated.
- f. Lock the socket lock, using the hex wrench provided with the microprocessor option.
- g. Tighten the heat-sink screws to secure the microprocessor, using the T-handled Torx wrench provided with the microprocessor option.
- h. Slide the power module gently into the microprocessor.
- i. Tighten the power-module screws to secure the power module.
- j. Plug the power-module cable into the power module and into the adjacent power-module cable connector.



8. Carefully install the processor-board assembly and retention bracket.
9. Carefully install the memory-board assembly.
10. If you have other options to install or remove, do so now. Otherwise, go to “Completing the installation” on page 111.

Replacing and troubleshooting fans

Your xSeries 450 server has two hot-swap 150 mm x 51 mm fans and two hot-swap 150 mm x 38 mm fans. The two 150 mm x 51 mm fans (fan 1 and fan 2) are located toward the front of the server and are used to cool the memory board and processor board. The two 150 mm x 38 mm fans (fan 3 and fan 4) are located just behind the PCI-X board and are used to cool the power supplies, PCI-X slots, and other components.

Each fan has an LED to help you detect a problem. When the fan is operating correctly, this LED is off. If a fan stops working, the Light Path Diagnostics feature will light the system-error LED on the front of the server, indicating that there is a problem, and guide you to the defective fan. When this occurs, first identify the defective fan; then, using the appropriate procedure, remove and replace the fan.

Replacing fan 1 or 2

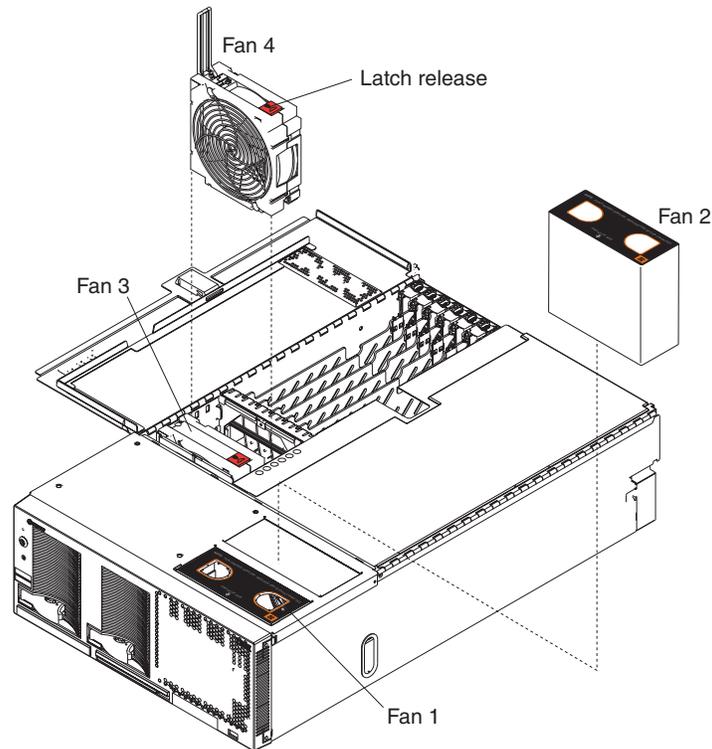
Fans 1 and 2 are located on the right side of the server. These fans are redundant, meaning that if one fails, the remaining fan will temporarily speed up to properly cool the server components.

Attention: All fans must be replaced within 48 hours of failing.

Complete the following steps to replace fan 1 or 2:

1. Read the safety information beginning on page 197 and “Installation guidelines” on page 77.
2. Place your fingers into the two finger holes on the top of the fan, and squeeze them together; then, lift the fan out of the server.
3. Turn the new fan so that the LED on the top of the fan is to the right side of the server.

4. Push the replacement fan assembly into the server until it clicks into place.



5. If you have other options to install or remove, do so now.
6. Close the server cover (see “Closing the cover” on page 111).

Replacing fan 3 or 4

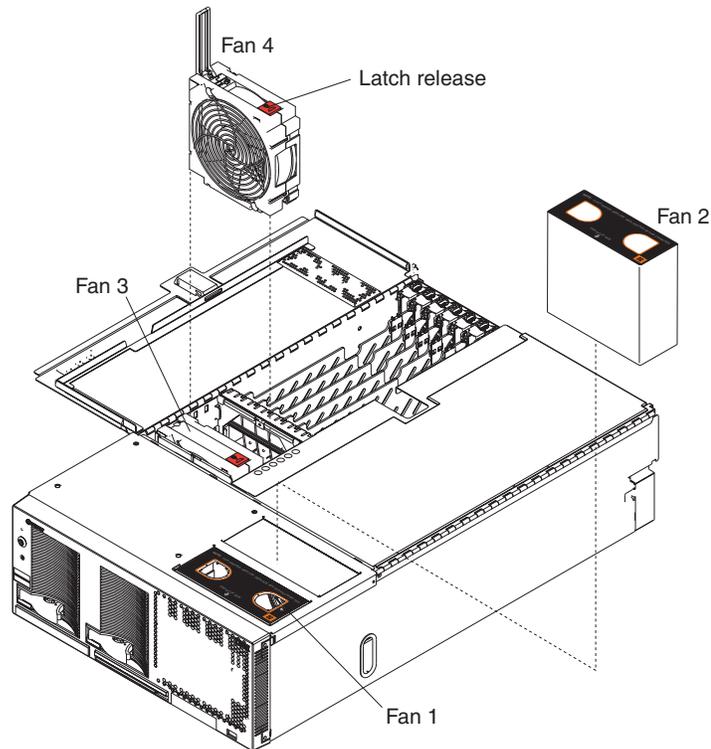
Fan 3 and fan 4 are located in front of the PCI-X slots. These fans are redundant, meaning that if one fails, the remaining fan will temporarily speed up to properly cool server components.

Attention: All fans must be replaced within 48 hours of failing.

Complete the following steps to replace fan 3 or 4:

1. Read the safety information beginning on page 197 and “Installation guidelines” on page 77.
2. Press the latch release to the right, and let the handle come up.
3. Grasp the handle, and lift the fan out of the server.
4. Turn the new fan so that the latch release on the top of the fan is to the right side of the server.
5. With the handle raised, push the replacement fan assembly into the server until it clicks into place.

6. Push the handle down until it clicks into place under the latch release.



7. If you have other options to install or remove, do so now.
8. Close the server cover (see “Closing the cover” on page 111).

Replacing the battery

When replacing the battery, you must replace it with a lithium battery of the same type, from the same manufacturer. To avoid possible danger, read and follow the safety statement below.

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

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

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.

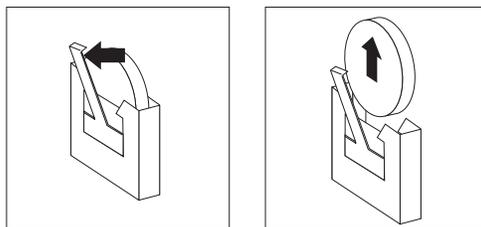
Do not:

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

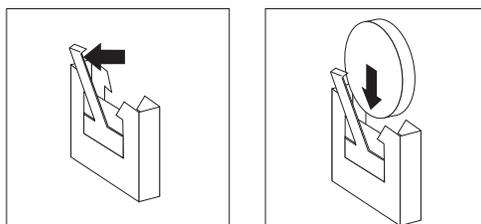
Dispose of the battery as required by local ordinances or regulations.

Complete the following steps to replace the battery:

1. Read the safety information beginning on page 197 and “Installation guidelines” on page 77. Follow any special handling and installation instructions supplied with the replacement battery.
2. Turn off the server and peripheral devices, and disconnect the power cords and all external cables from the server; then, open the cover (see “Opening the cover” on page 88 for details).
3. Remove fans 3 and 4 from the server (see “Replacing fan 3 or 4” on page 108 for details).
4. Remove the battery:
 - a. Use one finger to press the top of the battery clip away from the battery.
 - b. Lift and remove the battery from the socket.



5. Insert the new battery:
 - a. Use one finger to press the top of the battery clip away from the battery.
 - b. Press the battery into the socket until it clicks into place. Make sure that the battery clip holds the battery securely.



6. Install fans 3 and 4 in the server (see “Replacing fan 3 or 4” on page 108 for details).
7. Close the server cover, and connect the cables.
8. Turn on the server.
9. Start the Configuration/Setup Utility program, and set configuration parameters.
 - Set the system date and time.
 - Set the power-on password.
 - Reconfigure your server.

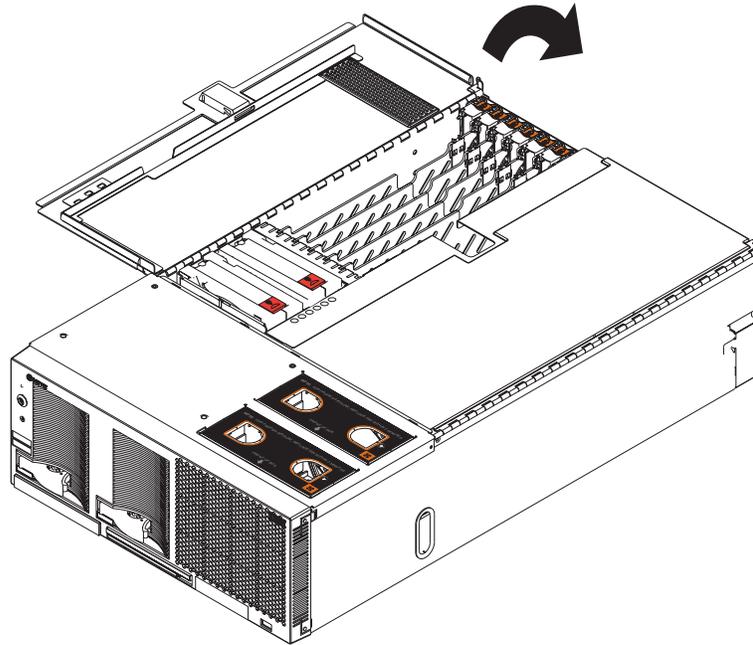
Completing the installation

To complete your installation, close the server cover, reconnect all cables that you disconnected earlier and, for certain options, run the Configuration/Setup Utility program. Follow the instructions in this section.

Attention: For proper cooling and airflow, close the server cover before or shortly after turning on the server. Operating the server for extended periods of time (over 15 minutes) with the server cover open might damage server components.

Closing the cover

Close the cover by first closing the right side; then, close the left side and press down to latch the two halves of the cover in place.



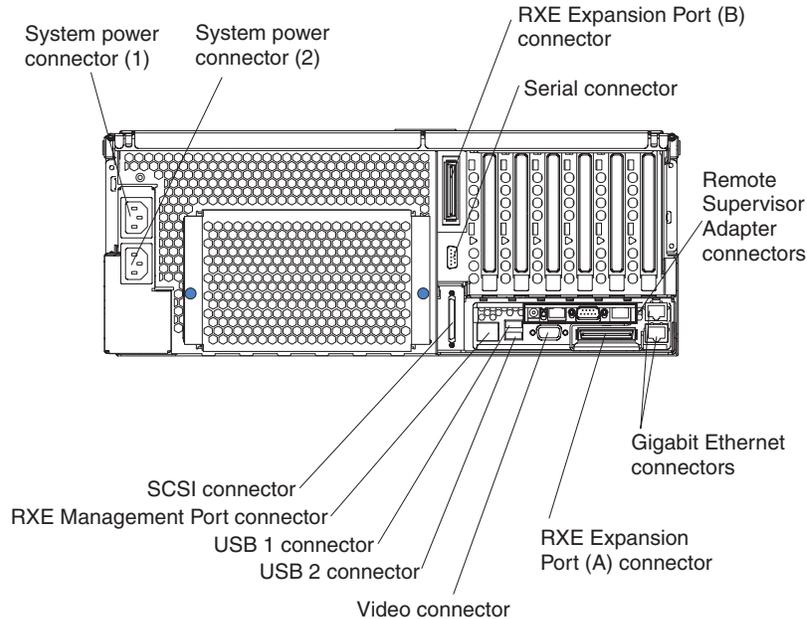
Connecting the cables

Notes:

1. You must turn off the server before connecting any cables to or disconnecting any cables from the server.
2. See the documentation that comes with your external options for additional cabling instructions. It might be easier for you to route any cables before you connect the devices to the server.

3. If you have just plugged the power cords of the server into an electrical outlet, you must wait 30 seconds before pressing the power-control button.

The following illustration shows the locations of the input and output connectors on your server. See page 6 for descriptions of the I/O connectors.



Updating your server configuration

When you start your server for the first time after you add or remove an internal option or an external SCSI device, you might see a message telling you that the configuration has changed (see “Using the Configuration/Setup Utility program” on page 12).

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

If your server comes with two microprocessors or if your server comes with one microprocessor and you have installed one or more additional microprocessors, your server can now operate as an SMP server. Therefore, you might need to upgrade your operating system to support SMP. See the *User's Guide* on the IBM *xSeries Documentation CD* and your operating-system documentation for additional information.

If you have a RAID configuration on your server using the integrated SCSI controller and you have installed or removed a hard disk drive, you might need to reconfigure your disk arrays. See the RAID documentation on the IBM *xSeries Documentation CD* for information about reconfiguring your disk arrays.

If you install a different type of RAID adapter in your server, use the configuration method supplied with the RAID adapter to view or change SCSI settings for attached devices.

The internal hard disk drives can connect only to the integrated SCSI controller with RAID capabilities.

Installing the server in a rack

Detailed cabling instructions, including the use of the cable management arm (which comes with the server) are in the *Rack Installation Instructions* provided with the server.

Chapter 5. Field replaceable units

The following information describes procedures for removing and installing certain components inside the system. Only a qualified service technician is authorized to replace the components described in this section.

Important: The field replaceable unit (FRU) procedures are intended for trained servicers who are familiar with IBM xSeries products.

Note: Before servicing this system, read “Installation guidelines” on page 77 and “Safety information” on page 197.

Memory-board assembly

The memory-board assembly consists of the memory board, memory, memory-board VRM, and the memory switch card and cable. The following sections describe how to remove the memory board, memory-board VRM, and the memory switch card and cable. For instructions to remove and replace memory, see “Installing memory” on page 98.

Memory board

Note: When replacing the memory board, you must either update the system with the latest firmware or restore the pre-existing firmware that the customer provides on a CD image. See “Updating the firmware” on page 39.

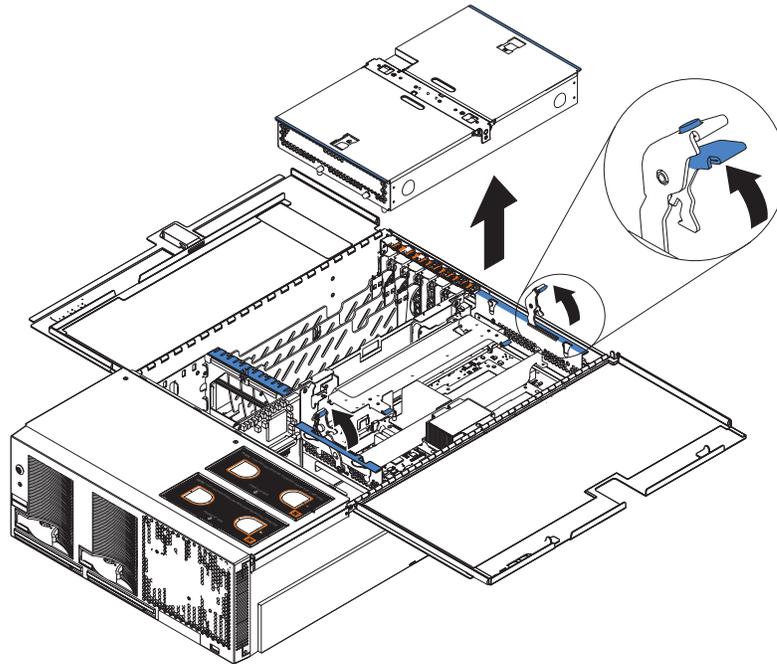
Before you begin:

- Read “Installation guidelines” on page 77.
- Read the safety notices at “Safety notices (multilingual translations)” on page 201.
- Read “Handling static-sensitive devices” on page 200.

Complete the following steps to replace a memory board:

1. Turn off the server (see “Turning off the server” on page 8), and disconnect all power cords and external cables.
2. Open the cover (see “Opening the cover” on page 88).

3. Pull open the memory-board retaining latches, and remove the memory-board assembly.



4. Set the memory-board assembly on a static-free, clean work surface, and remove the DIMMs and VRMs that will be reused. See “Installing memory” on page 98.
5. Remove the memory board from the memory-board assembly.
6. Install the DIMMs and VRMs that were removed in step 4 into the new board.
7. Reinstall the memory board.
8. Reinstall the memory-board assembly.

Note: When you install or remove the memory board, the server configuration information changes. Therefore, you must change and save the new configuration information by using the Configuration/Setup Utility program (see “Starting the Configuration/Setup Utility program” on page 12).

Memory-board voltage regulator module (VRM)

This section contains instructions for removing and replacing memory-board VRMs.

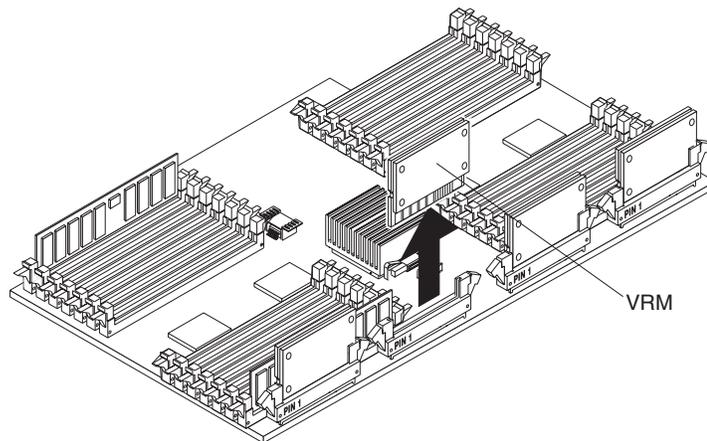
Before you begin:

- Read “Installation guidelines” on page 77.
- Read the safety notices at “Safety notices (multilingual translations)” on page 201.
- Read “Handling static-sensitive devices” on page 200.

To remove a voltage regulator module (VRM) from the memory board, complete the following steps:

1. Turn off the server (see “Turning off the server” on page 8), and disconnect all power cords and external cables.
2. Open the DIMM access door that covers the memory-board VRM that you are removing.

3. Pull the VRM-retention latches apart, and lift the VRM out of the memory-board VRM connector.



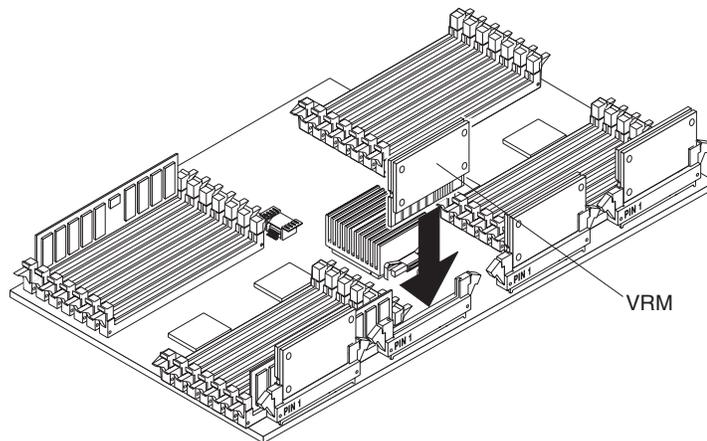
4. Close the DIMM access door.

To replace the memory-board VRM, complete the following steps:

1. Turn off the server (see “Turning off the server” on page 8), and disconnect all power cords and external cables.
2. Open the DIMM access door that covers the memory-board VRM connector into which you will be installing the VRM.
3. Open the retaining clip on each end of the VRM connector.
4. Touch the static-protective package containing the VRM to any unpainted metal surface on the server. Then, remove the VRM from the package.

Attention: To avoid breaking the retaining clips or damaging the VRM connectors, open and close the clips gently.

5. Turn the VRM so that the VRM keys align correctly with the slot, and insert the VRM into the connector by aligning the edges of the VRM with the slots at the ends of the VRM connector. Firmly press the VRM straight down into the connector by applying pressure on both ends of the VRM simultaneously. The retaining clips snap into the locked position when the VRM is firmly seated in the connector. If there is a gap between the VRM and the retaining clips, the VRM has not been correctly inserted; open the retaining clips, remove the VRM, and then reinsert it.

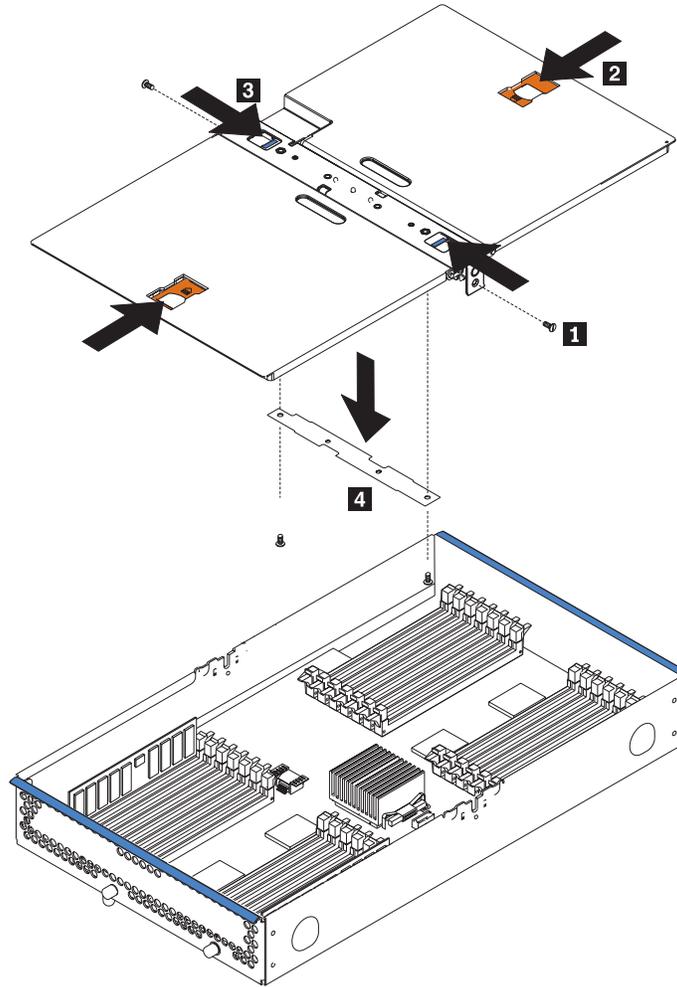


6. Close the DIMM access door.

Memory switch card and cable

To remove the memory switch card and cable from the xSeries 450 server, complete the following steps:

1. Turn off the server (see “Turning off the server” on page 8), and disconnect all power cords and external cables.
2. Remove the memory-board assembly. See “Memory board” on page 115.
3. Remove the cover from the memory-board assembly.
4. Disconnect the memory switch card cable from the memory switch card.
5. Remove the memory switch card from the cover of the memory-board assembly.



6. To replace the memory switch card and cable, reverse the steps.

Processor-board assembly

This section contains instructions for removing the processor-board assembly, the microprocessor and power module, and the processor-board VRM.

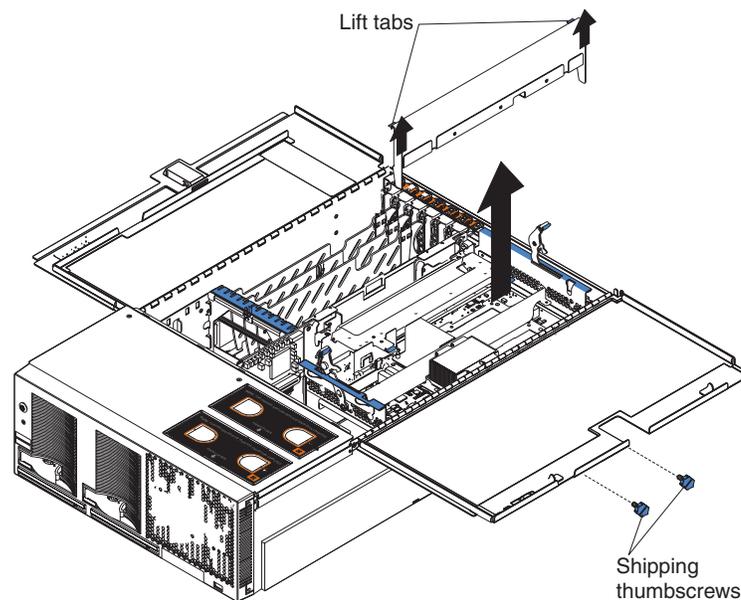
Note: When replacing the processor-board assembly, you must either update the server with the latest firmware or restore the pre-existing firmware that the customer provides on a CD image. See “Updating the firmware” on page 39.

Before you begin:

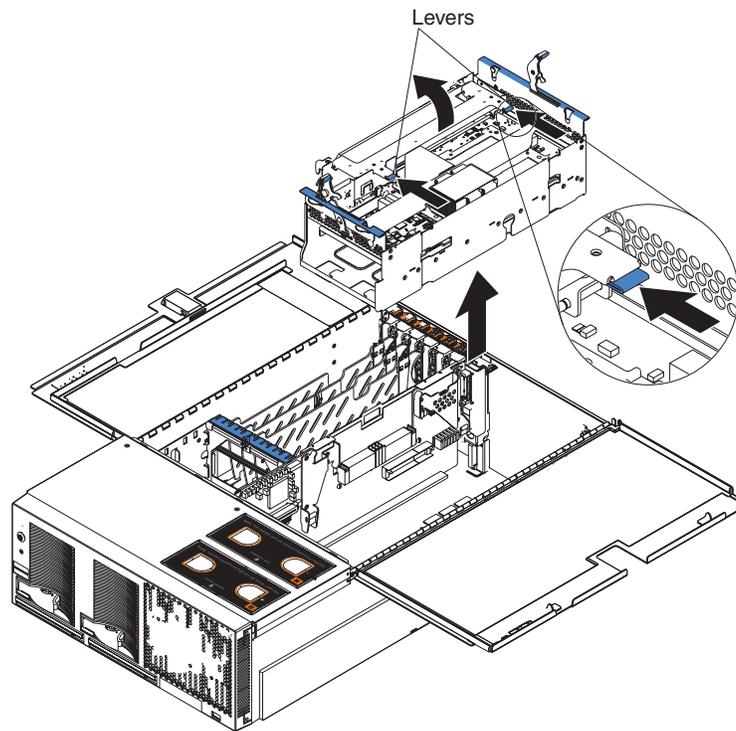
- Read “Installation guidelines” on page 77.
- Read the safety notices at “Safety notices (multilingual translations)” on page 201.
- Read “Handling static-sensitive devices” on page 200.

Complete the following steps to replace a processor-board assembly:

1. Turn off the server (see “Turning off the server” on page 8), and disconnect all power cords and external cables.
2. Open the cover (see “Opening the cover” on page 88).
3. Pull open the memory-board retaining latches, and remove the memory-board assembly. See “Memory board” on page 115 for details.
4. Remove the shipping thumbscrews from the right side of the server, and lift the retention bracket from the server.



5. Remove the processor-board assembly from the server:
 - a. Press to unlock the levers securing the processor-board assembly, and pull up on the levers to release the processor-board assembly.
 - b. Slide the assembly toward the right side of the server.
 - c. Carefully remove the processor-board assembly from the server, and place it on a static-free, clean work surface.



6. Set the processor-board assembly on a static-free, clean work surface, and remove the microprocessor assemblies and power modules that will be reused. See “Microprocessor and power module” on page 121.
7. Place the new processor-board assembly on a static-free, clean work surface, and install the microprocessors and power modules that were removed in the preceding step into the new processor board. See “Installing and replacing a microprocessor and power module” on page 100.
8. Reinstall the processor-board assembly in the server.

Note: When you install or remove the processor-board assembly, the server configuration information changes. Therefore, you must use the Configuration/Setup Utility program to change and save the new configuration information (see “Starting the Configuration/Setup Utility program” on page 12).

9. Reinstall the retention bracket.
10. Replace the two shipping thumbscrews.
11. Reinstall the memory-board assembly.

Microprocessor and power module

Before you begin:

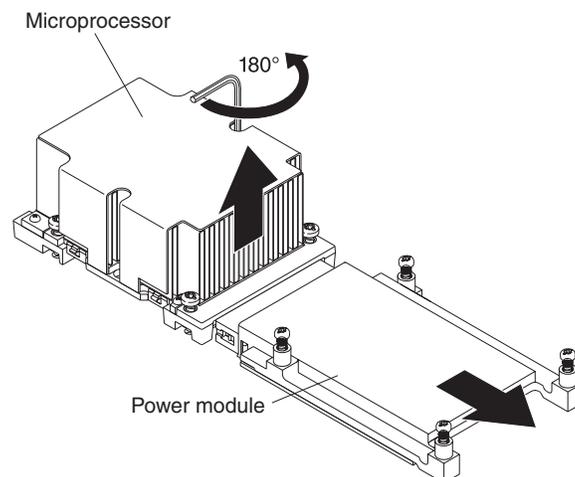
- Read “Installation guidelines” on page 77.
- Read the safety notices at “Safety notices (multilingual translations)” on page 201.
- Read “Handling static-sensitive devices” on page 200.

Complete the following steps to remove a microprocessor:

1. Turn off the server and peripheral devices, and disconnect the power cords and all external cables; then, open the cover.
2. Pull open the memory-board retaining latches, and remove the memory-board assembly. See “Memory board” on page 115 for details.
3. Remove the shipping thumbscrews from the right side of the server, and lift the retention bracket from the server.
4. Remove the processor-board assembly from the server, and place it on a static-free, clean work surface. See “Processor-board assembly” on page 119 for details.
5. Remove the microprocessor and power module:

Attention: Failure to complete the instructions in the prescribed order might cause damage to the microprocessor pins and cause the microprocessor to fail.

- a. Using the T-handled Torx wrench provided with the microprocessor FRU, completely loosen the power-module screws.
- b. Slide the power module from the microprocessor, and remove the power module.
- c. Completely loosen the heat-sink screws.
- d. Use the hex wrench provided with the microprocessor FRU to open the socket lock, and remove the heat sink and microprocessor.



6. Replace the microprocessor and power module. See “Installing and replacing a microprocessor and power module” on page 100 for instructions.
7. Carefully install the processor-board assembly. See “Processor-board assembly” on page 119 for instructions.
8. Reinstall the retention bracket, and replace the two shipping thumbscrews.

9. Carefully install the memory-board assembly. See “Memory board” on page 115 for instructions.

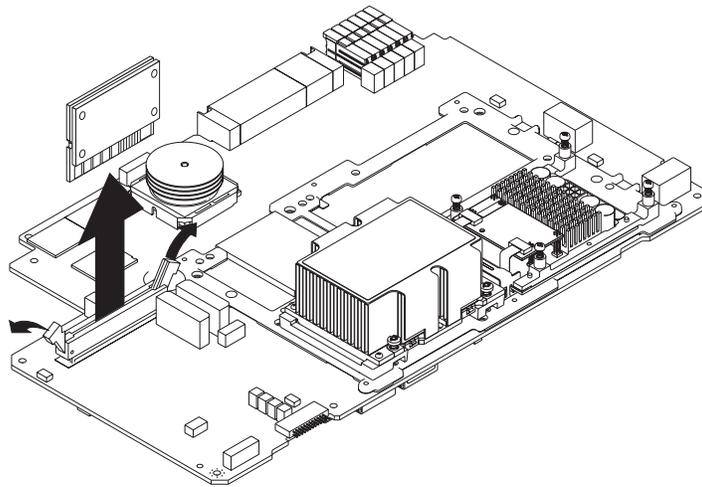
Processor-board VRM

Before you begin:

- Read “Installation guidelines” on page 77.
- Read the safety notices at “Safety notices (multilingual translations)” on page 201.
- Read “Handling static-sensitive devices” on page 200.

To remove a VRM from the processor board, complete the following steps:

1. Turn off the server (see “Turning off the server” on page 8), and disconnect all power cords and external cables.
2. Pull open the memory-board retaining latches, and remove the memory-board assembly. See “Memory board” on page 115 for details.
3. Remove the shipping thumbscrews from the right side of the server, and lift the retention bracket from the server.
4. Remove the processor-board assembly. See “Processor-board assembly” on page 119.
5. Pull the VRM-retention latches apart, and lift the VRM out of the processor-board VRM connector.

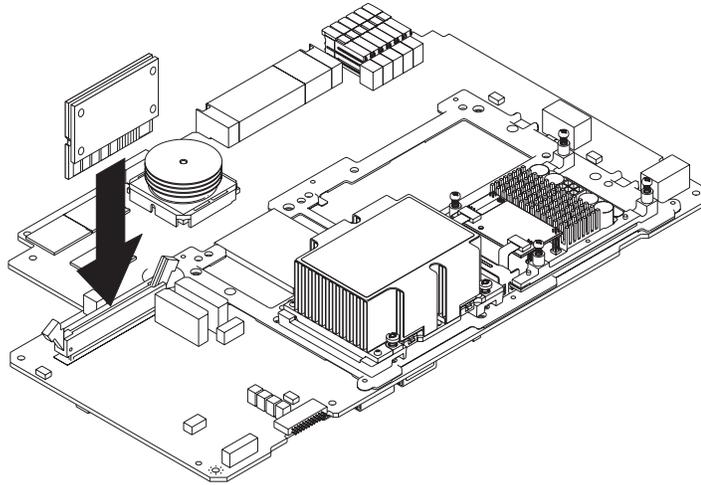


To replace the processor-board VRM, complete the following steps:

1. Turn off the server (see “Turning off the server” on page 8), and disconnect all power cords and external cables.
2. Remove the memory-board assembly. See “Memory board” on page 115 for details.
3. Remove the shipping thumbscrews from the right side of the server, and lift the retention bracket from the server.
4. Remove the processor-board assembly. See “Processor-board assembly” on page 119.
5. Open the retaining clip on each end of the VRM connector.
6. Touch the static-protective package containing the VRM to any unpainted metal surface on the server. Then, remove the VRM from the package.

Attention: To avoid breaking the retaining clips or damaging the VRM connectors, open and close the clips gently.

7. Turn the VRM so that the VRM keys align correctly with the slot.
8. Insert the VRM into the connector by aligning the edges of the VRM with the slots at the ends of the VRM connector. Firmly press the VRM straight down into the connector by applying pressure on both ends of the VRM simultaneously. The retaining clips snap into the locked position when the VRM is firmly seated in the connector. If there is a gap between the VRM and the retaining clips, the VRM has not been correctly inserted; open the retaining clips, remove the VRM, and then reinsert it.



PCI-X board assembly

The PCI-X board assembly contains the following components:

- Active PCI assembly
- Midplane board
- I/O board
- PCI and PCI-X adapters and spacers
- PCI-X board
- Riser card
- Remote Supervisor Adapter
- VRMs

The PCI-X board assembly must be removed from the server to access many of these components.

Before you begin:

- Read “Installation guidelines” on page 77.
- Read the safety notices at “Safety notices (multilingual translations)” on page 201.
- Read “Handling static-sensitive devices” on page 200.

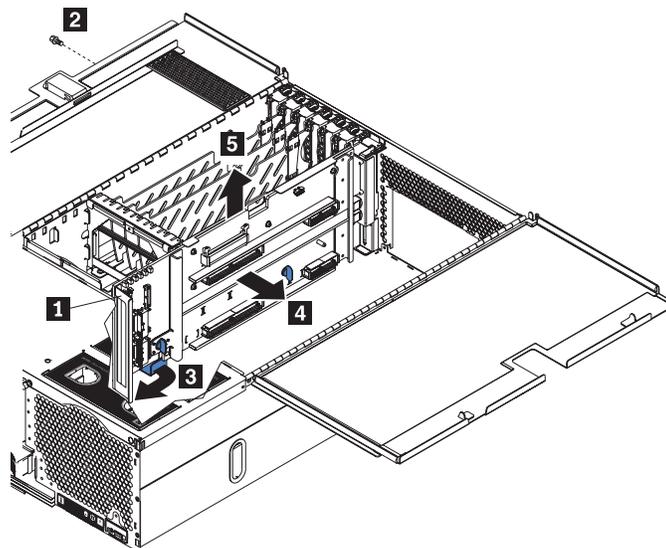
Complete the following steps to remove the PCI-X board assembly from the server:

1. Turn off the server (see “Turning off the server” on page 8), and disconnect all power cords and external cables.
2. Remove the front bezel. See “Removing and replacing the bezel” on page 89.

3. Remove the power supplies. See “Removing and replacing a hot-swap power supply” on page 90.
4. Open the top cover (see “Opening the cover” on page 88).
5. Remove fans 1 and 2 (see “Replacing fan 1 or 2” on page 107).
6. Remove the memory-board assembly. See “Memory board” on page 115 for details.
7. Remove the shipping thumbscrews from the right side of the server, and lift the retention bracket from the server.
8. Remove the processor-board assembly. See “Processor-board assembly” on page 119 for details.
9. If the system contains a removable cable retainer, turn the thumbscrew to remove it.
10. Disconnect all cables attached to the PCI-X board assembly **1**.
11. Remove the shipping thumbscrews from the left side of the server, if installed **2**.
12. Disconnect the cables to the hard disk drive backplane (see “Hard disk drive backplane” on page 138).

Note: Failure to disconnect the hard disk drive backplane cables might result in the PCI-X board assembly becoming entangled in these cables at step 14.

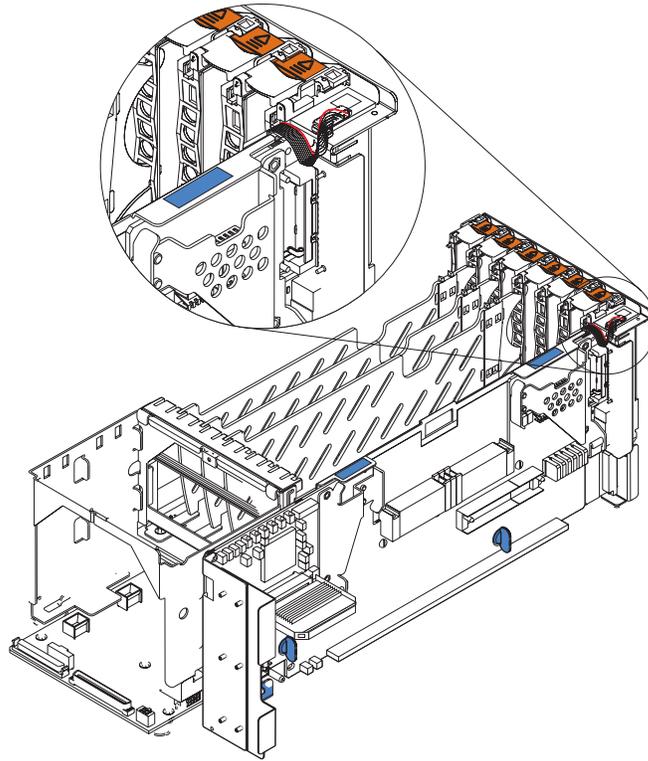
13. Pivot the release handle **3**.
14. Slide the PCI-X board assembly as far forward as possible, and then slightly to the right **4**.
15. Disconnect the PCI hot-swap cable, and lift the PCI-X board assembly straight up and out of the server **5**.



16. To reinstall the PCI-X board assembly, reverse these steps.

Note: The PCI-X board assembly connects to the chassis with tabs that connect with seven slots on the bottom of the chassis and two slots on the side of the chassis. Line up the tabs on the PCI-X board assembly with the slots on the chassis, and then slide the PCI-X board assembly into place.

Attention: To prevent damage to the PCI hot-swap cable, route the cable so that it lays flat over the top of the PCI-X assembly, as shown in the following illustration.



Midplane board

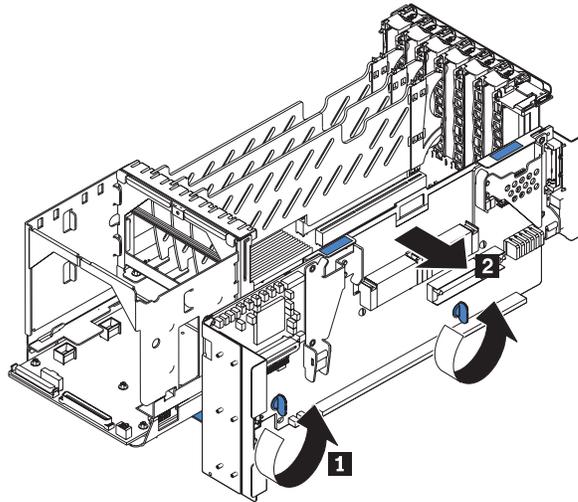
Before you begin:

- Read “Installation guidelines” on page 77.
- Read the safety notices at “Safety notices (multilingual translations)” on page 201.
- Read “Handling static-sensitive devices” on page 200.

Complete the following steps to remove the midplane board:

1. Turn off the server (see “Turning off the server” on page 8), and disconnect all power cords and external cables.
2. Open the top cover (see “Opening the cover” on page 88).
3. Remove the memory-board assembly. See “Memory board” on page 115 for details.
4. Remove the shipping thumbscrews from the right side of the server, and lift the retention bracket from the server.
5. Remove the processor-board assembly. See “Processor-board assembly” on page 119 for details.
6. Remove the PCI-X board assembly from the server (see “PCI-X board assembly” on page 123), and place it on a clean work surface.

7. Remove the midplane board by turning the two midplane thumbscrews (**1**) to release it; then, carefully pull the midplane board out of its socket (**2**).



8. To replace the midplane board, reverse the previous steps.

Midplane-board VRM

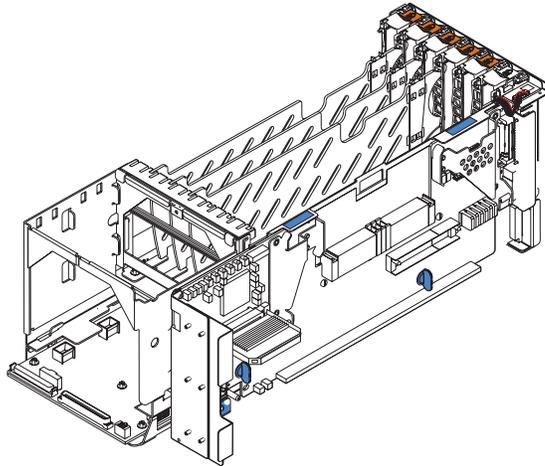
Before you begin:

- Read “Installation guidelines” on page 77.
- Read the safety notices at “Safety notices (multilingual translations)” on page 201.
- Read “Handling static-sensitive devices” on page 200.

To remove the VRM from the midplane board, complete the following steps:

1. Turn off the server (see “Turning off the server” on page 8), and disconnect all power cords and external cables.
2. Open the top cover (see “Opening the cover” on page 88).
3. Remove the memory-board assembly. See “Memory board” on page 115 for details.
4. Remove the shipping thumbscrews from the right side of the server, and lift the retention bracket from the server.
5. Remove the processor-board assembly. See “Processor-board assembly” on page 119 for details.
6. Remove the PCI-X board assembly from the server (see “PCI-X board assembly” on page 123), and place it on a clean work surface.
7. Press down on the VRM-retention bar, and release the VRM-retention bar.

8. Pull the VRM from the midplane-board VRM connector.



9. To replace the midplane-board VRM, reverse the steps.

PCI-X board

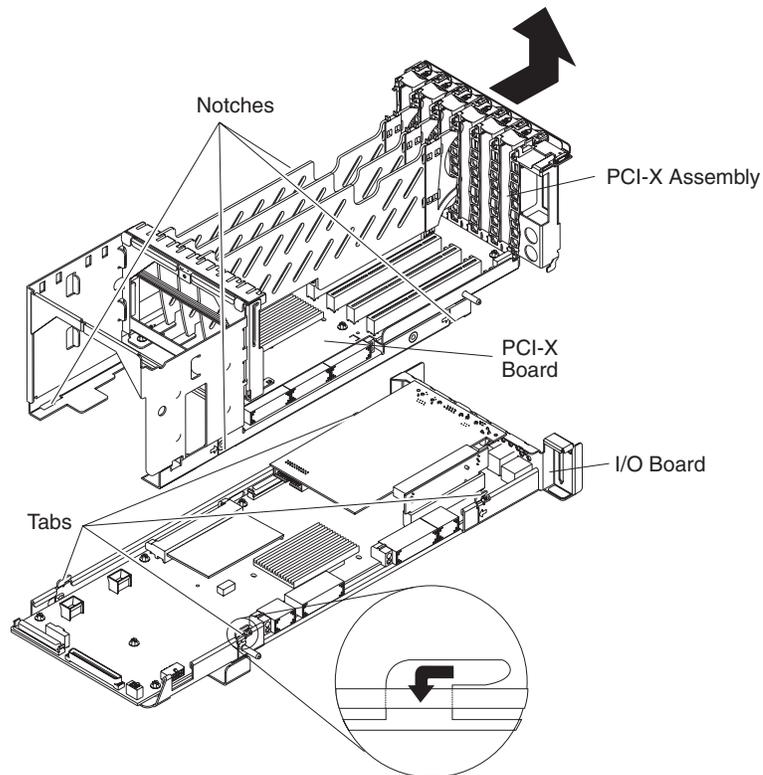
Before you begin:

- Read “Installation guidelines” on page 77.
- Read the safety notices at “Safety notices (multilingual translations)” on page 201.
- Read “Handling static-sensitive devices” on page 200.

Complete the following steps to remove the PCI-X board:

1. Turn off the server (see “Turning off the server” on page 8), and disconnect all power cords and external cables.
2. Open the top cover (see “Opening the cover” on page 88).
3. Remove the memory-board assembly. See “Memory board” on page 115 for details.
4. Remove the shipping thumbscrews from the right side of the server, and lift the retention bracket from the server.
5. Remove the processor-board assembly. See “Processor-board assembly” on page 119 for details.
6. Remove the PCI-X board assembly from the server (see “PCI-X board assembly” on page 123), and place it on a clean work surface.

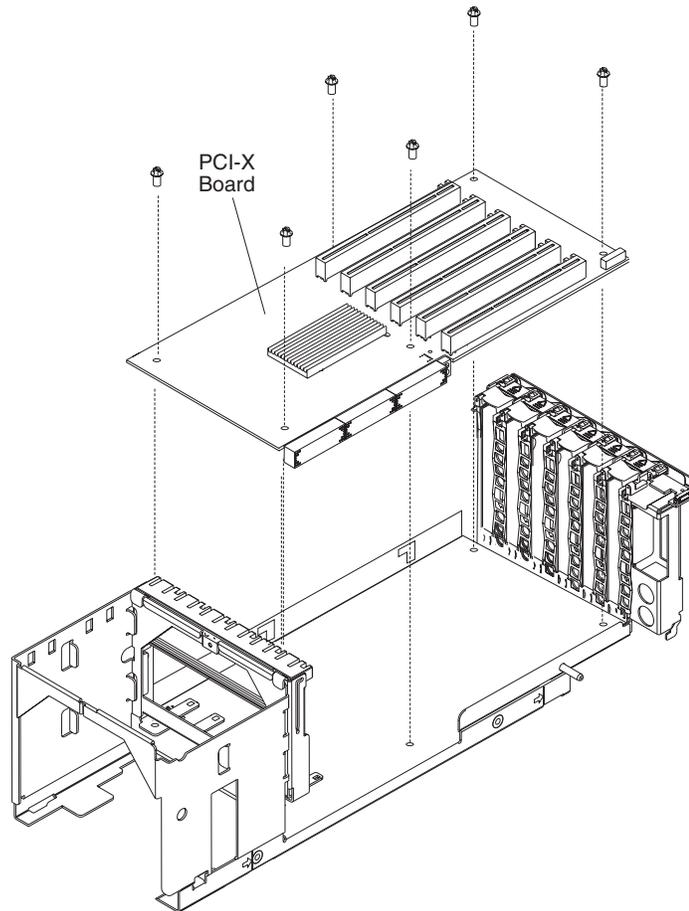
7. Remove the PCI-X board assembly from the I/O board:
 - a. Remove any adapters and adapter separators that are installed (see “Installing an adapter” on page 92), disconnecting any necessary cables.
 - b. Remove the midplane board by turning the two midplane board thumbscrews to release it; then, carefully lift the midplane board out of its socket, and place it on a static-free, clean work surface.
 - c. Release the PCI-X board assembly from the I/O board at the four notches that secure them together; then, lift the PCI-X board assembly off of the I/O board, and set it on a safe, clean work surface.



8. Remove any cables that are attached to the PCI-X board.

9. Remove the six screws that fasten the PCI-X board to the assembly.

Note: You might have to move the clear plastic label out of the way.



10. Lift the board up and out of the PCI-X board assembly.
11. To replace the PCI-X board, reverse the previous steps.

Active PCI assembly

The Active PCI assembly, mounted on the top rear of the server frame adjacent to the PCI and PCI-X adapters, contains one switch for each of the six adapters. This ensures that power is disconnected from the associated adapter if you attempt to open the adapter latch and remove an adapter.

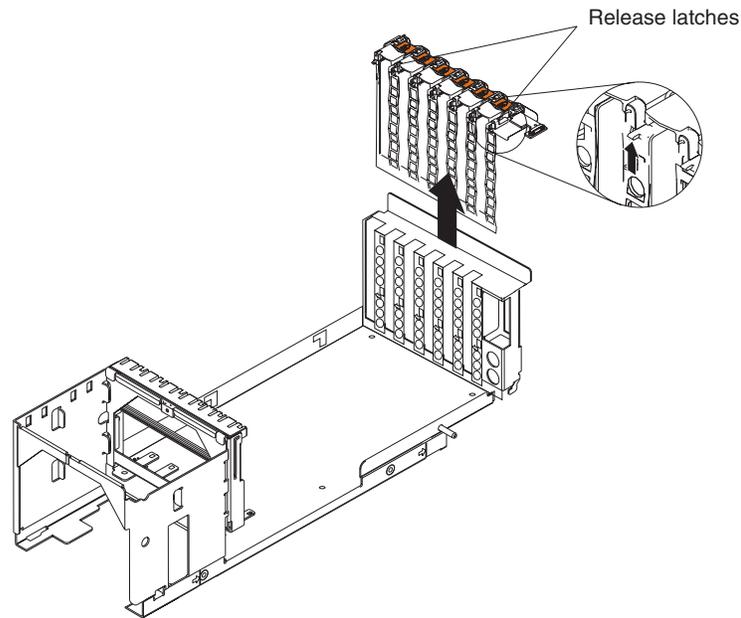
Before you begin:

- Read “Installation guidelines” on page 77.
- Read the safety notices at “Safety notices (multilingual translations)” on page 201.
- Read “Handling static-sensitive devices” on page 200.

Complete the following steps to replace the Active PCI assembly:

1. Turn off the server, and disconnect all power cords and external cables; then, remove the top cover (see “Opening the cover” on page 88).
2. Disconnect the Active PCI assembly cable from the server.

3. Grasp the two adapter switch card release latches, and slide the assembly away from the server chassis; then, lift it out of the server.



4. To replace the Active PCI assembly, lower the assembly into place so that the lips on the bottom of the EMI shielding material fit into the chassis at the rear of the server, and slide the card into place until the two release latches snap securely. Then, connect the cable from the Active PCI assembly to the board.
5. Close the top cover (see "Closing the cover" on page 111).

I/O board, riser card, and Remote Supervisor Adapter

This section contains instructions and considerations for removing and replacing the I/O board, the riser card, and the Remote Supervisor Adapter.

Before you begin:

- Read "Installation guidelines" on page 77.
- Read the safety notices at "Safety notices (multilingual translations)" on page 201.
- Read "Handling static-sensitive devices" on page 200.

Attention: The EFI in the xSeries 450 stores its variables with nonvolatile attributes in NVRAM on the Remote Supervisor Adapter. Before you remove or replace the Remote Supervisor Adapter or clear the NVRAM, make a backup copy of the current nonvolatile variables stored in the NVRAM on the Remote Supervisor Adapter. After you install a new Remote Supervisor Adapter, you must restore the EFI variables previously stored in the NVRAM. The EFI variables stored in the NVRAM on the Remote Supervisor Adapter include the following:

- Console definitions
- Startup options and drivers
- Startup order and timeout

Complete the following steps to create a backup copy of the EFI variables.

Attention: If you cannot use the following instructions to make a backup copy, ask the customer if they have a current backup copy. If they do not, go to the procedure on page 135 to manually create a backup copy of the EFI variables before you remove or replace the Remote Supervisor Adapter or clear NVRAM.

1. Ensure that the formatted media where you plan to store the backup file is installed, and start the server.
2. From the EFI Boot Manager, select **EFI Shell [Built-In]**, and press Enter.

Note: If EFI Shell is not a choice on the list, the server has a customized startup configuration. Contact the system administrator for further instructions.

3. In the Shell prompt, type `map -b`, and press Enter.
4. Look for a file system to which you can write backup file information, and note the file system number (`fsn:`, where *n* is the number of the file system). The following character string will be displayed in the middle of the line: `Scsi`.
5. At the Shell prompt, type `fsn:`, and press Enter. The prompt changes to `fsn:\`.
6. Type the following EFI command to create a backup copy of the EFI variables:

```
backup filename
```

(Where *filename* is the name you want to assign to the backup copy, for example, `efibskup.001`), and press Enter.

Note: You might need to locate the file.

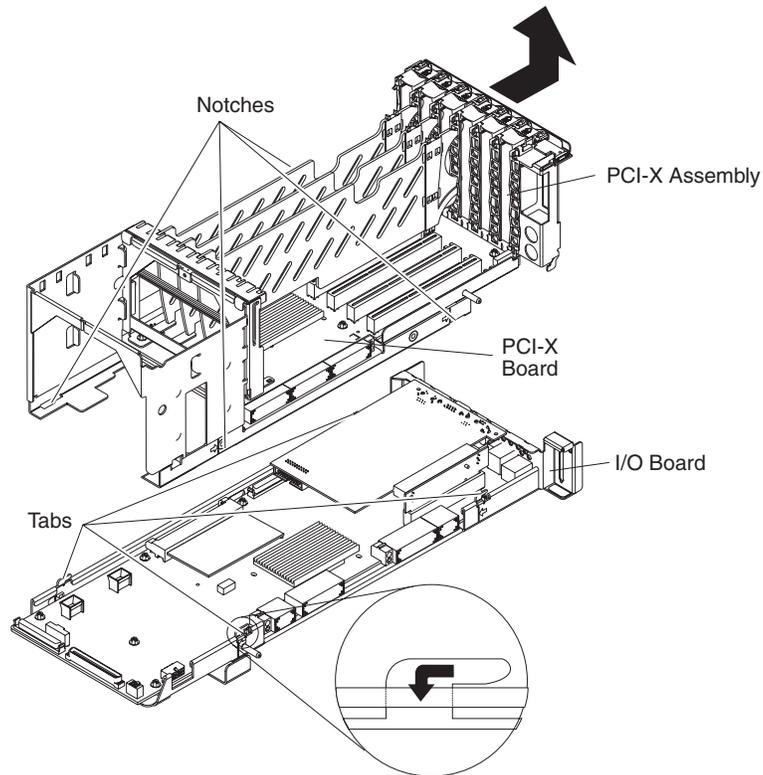
If the backup is successful, the screen will display the following message:
Completed - Success

7. Type one of the following EFI commands to verify that the backup file was created successfully: `dir` or `ls`.

Complete the following steps to remove the I/O board, riser card, or Remote Supervisor Adapter:

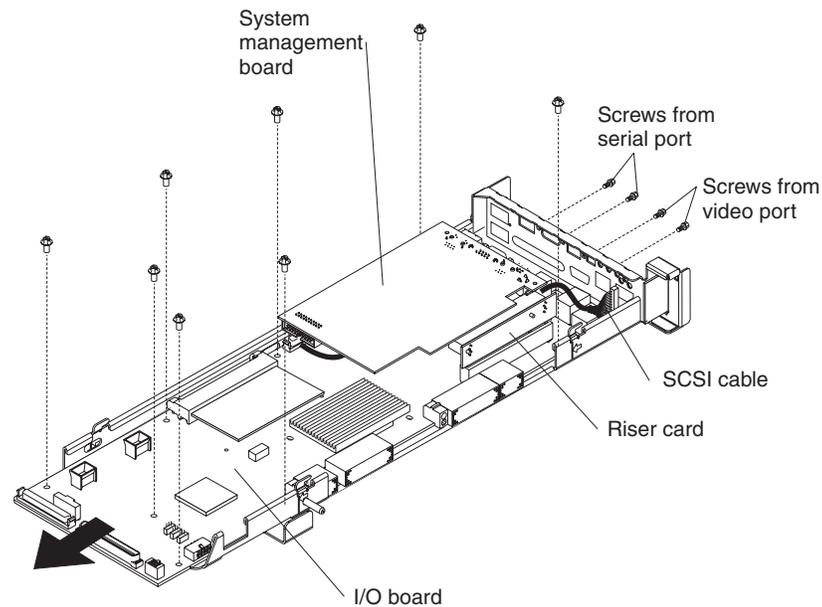
1. Turn off the server (see “Turning off the server” on page 8), and disconnect all power cords and external cables.
2. Open the top cover (see “Opening the cover” on page 88).
3. Remove the memory-board assembly. See “Memory board” on page 115 for details.
4. Remove the shipping thumbscrews from the right side of the server, and lift the retention bracket from the server.
5. Remove the processor-board assembly. See “Processor-board assembly” on page 119 for details.
6. Remove the PCI-X board assembly from the server (see “PCI-X board assembly” on page 123), and place it on a clean work surface.
7. Remove the midplane board by turning the two midplane thumbscrews to release it (see “Midplane board” on page 125); then, carefully lift the midplane board out of its socket, and place it on a static-protective surface.

8. Remove the PCI-X board assembly from the I/O board:
 - a. Remove any adapters and adapter separators that are installed (see “Installing an adapter” on page 92), unplugging any necessary cables.
 - b. Release the PCI-X board assembly from the I/O board at the four notches that secure them together, then lift the PCI-X board assembly off of the I/O board and set it in a safe place.

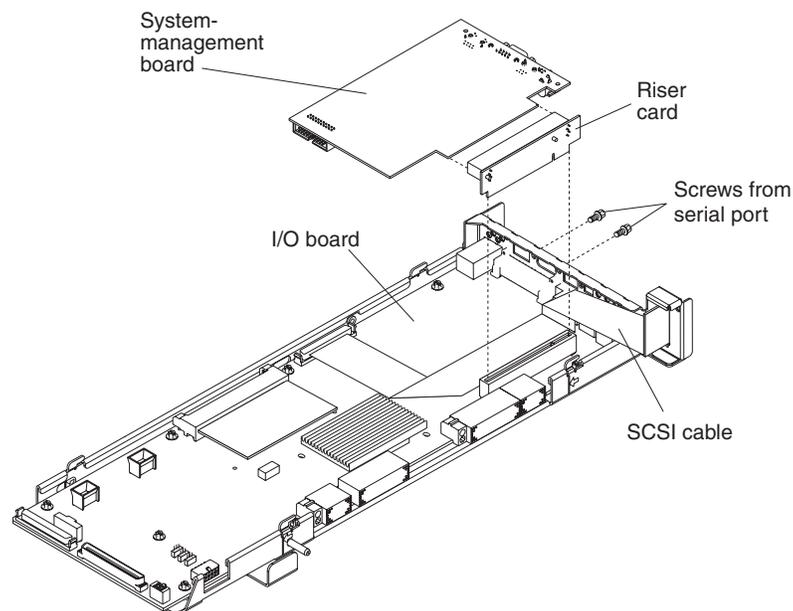


9. Remove the VRM from the I/O board.
10. Remove all screws securing serial ports and video connectors to the back of the I/O board assembly.
11. Remove the eight screws securing the I/O board to the I/O board assembly, and slide the I/O board approximately 1 in. (2.54 cm) forward.

12. Remove the Remote Supervisor Adapter from the riser card, disconnecting any cables, and set it in a safe place.



13. Remove the riser card from the I/O board, disconnecting any cables.



14. To replace the I/O board, reverse the previous steps.
15. Restart the server; then, update the firmware (see “Updating the firmware” on page 39).

If you cannot restart the server after updating the firmware, complete the following steps:

1. Attach an ANSI terminal emulator to the serial port of the Remote Supervisor Adapter of the server using a null modem cable. Use communications settings of 57600 baud, 8 data bits, no parity, 1 stop bit, no flow control.
2. Press Esc to access the login screen on the ANSI terminal emulator. A login window is displayed.

3. In the Login ID prompt, type USERID.
4. In the Password prompt, type PASSWORD.
5. Select **Settings**, and press Enter.
6. Select **Network Interfaces/Protocols**, and press Enter.
7. Select **Ethernet**, and press Enter.
8. Select **IP Configuration Assigned by DHCP server**, and press Enter.
9. Note the IP address on the IP Configuration Assigned by DHCP server screen.
10. Assign a static IP address to the server:
 - a. Open an Internet browser, such as Microsoft Internet Explorer.
 - b. Type the IP address that you noted in step 9, and click **OK**. A prompt asking for your user ID and password is displayed.
 - c. Type USERID and PASSWORD, and click **OK**. The Advanced System Management Welcome screen is displayed.
 - d. Set the timeout options that you want, and click **Continue**.
 - e. Click **Network Interface**.
 - f. Disable DHCP, and assign a static IP address in the IP address field; then, click **Save**.
 - g. Click **OK**.
11. Update the Remote Supervisor Adapter firmware:
 - a. From the Advanced System Management Welcome screen, click the **Firmware Update** link.
 - b. Click **Browse** to locate the following firmware files:
 - The boot ROM file: cnetbrus.pkt
 - The main application file: cnetmnus.pkt
 - The remote graphics file: cnetrgus.pkt
 - c. Click **Update**.
 - d. Click **OK**.
 - e. Repeat steps 11a through 11d for each firmware file.
12. Click **Restart ASM** to restart the Remote Supervisor Adapter.
13. Logoff the Advanced System Management utility, and exit Internet Explorer.
14. Remove the ANSI terminal emulator from the serial port of the server, and turn on the server.

Restoring the nonvolatile EFI variables

You might need to manually restore the nonvolatile EFI variables after replacing the Remote Supervisor Adapter. To restore the nonvolatile EFI variables after replacing the Remote Supervisor Adapter, complete the following steps:

1. Ensure that the formatted media where you plan to store the backup file is installed, and start the server.
2. From the EFI Boot Manager menu, select **EFI Shell [Built-In]**, and press Enter.

Note: If EFI Shell is not a choice on the list, the server has a customized startup configuration. Contact the system administrator for further instructions.

3. At the Shell prompt, type map -b, and press Enter.
4. Look for a file system in which you can locate the backup file, and note the file system number (*fsn*:, where *n* is the number of the file system).
5. At the Shell prompt, type *fsn*:, and press Enter. The prompt changes to *fsn*:\.

6. Type `restore filename` (where *filename* is the name you assigned to the backup copy), and press Enter. The following message is displayed:
Delete existing non-volatile efi variables? [y/n]
7. Type `y`, and press Enter. If the SAL/EFI settings have been restored, the following message is displayed:
Completed - Success
8. Type `reset`, and press Enter.

If SAL/EFI settings were not backed up, use one of the following procedures to restore settings for your operating system.

To restore Microsoft Windows 2003 Server startup options, complete the following steps:

1. From the EFI Boot Manager menu, select **EFI Shell [Built-In]**, and press Enter.
2. At the Shell prompt, type `map -b`, and press Enter.
3. Look for a file system where the following directory is located:
`fsn:\EFI\Microsoft\WINNTnn`, note the file system number (*fsn:*, where *n* is the number of the file system), and find the startup (`Bootnnnn`) file.
4. Note the name of the startup file.
5. At the Shell prompt, type `fsn:`, and press Enter. The prompt changes to `fsn:\`.
6. Type `cd EFI\MSUtil\`, and press Enter.
7. Type `nvrboot`, and press Enter.
8. In the Select prompt, type `I`, and press Enter.
9. Type the Import file path, and press Enter. The following message is displayed:
Imported Boot Options from file: press Enter to Continue.
10. Press Enter.
11. Type `q`, and press Enter.
12. Exit the EFI Shell; then, return to the EFI Boot Manager.
13. Select **Boot Options Maintenance Menu**, and press Enter.
14. If the server has multiple options of Windows, repeat steps 3 through 13 for each startable Windows installation.
15. Select **Manage BootNext**, if necessary, and press Enter; then, select **Save Settings to NVRAM**, and press Enter.
16. Select **Delete Boot Options**, if necessary, and press Enter; then, select **Save Settings to NVRAM**, and press Enter.
17. Select **Change Boot Order**, if necessary, and press Enter; then, select **Save Settings to NVRAM**, and press Enter.
18. Return to the EFI Boot Manager to start the startup option that you want.

To restore SuSE Linux startup options, complete the following steps:

1. From the EFI Boot Manager menu, select **Boot option maintenance menu**, and press Enter.
2. Select **Add a Boot Option**, and press Enter.
3. Select a volume for the EFI System Partition for SuSE Linux. The volume for SuSE Linux should have `\efi\SuSE` directory in it.
4. Select **efi**, and press Enter.
5. Select **SuSE**, and press Enter.
6. Select **elilo.efi**, and press Enter.

7. At the Type a New Description prompt, type the description of the startup option you want to appear in the Boot option maintenance menu.
8. Type `n` if there are no customized startup options.
9. Type `y` to save changes to NVRAM.
10. If the server has multiple options of SuSE Linux, repeat steps 3 on page 135 through 9 for each startable Linux installation.
11. Select **Exit**, and press Enter to return to the Boot option maintenance menu.
12. Select **Exit**, and press Enter to return to the EFI Boot Manager menu.

To restore console configuration settings, complete the following steps:

1. From the EFI Boot Manager menu, select **Boot options maintenance menu**, and press Enter.
2. Select **Active Console Output**, and press Enter to display available devices.
3. Select the devices that you want using the arrow keys, and press Enter. You can select more than one device as active.
4. Select **Save Settings to NVRAM**, and press Enter.
5. Select **Exit**, and press Enter to return to the Boot options maintenance menu.
6. Repeat steps 2 through 5 for Active Console Input and Active Error Output.
7. Select **Exit**, and press Enter to return to the EFI Boot Manager menu.
8. The settings will be active the next time you start up the server.

To restore all other startup options, complete the following steps:

1. From the EFI Boot Manager, select **Boot option maintenance menu**, and press Enter.
2. Select **Add a Boot Option**, and press Enter.
3. Select a volume for the EFI System Partition for the volume that you want or its directory and file.
4. At the Type a New Description prompt, type the description of the startup option you want to appear in the Boot option maintenance menu.
5. Type `n` if there are no customized startup options for Linux.
6. Type `y` to save changes to NVRAM.
7. Select **Exit**, and press Enter to return to the Boot option maintenance menu.
8. Select **Exit**, and press Enter to return to the EFI Boot Manager menu.

To restore any driver options, complete the following steps:

1. From the EFI Boot Manager, select **EFI Shell [Built-In]**, and press Enter.
2. Type `bcfg` to add, remove, or move any driver options, if necessary.

To restore active console devices, complete the following steps:

1. From the EFI Boot Manager, select **Boot option maintenance menu**, and press Enter.
2. Select **Active Console Output**, **Console Input**, and **Standard Error Devices**.

Note: If no devices are selected as active, VGA is used by default. If any device is selected as active, only selected devices are used. You can select multiple devices as active. Hot-plug devices are always active.

3. Select the active devices that you want; then, select **Save Settings to NVRAM**, and press Enter.
4. Cold reset or connect `-c` from the EFI shell for changes to take effect.

Note: If no devices are selected as active, VGA is used by default. If any device is selected as active, only selected devices are used. You can select multiple devices as active. Hot-plug devices are always active.

For instructions to restore a remote-control password, see “Configuring the remote-control password” on page 25.

Top cover assembly

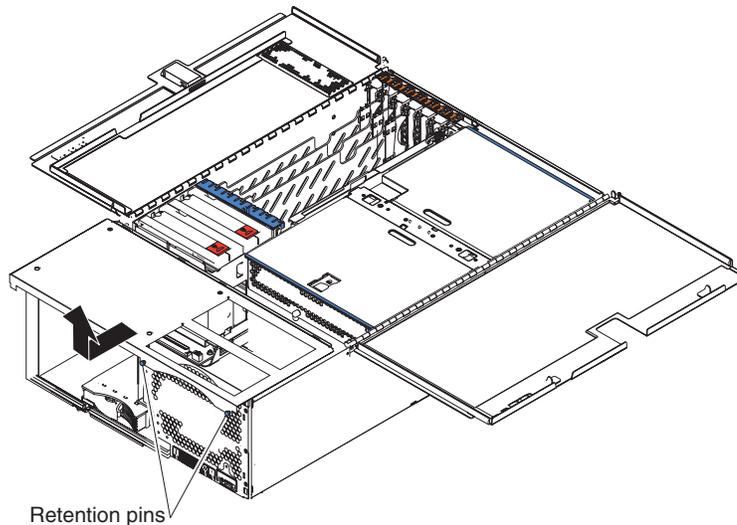
This section contains instructions for removing and replacing the top cover assembly.

Before you begin:

- Read “Installation guidelines” on page 77.
- Read the safety notices at “Safety notices (multilingual translations)” on page 201.
- Read “Handling static-sensitive devices” on page 200.

Complete the following steps to remove the top cover assembly.

1. Turn off the server (see “Turning off the server” on page 8), and disconnect all power cords and external cables.
2. Remove the front bezel (see “Removing and replacing the bezel” on page 89).
3. Pull the two retaining pins on the top front of the chassis until they loosen.
4. Slide the top cover to the front slightly.
5. Pull the cover up, and remove it from the server.



To replace the top cover assembly, complete the following steps:

1. Align the three notches on each side of the cover with the slots in the top of the chassis.
2. Push the cover toward the rear.
3. Push in on the two retaining pins.
4. Replace the front bezel.

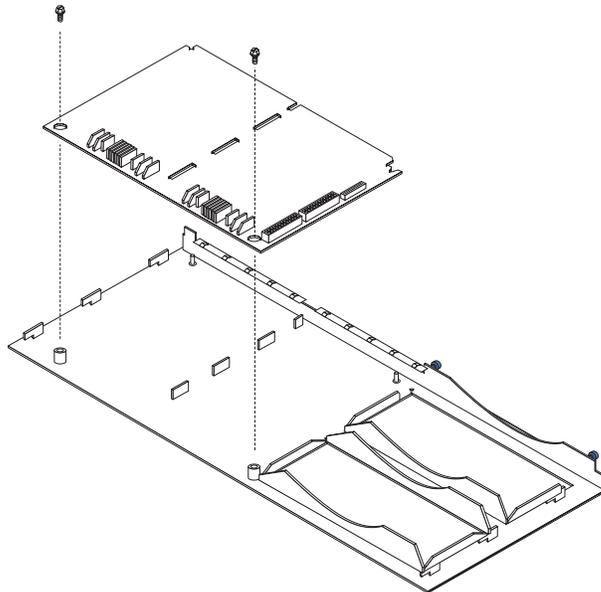
Top power board

Before you begin:

- Read “Installation guidelines” on page 77.
- Read the safety notices at “Safety notices (multilingual translations)” on page 201.
- Read “Handling static-sensitive devices” on page 200.

Complete the following steps to remove the top power board.

1. Turn off the server (see “Turning off the server” on page 8), and disconnect all power cords and external cables.
2. Remove the top cover assembly (see “Top cover assembly” on page 137), and set it upside-down on a clean work surface.
3. Remove the two screws securing the power board to the top cover.
4. Pull the power board away from the cover.



5. To install the top power board, reverse the above steps.

Hard disk drive backplane

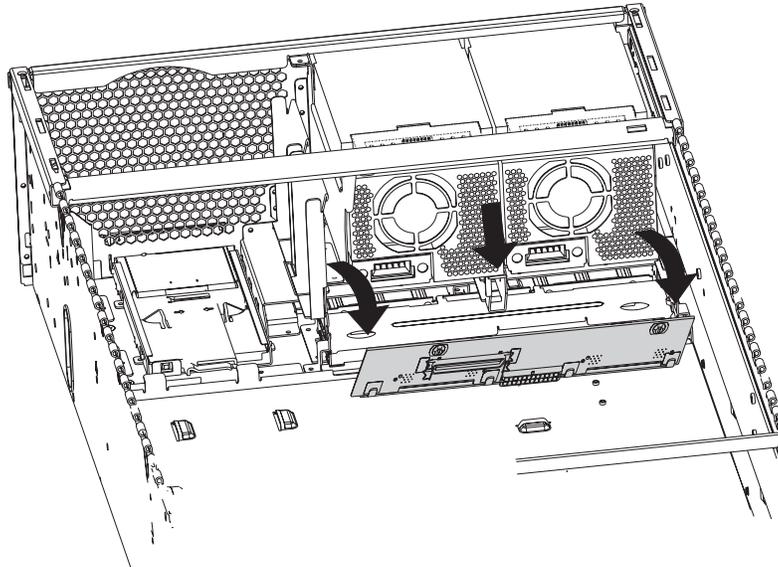
Before you begin:

- Read “Installation guidelines” on page 77.
- Read the safety notices at “Safety notices (multilingual translations)” on page 201.
- Read “Handling static-sensitive devices” on page 200.

Complete the following steps to remove the hard disk drive backplane.

1. Turn off the server (see “Turning off the server” on page 8), and disconnect all power cords and external cables.
2. Open the cover (see “Opening the cover” on page 88).
3. Remove the power supplies (see “Removing and replacing a hot-swap power supply” on page 90).

4. Remove the memory-board assembly (see “Memory board” on page 115 for details).
5. Remove the shipping thumbscrews from the right side of the server, and lift the retention bracket from the server.
6. Remove the processor-board assembly (see “Processor-board assembly” on page 119 for details).
7. Remove the PCI-X board assembly (see “PCI-X board assembly” on page 123).
8. Grasp the edge of the hard disk drive backplane nearest the front of the server, and flip the backplane up.



9. Remove the backplane from the server.
10. To install the hard disk drive backplane, reverse the previous steps, making sure to align the pins in the hard disk drive backplane with the notches in the server chassis.

Media bay card

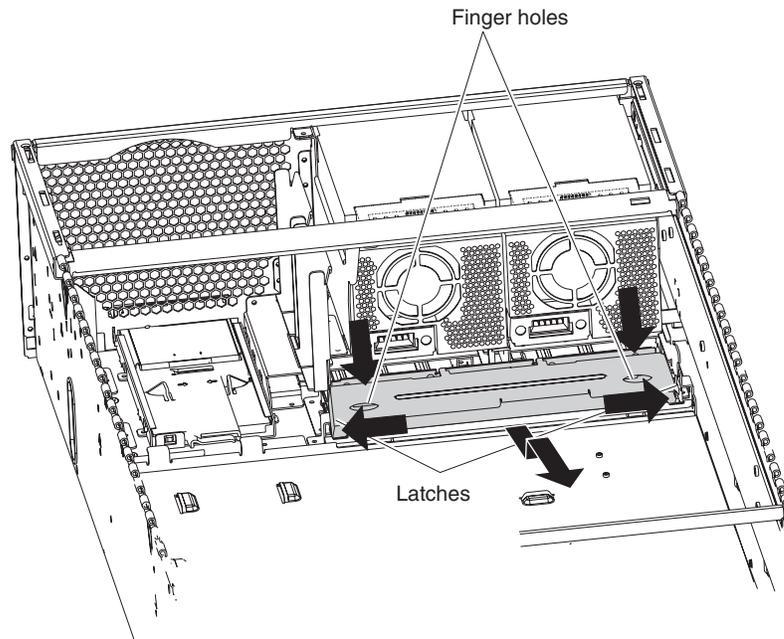
Before you begin:

- Read “Installation guidelines” on page 77.
- Read the safety notices at “Safety notices (multilingual translations)” on page 201.
- Read “Handling static-sensitive devices” on page 200.

Complete the following steps to remove the media bay card.

1. Turn off the server (see “Turning off the server” on page 8), and disconnect all power cords and external cables.
2. Open the cover (see “Opening the cover” on page 88).
3. Remove the hard disk drive backplane (see “Hard disk drive backplane” on page 138).

4. Insert your fingers in the two thumb holes, and push toward the outside edges of the card until the card is released.



5. Pull the card out of the server.
6. To replace the media bay card, reverse the previous steps.

Memory-board retaining latches

This section contains instructions for removing the memory-board retaining latches from the processor-board assembly.

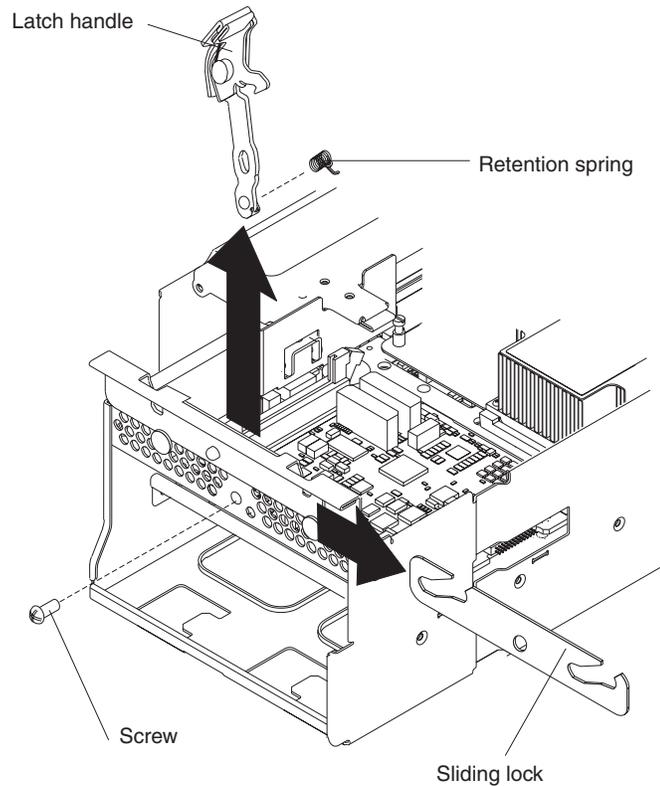
Before you begin:

- Read “Installation guidelines” on page 77.
- Read the safety notices at “Safety notices (multilingual translations)” on page 201.
- Read “Handling static-sensitive devices” on page 200.

Complete the following steps to replace the memory-board retaining latches:

1. Turn off the server (see “Turning off the server” on page 8), and disconnect all power cords and external cables.
2. Open the cover (see “Opening the cover” on page 88).
3. Pull open the memory-board retaining latches, and remove the memory-board assembly. See “Memory board” on page 115 for details.
4. Remove the shipping thumbscrews from the right side of the server, and lift the retention bracket from the server.
5. Remove the processor-board assembly from the server (see “Processor-board assembly” on page 119).
6. Set the processor-board assembly on a static-free, clean work surface.
7. Remove the screws securing the memory-board retaining latches to the processor-board assembly.
8. Remove the memory-board retaining latches and the retention spring from the processor-board assembly; then, remove the the locking slides from the processor-board assembly.

9. Place the new locking slides in the processor-board assembly.
10. Place the new memory-board retaining latches and the retention spring, and secure them with the screws that you removed in step 7 on page 140.



Note: When you install or remove the processor-board assembly, the server configuration information changes. Therefore, you must use the Configuration/Setup Utility program to change and save the new configuration information (see “Starting the Configuration/Setup Utility program” on page 12).

11. Reinstall the processor-board assembly in the server.
12. Reinstall the retention bracket.
13. Replace the two shipping thumbscrews.
14. Reinstall the memory-board assembly.

AC box assembly mechanism

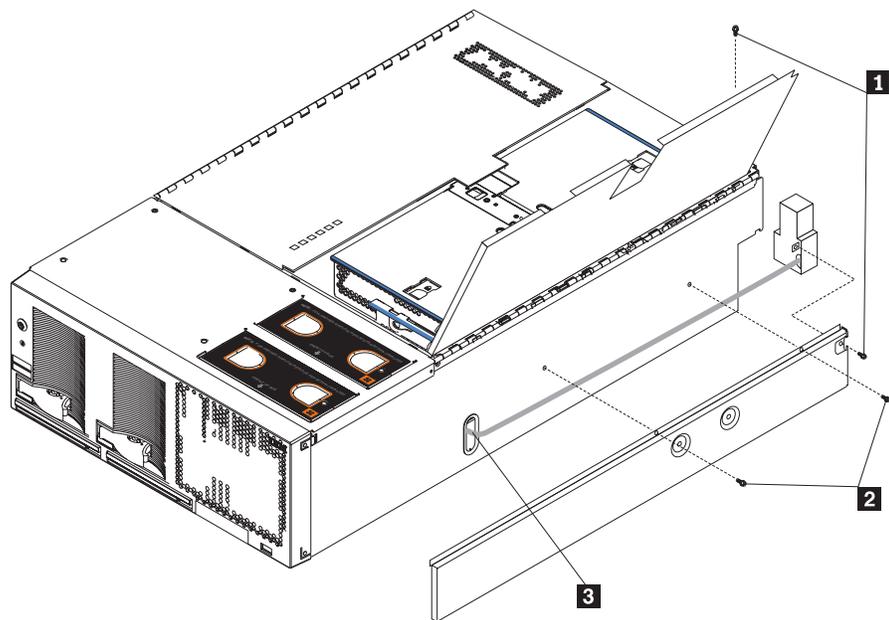
Before you begin:

- Read “Installation guidelines” on page 77.
- Read the safety notices at “Safety notices (multilingual translations)” on page 201.
- Read “Handling static-sensitive devices” on page 200.

Complete the following steps to remove the ac box assembly mechanism:

1. Turn off the server (see “Turning off the server” on page 8), and disconnect all power cords and external cables.
2. Remove the fans (see “Replacing fan 1 or 2” on page 107).
3. Remove the top cover assembly (see “Top cover assembly” on page 137).

4. Open the top cover (see “Opening the cover” on page 88).
5. Remove the memory-board assembly (see “Memory board” on page 115 for details).
6. Remove the shipping thumbscrews from the right side of the server, and lift the retention bracket from the server.
7. Remove the processor-board assembly (see “Processor-board assembly” on page 119 for details).
8. Remove the PCI-X board assembly (see “PCI-X board assembly” on page 123).
9. Remove the two screws **1** that secure the ac box assembly mechanism to the chassis.
10. Remove the two screws **2** that secure the side panel to the chassis, and lift the panel away from the server.
11. Detach each of the two power connectors near the power supplies:
 - a. Using a screwdriver, depress the two tabs on the connector.
 - b. Pull the connector toward the rear of the server and detach.
12. Detach the bundled power cable from the chassis:
 - a. Pull the bundled power cable through the slot in the crossbar.
 - b. Slide the two power connectors through the opening **3** on the side of the server.
13. Remove the ac box assembly from the server.



14. To install the ac box assembly, reverse the above steps.

Note: When replacing the side panel:

- a. Line up the tabs on the panel with the notches on the server, then slide the side panel towards the rear of the server.
- b. Position the bundled cable towards the bottom of the panel before securing the panel.
- c. The screw nearest the rear of the server secures both the panel and the ac box assembly mechanism.

Media-extract mechanism

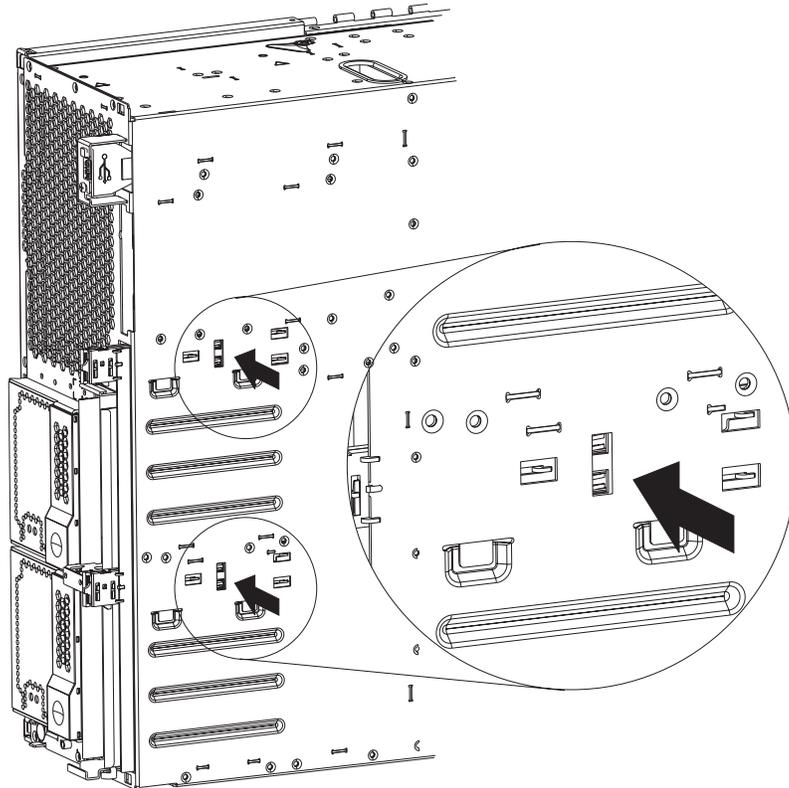
The server contains two media-extract mechanisms.

Before you begin:

- Read “Installation guidelines” on page 77.
- Read the safety notices at “Safety notices (multilingual translations)” on page 201.
- Read “Handling static-sensitive devices” on page 200.

Complete the following steps to remove a media-extract mechanism from the server:

1. Turn off the server (see “Turning off the server” on page 8), and disconnect all power cords and external cables.
2. Remove the drive associated with the media-extract mechanism to be removed (see “Installing a 1.44 MB diskette drive” on page 96 or “Installing a CD-ROM or DVD-ROM drive” on page 97).



3. With a screwdriver, press the two notches on the media-extract mechanism until it pops free of the chassis.
4. Pull the media-extract mechanism out of the front of the server.
5. To install the media extract mechanism, reverse the above steps, sliding the media-extract mechanism into position until it snaps into place.

Note: It might be easier to install the media-extract mechanism if the drive is installed in the bay before sliding the media-extract mechanism into position.

Power/reset card assembly

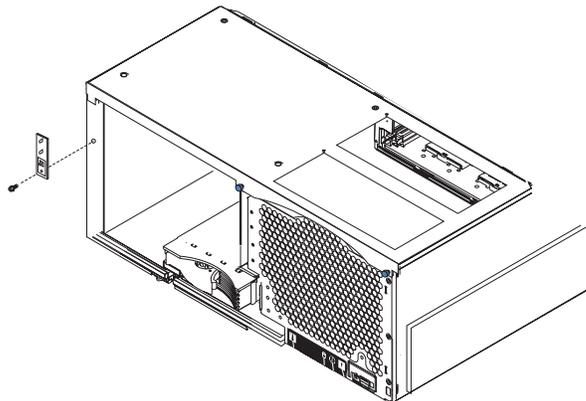
The power/reset card assembly is located on the left front of the server.

Before you begin:

- Read “Installation guidelines” on page 77.
- Read the safety notices at “Safety notices (multilingual translations)” on page 201.
- Read “Handling static-sensitive devices” on page 200.

Complete the following steps to remove the power/reset card assembly:

1. Turn off the server (see “Turning off the server” on page 8), and disconnect all power cords and external cables.
2. Remove the front bezel (see “Removing and replacing the bezel” on page 89).
3. Remove fans 3 and 4 to access the power/reset cable (see “Replacing fan 3 or 4” on page 108).
4. Disconnect the power/reset card cable from the I/O board.



5. Remove the screw that attaches the card to the chassis, and carefully set it aside.
6. Remove the card assembly from the server by drawing the cable through the channel in the side of the chassis and out the front.
7. To replace the card assembly, reverse the previous steps, threading the cable through the gap in the chassis.

Light Path card

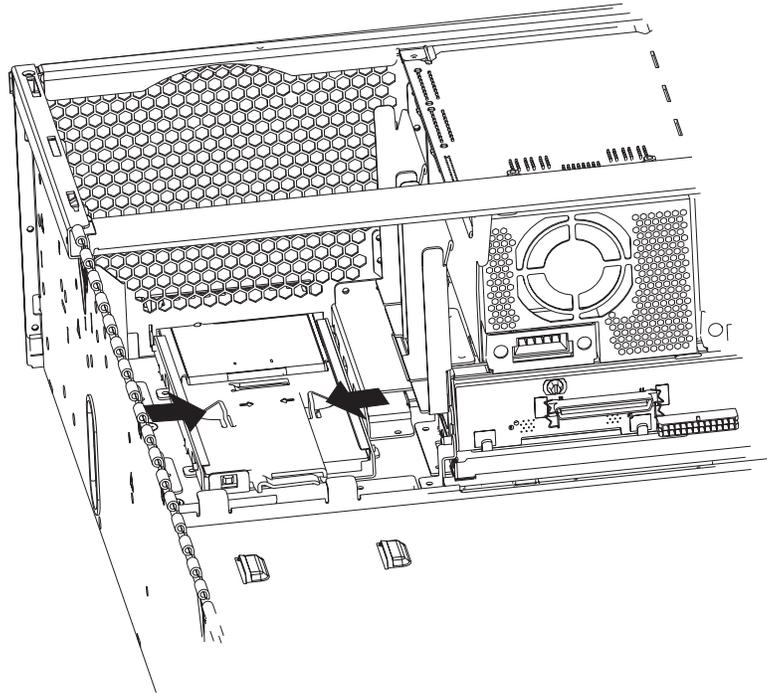
Before you begin:

- Read “Installation guidelines” on page 77.
- Read the safety notices at “Safety notices (multilingual translations)” on page 201.
- Read “Handling static-sensitive devices” on page 200.

Complete the following steps to remove the Light Path card:

1. Turn off the server (see “Turning off the server” on page 8), and disconnect all power cords and external cables.
2. Remove the two front fans (see “Replacing fan 1 or 2” on page 107).
3. Remove the front bezel (see “Removing and replacing the bezel” on page 89).
4. Open the cover (see “Opening the cover” on page 88).

5. Remove the top cover assembly (see “Top cover assembly” on page 137), and set it upside-down on a clean work surface.
6. Disconnect the Light Path cable from the midplane board (see “Midplane board connectors and LEDs” on page 84).
7. From the front of the server, grasp the edge of the Light Path card, push it in slightly to release the catch mechanism, and then pull it out until it tilts downward.



8. Inside the server, squeeze the Light Path card at the arrows to free it from the server.
9. Slide the card the rest of the way out of the server.
10. To replace the Light Path card, reverse the previous steps.

Chapter 6. Symptom-to-FRU index

This index supports xSeries 450 servers.

Notes:

1. Check the configuration before you replace a FRU. Configuration problems can cause false errors and symptoms.
2. For IBM devices not supported by this index, refer to the manual for that device.
3. Always start with “General checkout” on page 33.

The Symptom-to-FRU index 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 server.

The left-hand column of the tables in this index lists error codes or messages, and the right-hand column lists one or more suggested actions or FRUs to replace.

Note: Some tables have more than two columns; in those instances, more than one column on the left is required to describe the error symptom. Take the action (or replace the FRU) suggested first in the list of the right-hand column, then try the server again to see if the problem has been corrected before taking further action.

Note: Try reseating a suspected component or reconnecting a cable before replacing the component.

Light Path LED errors

The system-error LED on the operator information panel is lit when certain system errors occur. If the system-error LED on your server is lit, use the following table to help determine the cause of the error and the action you should take.

Before replacing any FRU:

1. Observe LEDs on boards.
2. View the system-error log.
3. Run AMIDiag program.

Level 2 Light Path LED	FRU/action
None (An error has occurred and cannot be isolated, or the ASM processor has failed.)	An error has occurred that is not represented by a Light Path Diagnostics LED. Check the system-error log for more information about the error.
All LEDs off (error log full) Note: “See Log” LED might be lit.	<ol style="list-style-type: none">1. System-error log is 75% full; clear the log.2. PFA alert; check error log for failure; clear PFA alert; remove ac power for at least 20 seconds, reconnect, then turn on server.3. Run diagnostics.
CPU LED on (failed processor) Note: Verify correct installation sequence; see “Installing and replacing a microprocessor and power module” on page 100.	<ol style="list-style-type: none">1. See the system-error log.2. Microprocessor 1-4. Note: To see microprocessor error LEDs, remove the processor-board assembly from the chassis, and press the LED activation switch.3. Processor board.

Level 2 Light Path LED	FRU/action
MEM LED on (memory error)	<ol style="list-style-type: none"> 1. Check DIMM error LED on memory board. Note: If there is a DIMM failure, an LED on the memory board indicates the failing DIMM. Reseat the failing DIMMs, re-enable the DIMMs using the Configuration/Setup Utility program, and run AMIDiag to pinpoint the failing DIMM. 2. DIMM. 3. Memory board.
DASD LED on (hot-swap hard drive failure) Note: If RAID system, refer to the <i>Hardware Maintenance Manual</i> for the specific RAID adapter.	<ol style="list-style-type: none"> 1. Run the AMIDiag program. 2. Failing drive (reseat/replace). 3. Be sure the fans are operating correctly and the air flow is good. 4. SCSI backplane.
PCI-X BUS LED on (adapter failure)	<ol style="list-style-type: none"> 1. Check the system-error log. 2. If there is a PCI-X slot available, move the adapter to an empty PCI-X slot, and restart the server. 3. Failing adapter. 4. PCI-X board.
FAN LED on (fan failure) Note: A failing fan can also cause the TEMP and DASD LEDs to be on.	<ol style="list-style-type: none"> 1. Check individual fan LEDs. 2. Replace respective fan. 3. Front fan connectors. 4. I/O board.
TEMP LED on (temperature too high)	<ol style="list-style-type: none"> 1. If a fan LED is on, replace the fan. 2. Ambient temperature must be within normal operating specifications. See “Features and specifications” on page 3. 3. Examine the system-error log. <ol style="list-style-type: none"> a. System over recommended temperature b. Operator information panel c. DASD over recommended temperature — overheating hard disk drive. d. System over temperature for processor x (where x is processor number) — microprocessor x. e. VRM LED on — failing VRM. f. Power supply fault / over temp — failing power supply
NMI (nonmaskable interrupt) Note: A PCI or MEM LED may also be on.	<ol style="list-style-type: none"> 1. See the system-error log. 2. If a PCI LED is on, follow the instructions for that LED. 3. If a MEM LED is on, follow the instructions for that LED. 4. Restart the server.
Board LED on (system monitor detected an error on one of the six system boards (see system board LEDs 1-6 for additional location information)	<ol style="list-style-type: none"> 1. Turn off the server and disconnect the ac power cord. 2. Wait at least 10 seconds before plugging in the ac power cord again, and restart the server. 3. Failed system board.
Event Log	See the system-error log.
PS1 LED on	<ol style="list-style-type: none"> 1. Power supply 1 2. Top power board 3. Midplane board
PS2 LED on	<ol style="list-style-type: none"> 1. Power supply 2 2. Top power board 3. Midplane board

Level 2 Light Path LED	FRU/action
VRM LED on (VRM failure)	<ol style="list-style-type: none"> 1. See the system-error log. 2. Microprocessor power module 1-4. Note: To see microprocessor error LEDs, remove the processor-board assembly from the chassis, and press the LED Activation switch. 3. VRM 1-4. 4. Midplane-board VRM. 5. Processor-board VRM. 6. Processor board. 7. Midplane board.
Non Redund (nonredundancy lost)	<ol style="list-style-type: none"> 1. Connect the server to 220v ac if power redundancy is required. 2. If the PSx LED is lit on Level 2 Light Path, follow the instructions for that LED. 3. Replace failing power supply.
Over Spec (power supplies' rating exceeded)	<ol style="list-style-type: none"> 1. Ensure that ac power is applied to both power supplies. 2. Power supply.
VRM and memory LEDs on (memory board level 3 LED on)	<ol style="list-style-type: none"> 1. Replace the failing VRM with lit LED, and re-enable any failed memory. 2. Memory board. 3. Midplane board.
Level 2 VRM LED on and board LED on	<ol style="list-style-type: none"> 1. Processor-board VRM. 2. Remove all PCI adapters from the server. 3. PCI-X board VRM. 4. PCI-X board.

System-error log entries

The system-error log is similar to an event log and can contain messages of three major types:

- Information** Information messages do not require action and record significant system-level events. Example: 'System Complex Powered Up'
- Warning** Warning messages indicate possible problems but do not require immediate action. Example: 'System over recommended ambient temperature'
- Error** Error messages indicate system errors that may require attention. Example: 'Fan 2 not detected'

System-error log messages can originate from two sources.

- SAL/EFI
- Service processor

Each entry contains date and time information, which is useful in determining the nature of the occurrence.

SAL/EFI messages

The following is an example of a typical SAL/EFI message:

```

-----
Log Entry #: 2
Logging Source: SAL/EFI
Log Type: E, I, or W
Date: 06/17/2003
Time: 6:17:3
Recoverable Error handling example message
-----

```

This message indicates that a SAL/EFI error occurred at the recorded time. The following table lists all of the error codes and the actions to take in the event of an error code.

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.

In the following error codes, X can be any number or letter.

Error message/symptom	FRU/action
B113 (CMOS read/write failure)	<ol style="list-style-type: none"> Battery I/O board
B114 (SAL/EFI ROM checksum or Boot error.)	<ol style="list-style-type: none"> Update system firmware. I/O board.
B124 (Memory board: Controller initialization failed.)	Memory board
B231B (I/O card fault, Video initialization error.)	I/O board
B3121 (I/O board: Video: initialization error.)	I/O board
062 (System failed three consecutive boot attempts.)	<ol style="list-style-type: none"> Update server to latest levels. I/O board. Processor board. Processor.
129 (Processor: x Internal cache error, removed from service.)	Processor x
161 (CMOS battery failure.)	Battery
162 (CMOS checksum error.)	<ol style="list-style-type: none"> Battery I/O board
163 (Time or Date Error.)	<ol style="list-style-type: none"> Set time of day using the Configuration/Setup Utility program. Battery. I/O board.
175 (I/O Card Fault: Bad EEPROM CRC#1.)	I/O board
178 (I/O Card Fault: EEPROM not functional.)	I/O board
185 (All boot options failed.)	<ol style="list-style-type: none"> Set the startup sequence using the Configuration/Setup Utility program. I/O board.

Error message/symptom	FRU/action
187 (I/O Card Fault: VPD serial number not set.)	I/O board
188 (I/O Card Fault: Bad EEPROM CRC#2.)	I/O board
201 (Invalid memory configuration.)	<ol style="list-style-type: none"> 1. Verify DIMM installation order. 2. Reseat DIMMs, re-enable DIMMs, if necessary, using the Configuration/Setup Utility program, and run diagnostics. 3. Replace failing DIMM. 4. Memory board.
210 (Invalid memory configuration)	<ol style="list-style-type: none"> 1. Verify DIMM installation order. 2. Reseat DIMMs, re-enable DIMMs, if necessary, using the Configuration/Setup Utility program, and run diagnostics. 3. Replace failing DIMM. 4. Memory board.
211 (Memory board error)	Memory board
212 (Memory board port 2 SMI parity error)	Memory board
213 (Memory board port 1 SMI parity error)	Memory board
214 (Error on memory board port 1.)	<ol style="list-style-type: none"> 1. Reseat DIMMs, re-enable DIMMs, if necessary, using the Configuration/Setup Utility program, and run diagnostics. 2. Replace failing DIMM. 3. Memory board.
215 (Error on memory board port 2.)	<ol style="list-style-type: none"> 1. Reseat DIMMs, re-enable DIMMs, if necessary, using the Configuration/Setup Utility program, and run diagnostics. 2. Replace failing DIMM. 3. Memory board.
216 (Memory board error.)	Memory board
220 (DIMM in slot <i>n</i> is not DDR and ECC)	Replace with DDR ECC DIMM.
221 (DIMM in slot <i>n</i> has an unsupported number of rows.)	Replace with correct DIMM.
222 (DIMM in slot <i>n</i> is an unsupported size.)	Replace with correct DIMM.
223 (DIMMs in slots <i>m</i> and <i>n</i> are not a valid pair.)	Ensure DIMMs in slots <i>m</i> and <i>n</i> are identical.
224 (DIMM capacity exceeded in port <i>n</i> , maximum 5 pairs total when using 2 GB DIMMs.)	Review and populate DIMMs according to installation rules.
229 (Processor board: External cache error, cache disabled.)	Processor board
230 (CPU board cache controller error)	Processor board
233 (CPU board cache controller Register error)	Processor board
236 (CPU board cache controller request error handler)	Processor board
237 (CPU board cache controller pending queue error)	Processor board
238 (CPU board cache controller L4 error)	Processor board
239 (CPU board cache controller coherence directory)	Processor board

Error message/symptom	FRU/action
240 (CPU board cache controller QuadT bus error)	<ol style="list-style-type: none"> 1. Memory board 2. Processor board 3. Midplane board
241 (CPU board cache controller error)	Processor board
245 (No configurable memory detected)	<ol style="list-style-type: none"> 1. Verify DIMM installation order. 2. Reseat DIMMs, re-enable DIMMs, if necessary, using the Configuration/Setup Utility program, and run diagnostics. 3. Replace failing DIMMs. 4. Memory board.
247 (Error port <i>n</i> after WIAP SMI)	Memory board
248 (Memory board RIAP not complete on port <i>n</i>)	Memory board
249 (Memory board RIAP failed on port <i>n</i>)	Memory board
265 (Memory board SMI initialization error on port <i>n</i>)	Memory board
266 (Service processor machine check reported, disabled DIMM <i>x</i> and DIMM <i>y</i> .)	<ol style="list-style-type: none"> 1. Reseat DIMMs, re-enable DIMMs, if necessary, using the Configuration/Setup Utility program, and run diagnostics. 2. Replace failing DIMMs. 3. Memory board.
267 (Service processor machine check reported, disabled cache)	Processor board
268 (Uncorrectable error isolated to DIMMs <i>x</i> and <i>y</i> .)	<ol style="list-style-type: none"> 1. Reseat DIMMs, re-enable DIMMs, if necessary, using the Configuration/Setup Utility program, and run diagnostics. 2. Replace failing DIMMs. 3. Memory board.
289 (Memory error detected, DIMM <i>x</i> disabled.)	<ol style="list-style-type: none"> 1. Reseat DIMMs, re-enable DIMMs, if necessary, using the Configuration/Setup Utility program, and run diagnostics. 2. Replace DIMM <i>x</i>. 3. Enable the DIMM using the Configuration/Setup Utility program. 4. Memory board.
291 (Protexion: error DIMM <i>x</i> and <i>y</i>)	<ol style="list-style-type: none"> 1. Reseat DIMMs, re-enable DIMMs, if necessary, using the Configuration/Setup Utility program, and run diagnostics. 2. Replace failing DIMM. 3. Memory board.
292 (Protexion: error DIMM <i>x</i>)	<ol style="list-style-type: none"> 1. Reseat DIMMs, re-enable DIMMs, if necessary, using the Configuration/Setup Utility program, and run diagnostics. 2. Replace failing DIMM. 3. Memory board.
1162 (I/O board: Serial: port configuration error.)	I/O board
1200 (Node 0/CPU slot <i>x</i> : CPUID <i>y</i> : Machine check exception.)	<ol style="list-style-type: none"> 1. Microprocessor <i>x</i> 2. Processor board

Error message/symptom	FRU/action
1205 (Node 0/CPU slot x: CPUID y: Manually initiated crash.)	<ol style="list-style-type: none"> 1. Microprocessor x 2. Processor board
1331 (I2C failure)	<ol style="list-style-type: none"> 1. I/O board 2. Memory board 3. Midplane board 4. PCI-X board
1332 (I/O board I2C failure)	I/O board
1333 (Memory board I2C failure)	Memory board
1334 (Midplane board I2C failure)	Midplane board
1335 (PCI board I2C failure)	PCI-X board
1336 (I/O board error, DMC did not respond)	I/O board
1337 (DMC error: failed to enable PCI board integrated PC/PCI-X bridge)	<ol style="list-style-type: none"> 1. PCI-X board 2. I/O board
1401 (Failed to enable unrecoverable error handling)	I/O board
1610 (SP error x: attempting L4 initialization.)	Remote Supervisor Adapter
1611 ((SP error x: validating L4 initialization.)	Remote Supervisor Adapter
1612 (SP error completing L4 initialization.)	Remote Supervisor Adapter
1613 (SP error x: enabling PCI board integrated PCI/PCI-X bridge)	<ol style="list-style-type: none"> 1. PCI-X board 2. Remote Supervisor Adapter
1620 (Current SP main application version <i>n</i> required)	<ol style="list-style-type: none"> 1. Update service processor firmware. 2. Remote Supervisor Adapter. 3. I/O board.
1621 (Current SP Boot ROM version <i>x</i> is outdated, <i>x</i> is required)	<ol style="list-style-type: none"> 1. Update service processor firmware. 2. Remote Supervisor Adapter. 3. I/O board.
1622 (Current SP remote control version <i>x</i> is downlevel, version <i>y</i> required)	<ol style="list-style-type: none"> 1. Update service processor firmware. 2. Remote Supervisor Adapter. 3. I/O board.
1623 (Current integrated system management processor version <i>n</i> is outdated, version <i>n</i> is required)	<ol style="list-style-type: none"> 1. Update service processor firmware. 2. Remote Supervisor Adapter. 3. I/O board.
1801 (Slot <i>x</i> : ROM space not available)	Reconfigure PCI/PCI-X adapters.
1802 (Slot <i>x</i> : I/O not available)	Reconfigure PCI/PCI-X adapters.
1803 (Slot <i>x</i> : MMIO not available.)	Reconfigure PCI/PCI-X adapters.
1804 (Slot <i>x</i> : MMIO below 1 MB not available)	Reconfigure PCI/PCI-X adapters.
1805 (Slot <i>x</i> : ROM failed checksum)	PCI/PCI-X adapter in slot <i>x</i>
1806 (Slot <i>x</i> : Failed BIST)	PCI/PCI-X adapter in slot <i>x</i>
1807 (Slot <i>x</i> : Invalid header type)	PCI/PCI-X adapter in slot <i>x</i>
1808 (Slot <i>x</i> : Bridge above device failed)	<ol style="list-style-type: none"> 1. PCI-X board 2. I/O board
1809 (Planar device missing)	I/O board

Error message/symptom	FRU/action
1810 (Slot x: Unknown PCI error)	<ol style="list-style-type: none"> 1. Reconfigure PCI/PCI-X adapters. 2. PCI adapter. 3. PCI-X board.
1820 (Node 0/PCI slot x: Master Data Parity Error.)	<ol style="list-style-type: none"> 1. PCI/PCI-X adapter 2. PCI-X board
1821 (Node 0/PCI slot x: Detected Parity Error.)	<ol style="list-style-type: none"> 1. PCI/PCI-X adapter 2. PCI-X board
1822 (Node 0/PCI slot x: Signaled System Error.)	<ol style="list-style-type: none"> 1. PCI/PCI-X adapter 2. PCI-X board
1823 (I-node 0/PCI slot x: Received Master Abort.)	<ol style="list-style-type: none"> 1. PCI/PCI-X adapter 2. PCI-X board
1824 (Node 0/PCI slot x: Received Target Abort.)	<ol style="list-style-type: none"> 1. PCI/PCI-X adapter 2. PCI-X board
1825 (Node 0/PCI slot x: Signaled Target Abort.)	<ol style="list-style-type: none"> 1. PCI/PCI-X adapter 2. PCI-X board
1826 (Node 0/PCI slot x: PCI Host Bridge detected an error.)	<ol style="list-style-type: none"> 1. PCI/PCI-X adapter 2. PCI-X board
1962 (Start of [OS] failed.)	Verify operating system installation/startup media.

Service processor messages

An example of a typical service processor message is as follows:

```

-----
Log Entry #: 2
Logging Source: ServProc
Log Type: E, I, or W
Date: 06/17/2003
Time: 6:17:3
Recoverable Error handling example message
-----

```

This message indicates simply that the machine was turned on at the recorded time. The possible service processor error messages are listed in the following table.

Note: Try reseating a suspected component or reconnecting a cable before replacing the component.

Service Processor message	FRU/action
12V A Bus Fault	<ol style="list-style-type: none"> 1. Memory board VRM 2. Power backplane 3. Power cables 4. Memory board 5. Midplane board
12V B Bus Fault	<ol style="list-style-type: none"> 1. Microprocessor 3 power module 2. Microprocessor 3 power module cable 3. Processor-board assembly 4. Power backplane 5. Power cables 6. Midplane board
12V C Bus Fault	<ol style="list-style-type: none"> 1. Microprocessor 2 power module 2. Microprocessor 2 power module cable 3. Processor-board assembly 4. Power backplane 5. Power cables 6. Midplane board
12V D Bus Fault	<ol style="list-style-type: none"> 1. Microprocessor 4 power module 2. Microprocessor 4 power module cable 3. Processor-board assembly 4. Power backplane 5. Power cables 6. Midplane board
12V E Bus Fault	<ol style="list-style-type: none"> 1. Fans 2. Midplane-board VRM 3. Processor board 4. Power backplane 5. Power cables 6. Midplane board 7. I/O board
12V F Bus Fault	<ol style="list-style-type: none"> 1. Microprocessor 1 power module 2. Microprocessor 1 power module cable 3. Processor-board assembly 4. Power backplane 5. Power cables 6. Midplane board
12V G Bus Fault	<ol style="list-style-type: none"> 1. PCI-X board 2. Power backplane 3. Power cables 4. Midplane board

Service Processor message	FRU/action
12V H Bus Fault	<ol style="list-style-type: none"> 1. Disk drives 2. Disk drive backplane 3. I/O board 4. Power backplane 5. Power cables 6. Midplane board
5V Fault	<ol style="list-style-type: none"> 1. Remove PCI adapters, and see if the problem remains. 2. I/O board.
Cable: Control Panel Not Present	Cable to Light Path panel
Cable: SCSI I2C cable not detected	Cable to SCSI backplane
Cable: Service Processor Not Present	<ol style="list-style-type: none"> 1. Remote Supervisor Adapter 2. I/O board
Center Card Power Fault	<ol style="list-style-type: none"> 1. Midplane VRM 2. Midplane board
CPU 1-4 Over Temperature	<ol style="list-style-type: none"> 1. Check airflow blockage 2. Check fans 3. Microprocessor 1-4
Failure reading I2C device. Check devices on bus x.	<ol style="list-style-type: none"> 1. Restart the server 2. I/O board
Fan 1-4 Failure	<ol style="list-style-type: none"> 1. Check fan connection. 2. Fan.
Fan 1-4 not detected	<ol style="list-style-type: none"> 1. Check fan connection. 2. Fan.
Fan 1-4 Outside Recommended Speed	<ol style="list-style-type: none"> 1. Check fan connection. 2. Fan.
Invalid Fan configuration	<ol style="list-style-type: none"> 1. Check fan connections. 2. Fans.
Hard Drive 1-2 Fault	Run diagnostics.
Hard Drive 1-2 removal detected	<ol style="list-style-type: none"> 1. Hard disk drive 2. Run diagnostics
Integrated Systems Management Processor encountered failures upon starting	<ol style="list-style-type: none"> 1. Remove ac power for 20 seconds, reconnect and reboot, and run diagnostics. 2. I/O board.
Invalid CPU configuration	Ensure microprocessor 1 is properly installed.
CPU Card Machine Check TOR_MCK	<ol style="list-style-type: none"> 1. Run diagnostics. 2. Microprocessors. 3. Processor board. 4. Memory board. 5. I/O board. 6. Midplane board.

Service Processor message	FRU/action
Memory Card Machine Check CYC_MCK2	<ol style="list-style-type: none"> 1. Run diagnostics. 2. Memory board. 3. Processor board. 4. I/O board. 5. PCI-X board. 6. Midplane board.
Native I/O Card Machine Check	<ol style="list-style-type: none"> 1. Remove adapters in PCI-X slots 1 and 2, and run diagnostics. 2. I/O board. 3. Memory board. 4. Midplane board.
PCI Card Machine Check	<ol style="list-style-type: none"> 1. Remove PCI adapters, and run diagnostics. 2. PCI-X board. 3. Memory board. 4. Midplane board.
PCI Power Good Fault	<ol style="list-style-type: none"> 1. Remove PCI adapters and run diagnostics. 2. PCI-X board.
Power supply 1-2 current exceeded max spec value	<ol style="list-style-type: none"> 1. Check both power supplies are installed and connected to ac. 2. Power supply 1-2. 3. Power backplane.
Power Supply 1-2 Current Fault	<ol style="list-style-type: none"> 1. Check/replace power supply 1-2. 2. Power backplane.
Power Supply 1-2 Overcurrent Fault	<ol style="list-style-type: none"> 1. Check/replace power supply 1-2. 2. Power backplane.
Power Supply 1-2 12v Overvoltage Fault	<ol style="list-style-type: none"> 1. Check/replace power supply 1-2. 2. Power backplane.
Power Supply 1-2 12v Undervoltage Fault	<ol style="list-style-type: none"> 1. Check/replace power supply 1-2. 2. Power backplane.
Power Supply 1-2 5v Undervoltage Fault	<ol style="list-style-type: none"> 1. Check/replace power supply 1-2. 2. Power backplane.
Power Supply 1-2 ac Power Removed, Early Power Off Warning	Check ac power inputs.
Power Supply 1-2 dc Good Fault	Check/replace power supply 1-2.
Power Supply 1-2 Fan Fault	Check/replace power supply 1-2.
Power Supply 1-2 Removed	Check/replace power supply 1-2.
Power Supply 1-2 Temperature Fault	<ol style="list-style-type: none"> 1. Check for airflow obstructions. 2. Check/replace power supply 1-2.
System shutoff due to CPU 1-4 over temperature	<ol style="list-style-type: none"> 1. Check for airflow obstructions. 2. Check fans. 3. Microprocessor 1-4.

Service Processor message	FRU/action
System shutoff due to high ambient temperature	<ol style="list-style-type: none"> 1. Check room temperature. 2. Check for airflow obstructions. 3. Check fans. 4. Light Path assembly.
Xcel4 Accelerator Cache Error Detected.	Processor board
Uncorrectable memory error on DIMMs x, y	<ol style="list-style-type: none"> 1. Reseat DIMMs, re-enable DIMMs, if necessary, using the Configuration/Setup Utility program, and run diagnostics. 2. DIMMs x, y.
VRM 1-4 Fault	<ol style="list-style-type: none"> 1. Check microprocessor 1-4 power module cable. 2. Microprocessor 1-4 power module.
+2.5v VRM power fault	<ol style="list-style-type: none"> 1. Memory board 2.5v VRM 2. Memory board
+1.8v VRM power fault	<ol style="list-style-type: none"> 1. Memory board 1.8v VRM 2. Memory board
1.8v Fault	<ol style="list-style-type: none"> 1. Processor-board 1.8v VRM 2. Processor-board assembly
1.25v Fault	Processor board
Memory +1.8v Power fault	<ol style="list-style-type: none"> 1. Memory board 1.8v VRM 2. Memory board
Memory +1.25v Power fault	<ol style="list-style-type: none"> 1. Memory board 1.25v VRM 2. Memory board
Primary I/O Power fault	I/O board
Environmental Monitor Flash Update Failed.	<ol style="list-style-type: none"> 1. Retry Flash Update. 2. I/O board.
Environmental Monitor ROM error.	<ol style="list-style-type: none"> 1. Remove ac power for 20 seconds, reconnect, and run diagnostics. 2. Flash update system-management firmware. 3. I/O board.
Environmental Monitor RAM error	<ol style="list-style-type: none"> 1. Remove ac power for 20 seconds, reconnect, and run diagnostics. 2. I/O board.
Environmental Monitor firmware needs updating. No environmental information currently available.	Flash update system-management firmware.

The service processor also generates a large number of information, error, and warning messages.

If an RXE-100 unit is attached, the service processor might generate further messages specific to this unit. For information about these error messages, see “RXE port error codes” on page 173.

Diagnostic error codes

For information on running the diagnostic programs, see “Starting the AMIDiag program” on page 38.

System-error codes

Error Code/Symptom	FRU/action
3000h (Register Bank Switch Failed .)	<ol style="list-style-type: none">1. Reseat all microprocessors and power modules.2. Individually replace microprocessors and power modules.3. Processor board.
3001h (Register Read/Write Failed .)	<ol style="list-style-type: none">1. Reseat all microprocessors and power modules.2. Individually replace microprocessors and power modules.3. Processor board.
3002h (CPU Basic Instruction Operation Failed.)	<ol style="list-style-type: none">1. Reseat all microprocessors and power modules.2. Individually replace microprocessors and power modules.3. Processor board.
3003h (CPU Parallel Data Manipulation Failed.)	<ol style="list-style-type: none">1. Reseat all microprocessors and power modules.2. Individually replace microprocessors and power modules.3. Processor board.
3005h (FPU Arithmetic Error.)	<ol style="list-style-type: none">1. Reseat all microprocessors and power modules.2. Individually replace microprocessors and power modules.3. Processor board.
3006h (FPU Comparison Error.)	<ol style="list-style-type: none">1. Reseat all processors and power modules.2. Individually replace microprocessors and power modules.3. Processor board.
3007h (FPU Load/Store Error.)	<ol style="list-style-type: none">1. Reseat all microprocessors and power modules.2. Individually replace microprocessors and power modules.3. Processor board.
3008h (FPU Conversion Error.)	<ol style="list-style-type: none">1. Reseat all microprocessors and power modules.2. Individually replace microprocessors and power modules.3. Processor board.
3010h (CPU Speed does not match expected value.)	<ol style="list-style-type: none">1. Check that the expected value entered is correct.2. Reseat all microprocessors and power modules.3. Individually replace microprocessors and power modules.4. Processor board.
3100h (Read/Write test on DMA controller 1 failed.)	I/O board
3101h (Read/Write test on DMA controller 2 failed.)	I/O board
3102h (Read/Write test on page registers failed.)	I/O board
3140h (Battery backup unit that powers CMOS RAM has no power.)	Battery or CMOS unit

Error Code/Symptom	FRU/action
3141h (Configuration mismatch in CMOS RAM.)	<ol style="list-style-type: none"> 1. Run the Configuration/Setup Utility program. 2. Battery or CMOS unit.
3142h (CMOS RAM memory size.)	<ol style="list-style-type: none"> 1. Run the Configuration/Setup Utility program. 2. Battery or CMOS unit.
3143h (CMOS RAM time is invalid.)	<ol style="list-style-type: none"> 1. Run Configuration/Setup Utility program. 2. Battery or CMOS unit.
3144h (Bad CMOS RAM checksum detected.)	<ol style="list-style-type: none"> 1. Run Configuration/Setup Utility program. 2. Battery or CMOS unit.
3145h (Periodic time update cycle not occurring.)	I/O board
3146h (CMOS RAM fails to hold data.)	I/O board
00A0h (PCI Device Enumeration Failed .)	<ol style="list-style-type: none"> 1. Reseat all PCI devices. 2. Remove all PCI devices from PCI-X board, and re-run the PCI Test. 3. If step 2 is successful, replace PCI devices on the PCI-X board one at a time until faulty PCI devices are identified, and replace faulty PCI devices. 4. PCI-X board.
00A1h (PCI Device Access Failed.)	<ol style="list-style-type: none"> 1. Reseat all PCI devices. 2. Remove all PCI devices from PCI-X board, and re-run the PCI Test. 3. If step 2 is successful, replace PCI devices on the PCI-X board one at a time until faulty PCI devices are identified, and replace faulty PCI devices. 4. PCI-X board.
00A2h (PCI Configuration Space could not be verified.)	<ol style="list-style-type: none"> 1. Reseat all PCI devices. 2. PCI-X board.
1000h (MP table failed or Load MP driver failed.)	<ol style="list-style-type: none"> 1. Replace SAL/EFI. 2. I/O board.
1009h (Cache coherency test failed.)	<ol style="list-style-type: none"> 1. Reseat all microprocessors and power modules. 2. Individually replace processors and power modules. 3. Processor board.
100Ah (Memory consistency test failed.)	<ol style="list-style-type: none"> 1. Reseat all processors and power modules. 2. Individually replace microprocessors and power modules. 3. Processor board.
100Bh (I/O access test failed on processor X at port XXXXh.)	<ol style="list-style-type: none"> 1. Reseat all microprocessors and power modules. 2. Individually replace microprocessors and power modules. 3. Processor board.
100Eh (CPU speed error.)	<ol style="list-style-type: none"> 1. Check that the expected value entered is correct. 2. Reseat all microprocessors and power modules. 3. Individually replace microprocessors and power modules. 4. Processor board.
1020h (CPU functionality test failed.)	<ol style="list-style-type: none"> 1. Reseat all microprocessors and power modules. 2. Individually replace microprocessors and power modules. 3. Processor board.

Error Code/Symptom	FRU/action
1021h (FPU functionality test failed.)	<ol style="list-style-type: none"> 1. Reseat all microprocessors and power modules. 2. Individually replace microprocessors and power modules. 3. Processor board.
1024h (MP test time out.)	<ol style="list-style-type: none"> 1. Reseat all microprocessors and power modules. 2. Individually replace microprocessors and power modules. 3. Processor board.

IDE CD test error codes

Error Code/Explanation	FRU/Action
0A01h (Eject fails on drive x.)	<ol style="list-style-type: none"> 1. Manually eject media. 2. Retry tray function. 3. Check drive cables and connections. 4. Drive. 5. I/O board.
0A02h (Close failed on drive x.)	<ol style="list-style-type: none"> 1. Manually close drive. 2. Retry tray function. 3. Check drive cables and connections. 4. Drive. 5. I/O board.
0A03h (Sequential data test failed, Drive x, Sector Y.)	<ol style="list-style-type: none"> 1. Replace media. 2. Check drive cables and connections. 3. Connect drive to other IDE channel. 4. Drive. 5. I/O board.
0A04h (Sequential data test failed, No data CD in Drive x.)	<ol style="list-style-type: none"> 1. Replace media. 2. Check drive cables and connections. 3. Connect drive to other IDE channel. 4. Drive. 5. I/O board.
0A05h (Random data test failed, Drive x, Sector Y.)	<ol style="list-style-type: none"> 1. Replace media. 2. Check drive cables and connections. 3. Connect drive to other IDE channel. 4. Drive. 5. I/O board.
0A06h (Random data test failed, No data CD in Drive x.)	<ol style="list-style-type: none"> 1. Replace media. 2. Check drive cables and connections. 3. Connect drive to other IDE channel. 4. Drive. 5. I/O board.

Error Code/Explanation	FRU/Action
0A07h (Sequential Play test failed, Drive x, Sector y.)	<ol style="list-style-type: none"> 1. Replace media. 2. Check drive cables and connections. 3. Connect drive to other IDE channel. 4. Drive. 5. I/O board.
0A08h (Sequential Play test failed, no Audio CD in Drive x.)	<ol style="list-style-type: none"> 1. Replace media. 2. Check drive cables and connections. 3. Connect drive to other IDE channel. 4. Drive. 5. I/O board.
0A09h (Random Play test failed, Drive x, Sector y.)	<ol style="list-style-type: none"> 1. Replace media. 2. Check drive cables and connections. 3. Connect drive to other IDE channel. 4. Drive. 5. I/O board.
0A10h (Random Play test failed, no Audio CD in Drive x.)	<ol style="list-style-type: none"> 1. Replace media. 2. Check drive cables and connections. 3. Connect drive to other IDE channel. 4. Drive. 5. I/O board.
0A11h (No Audio tracks in the multisession CD in the Drive x.)	<ol style="list-style-type: none"> 1. Replace media. 2. Check drive cables and connections. 3. Connect drive to other IDE channel. 4. Drive. 5. I/O board.
0A12h (Number of Audio tracks inadequate for the test .)	<ol style="list-style-type: none"> 1. Replace media. 2. Check drive cables and connections. 3. Connect drive to other IDE channel. 4. Drive. 5. I/O board.

ATAPI removables test error codes

Error Code/Explanation	FRU/Action
0F01h (No ATAPI Removable drives present.)	<ol style="list-style-type: none"> 1. Check drive cables and connections. 2. Connect drive to other IDE channel. 3. Drive. 4. I/O board.
0F02h (Write failed.)	<ol style="list-style-type: none"> 1. Replace media. 2. Check drive cables and connections. 3. Connect drive to other IDE channel. 4. Drive. 5. I/O board.

Error Code/Explanation	FRU/Action
0F03h (Read failed.)	<ol style="list-style-type: none"> 1. Replace media. 2. Check drive cables and connections. 3. Connect drive to other IDE channel. 4. Drive. 5. I/O board.
0F04h (Seek operation failed.)	<ol style="list-style-type: none"> 1. Replace media. 2. Check drive cables and connections. 3. Connect drive to other IDE channel. 4. Drive. 5. I/O board.
0F05h (Eject fails on drive x.)	<ol style="list-style-type: none"> 1. Replace media. 2. Check drive cables and connections. 3. Connect drive to other IDE channel. 4. Drive. 5. I/O board.
0F06h (Sequential Read Verify failed.)	<ol style="list-style-type: none"> 1. Replace media. 2. Check drive cables and connections. 3. Connect drive to other IDE channel. 4. Drive. 5. I/O board.
0F07h (Random Read Operation failed.)	<ol style="list-style-type: none"> 1. Replace media. 2. Check drive cables and connections. 3. Connect drive to other IDE channel. 4. Drive. 5. I/O board.
0F08h (Random Read Verify failed.)	<ol style="list-style-type: none"> 1. Replace media. 2. Check drive cables and connections. 3. Connect drive to other IDE channel. 4. Drive. 5. I/O board.
0F09h (Random Seek Operation failed.)	<ol style="list-style-type: none"> 1. Replace media. 2. Check drive cables and connections. 3. Connect drive to other IDE channel. 4. Drive. 5. I/O board.

IDE DVD-ROM drive test error codes

Error Code/Explanation	FRU/Action
1900h (Critical/Command Error.)	<ol style="list-style-type: none"> 1. Replace media. 2. Check drive cables and connections. 3. Connect drive to other IDE channel. 4. Drive. 5. I/O board.
1901h (DVD Seek Test failed.)	<ol style="list-style-type: none"> 1. Replace media. 2. Check drive cables and connections. 3. Connect drive to other IDE channel. 4. Drive. 5. I/O board.
1902h (DVD Read Test failed.)	<ol style="list-style-type: none"> 1. Replace media. 2. Check drive cables and connections. 3. Connect drive to other IDE channel. 4. Drive. 5. I/O board.

SCSI test error codes

Code/Explanation	FRU/Action
0500h (SCSI device not ready.)	<ol style="list-style-type: none"> 1. Confirm that drive is configured. 2. Check drive cables and connections. 3. Drive. 4. I/O board or SCSI add-on controller.
0502h (SCSI device read error.)	<ol style="list-style-type: none"> 1. Confirm that drive is configured. 2. Check drive cables and connections. 3. Drive. 4. I/O board or SCSI add-on controller.
0506h (SCSI disk self test failed.)	<ol style="list-style-type: none"> 1. Confirm that drive is configured. 2. Check drive cables and connections. 3. Drive. 4. I/O board or SCSI add-on controller.
0507h (SCSI disk buffer error.)	<ol style="list-style-type: none"> 1. Confirm that drive is configured. 2. Check drive cables and connections. 3. Drive. 4. I/O board or SCSI add-on controller.
0508h (SCSI disk random read error.)	<ol style="list-style-type: none"> 1. Confirm that drive is configured. 2. Check drive cables and connections. 3. Drive. 4. System I/O Board or SCSI add-on controller.

Code/Explanation	FRU/Action
0509h (SCSI disk random write error.)	<ol style="list-style-type: none"> 1. Confirm that drive is configured. 2. Check drive cables and connections. 3. Drive. 4. I/O board or SCSI add-on controller.
050Ch (Error in disk partition table .)	<ol style="list-style-type: none"> 1. Confirm that drive is formatted and configured. 2. Check drive cables and connections. 3. Drive. 4. I/O board or SCSI add-on controller.
050Dh (Boot sector error. The boot partition has an incorrect definition.)	<ol style="list-style-type: none"> 1. Confirm that drive is formatted and configured. 2. Check drive cables and connections. 3. Drive. 4. I/O board or SCSI add-on controller.
050Eh (Media error. The media description for the partition is bad. The unit is not properly formatted.)	<ol style="list-style-type: none"> 1. Confirm that drive is formatted and configured. 2. Check drive cables and connections. 3. Drive. 4. I/O Board or SCSI add-on controller.
050Fh (The sector number information in the partition table is wrong. The unit is not properly OS formatted.)	<ol style="list-style-type: none"> 1. Confirm that drive is formatted and configured. 2. Check drive cables and connections. 3. Drive. 4. I/O board or SCSI add-on controller.
0510h (No Tape in the drive.)	<ol style="list-style-type: none"> 1. Check if a tape is in drive. 2. Confirm that drive is configured. 3. Check drive cables and connections. 4. Drive. 5. I/O board or SCSI add-on controller.
0511h (Positioning failed on tape drive.)	<ol style="list-style-type: none"> 1. Confirm that drive is configured. 2. Check drive cables and connections. 3. Drive. 4. I/O board or SCSI add-on controller.
0512h (Tape read error.)	<ol style="list-style-type: none"> 1. Check if write test has been run. 2. Confirm that drive is configured. 3. Check drive cables and connections. 4. Drive. 5. I/O board or SCSI add-on controller.
0515h (Tape Self-test error.)	<ol style="list-style-type: none"> 1. Confirm that drive is configured. 2. Check drive cables and connections. 3. Drive. 4. I/O board or SCSI add-on controller.
0516h (Tape buffer error.)	<ol style="list-style-type: none"> 1. Confirm that drive is configured. 2. Check drive cables and connections. 3. Drive. 4. I/O board or SCSI add-on controller.

Code/Explanation	FRU/Action
0520h (No CD in the drive.)	<ol style="list-style-type: none"> 1. Check if a CD is in drive. 2. Confirm that drive is configured. 3. Check drive cables and connections. 4. Drive. 5. I/O board or SCSI add-on controller.
0521h (CD-ROM read error.)	<ol style="list-style-type: none"> 1. Confirm that drive is configured. 2. Check drive cables and connections. 3. Drive. 4. I/O board or SCSI add-on controller.
0523h (CD-ROM play error.)	<ol style="list-style-type: none"> 1. Confirm that drive is configured. 2. Check drive cables and connections. 3. Drive. 4. I/O board or SCSI add-on controller.
0524h (CD Self-test error.)	<ol style="list-style-type: none"> 1. Confirm that drive is configured. 2. Check drive cables and connections. 3. Drive. 4. I/O board or SCSI add-on controller.
0525h (CD Open error.)	<ol style="list-style-type: none"> 1. Manually eject media and close drive. 2. Retry tray function. 3. Confirm that drive is configured. 4. Check drive cables and connections. 5. Drive. 6. I/O board or SCSI add-on controller.
0526h (CD Close error.)	<ol style="list-style-type: none"> 1. Manually eject media and close drive. 2. Retry tray function. 3. Confirm that drive is configured. 4. Check drive cables and connections. 5. Drive. 6. I/O board or SCSI add-on controller.
0527h (CD Buffer error.)	<ol style="list-style-type: none"> 1. Confirm that drive is configured. 2. Check drive cables and connections. 3. Drive. 4. I/O board or SCSI add-on controller.
0528h (Pattern compare failed. Check pattern did not match.)	<ol style="list-style-type: none"> 1. Check if AMIDdiag CD is present in drive. 2. Confirm that drive is configured. 3. Check drive cables and connections. 4. Drive. 5. I/O board or SCSI add-on controller.
0529h (CD-ROM random read error.)	<ol style="list-style-type: none"> 1. Confirm that drive is configured. 2. Check drive cables and connections. 3. Drive. 4. I/O board or SCSI add-on controller.

Code/Explanation	FRU/Action
0550h (Read timeout .)	<ol style="list-style-type: none"> 1. Confirm that drive is configured. 2. Check drive cables and connections. 3. Drive. 4. I/O board or SCSI add-on controller.
0560h (File not found.)	<ol style="list-style-type: none"> 1. Check if AMIDdiag CD is present in drive. 2. Confirm that drive is configured. 3. Check drive cables and connections. 4. Drive. 5. I/O board or SCSI add-on controller.
0580h (Cannot allocate memory.)	Restart the server and retry.
0590h (Command not supported. Unable to run the test on the device.)	<ol style="list-style-type: none"> 1. Confirm that drive is configured. 2. Check drive cables and connections. 3. Drive. 4. I/O board or SCSI add-on controller.

Video test error codes

Code/Explanation	FRU/Action
0900h (Vertical Synchronization Test failed.)	I/O board
0901h (Horizontal Synchronization Test failed.)	I/O board
0902h (Graphics controller test failed.)	I/O board
0903h (Attribute controller test failed.)	I/O board
0904h (DAC register test failed.)	I/O board
0905h (Video adapter memory R/W test failed .)	I/O board
2100h (Video adapter attribute test failed.)	<ol style="list-style-type: none"> 1. Video monitor 2. I/O board
2102h (Video adapter color test failed.)	<ol style="list-style-type: none"> 1. Video monitor 2. I/O board
2110h - 2120h (Param1 x Param2 mode test failed.)	<ol style="list-style-type: none"> 1. Video monitor 2. I/O board

USB test error codes

If any of the following USB errors occur on devices not directly attached to a USB port on the xSeries 450 (for example, a USB mouse attached to a USB keyboard with an internal USB hub), connect the suspect device directly to the xSeries 450 and re-run the failing test to isolate whether the failure is with an intermediate device, the device being tested, or the USB subsystem of the xSeries 450. In cases where the direct attachment passes, replace the intermediate devices and re-test in the original configuration before replacing the device being tested or the I/O board.

Code/Explanation	FRU/Action
0B00h (USB mouse set protocol failed.)	<ol style="list-style-type: none"> 1. Check USB mouse connection. 2. USB mouse. 3. I/O board.
0B01h (USB mouse remove and attach tests failed.)	<ol style="list-style-type: none"> 1. Check USB mouse connection. 2. USB mouse. 3. I/O board.
0B02h (USB mouse not present.)	<ol style="list-style-type: none"> 1. Check USB mouse connection. 2. USB mouse. 3. I/O board.
0B30h (USB keyboard control test failed.)	<ol style="list-style-type: none"> 1. Check USB keyboard connection. 2. USB keyboard. 3. I/O board.
0B40h (USB keyboard LED test failed.)	<ol style="list-style-type: none"> 1. Check USB keyboard connection. 2. USB keyboard. 3. I/O board.
0B50h (USB keyboard remove and attach test failed.)	<ol style="list-style-type: none"> 1. Check USB keyboard connection. 2. USB keyboard. 3. I/O board.
0B60h (USB keyboard not present.)	<ol style="list-style-type: none"> 1. Check USB keyboard connection. 2. USB keyboard. 3. I/O board.
0B70h (USB Hub communication test failed.)	<ol style="list-style-type: none"> 1. Check USB hub connection. 2. USB hub. 3. I/O board.
1302h (UHCI Register Test failed.)	I/O board
1303h (UHCI Status Test failed.)	I/O board
1304h (UHCI Interrupt Test failed.)	I/O board
1305h (UHCI Frame Test failed.)	I/O board
1306h (UHCI Transfer Descriptor Test failed.)	I/O board
1312h (OHCI Register Test failed.)	I/O board
1313h (OHCI Status Test failed.)	I/O board
1314h (OHCI Interrupt Test failed.)	I/O board
1315h (OHCI Frame Test failed.)	I/O board
1316h (OHCI Transfer Descriptor Test failed.)	I/O board

Serial port test error codes

Code/explanation	FRU/action
0601h (Data written to port XXXXh was yyyyh. Data read back from the port was zzzzh.)	1. Check connection of loopback if used during test. 2. I/O board.
0602h (Interrupt identification register test failed .)	I/O board
0603h (Data written to port XXXXh was yyyyh. Data read back from the port was zzzzh .)	1. Check connection of loopback if used during test. 2. I/O board.
0604h (Line status register test failed at port XXXXh .)	I/O board
0605h (Interrupt activation test failed at port XXXXh.)	I/O board
0606h (Data transfer test failed at port XXXXh 1.)	1. Check connection of loopback if used during test. 2. I/O board.
0607h (Loop back test failed at port XXXXh .)	1. Check connection of loopback if used during test. 2. I/O board.
0608h (FIFO register test failed at port XXXXh.)	I/O board
0609h (FIFO trigger level test failed at port XXXXh.)	I/O board
0610h (FIFO character timeout indication test failed at port XXXXh.)	I/O board
0611h (FIFO data transfer test failed at port XXXXh.)	I/O board
0612h (Baud rate speed test failed at port XXXXh.)	I/O board

Advanced System Management error codes

Code/explanation	FRU/action
9100-xxx-xxx-xxx (SAL/EFI failed to communicate with ASM.)	<ol style="list-style-type: none"> 1. Run ASM Restart Test to restart ASM. 2. Rerun diagnostic test. 3. Correct other error conditions, including other failed system management tests and items logged in Remote Supervisor adapter system-error log, and retry. 4. Disconnect all server and option power cords from server, wait 30 seconds, reconnect, and retry. 5. Remote Supervisor Adapter. 6. I/O board.
9101-000-000-000 (DMC Self Test failed to complete.)	<ol style="list-style-type: none"> 1. Disconnect all server and option power cords from server, wait 30 seconds, reconnect, and retry. 2. Update the ISMP on the xSeries 450 node and RXE with the latest firmware level. 3. RXE backplane if test on RXE unit, I/O board if test on xSeries 450 node.
9102-000-000-000 (DMC Self Test failed update.)	<ol style="list-style-type: none"> 1. Disconnect all server and option power cords from server, wait 30 seconds, reconnect, and retry. 2. Update the ISMP on the xSeries 450 node and RXE with the latest firmware level. 3. RXE backplane if test on RXE unit, I/O board if test on xSeries 450 node.
9103-000-000-000 (DMC Self Test failed ROM.)	<ol style="list-style-type: none"> 1. Disconnect all server and option power cords from server, wait 30 seconds, reconnect, and retry. 2. Update the ISMP on the xSeries 450 node and RXE with the latest firmware level. 3. RXE backplane if test on RXE unit, I/O board if test on xSeries 450 node.
9104-000-000-000 (DMC Self Test failed RAM.)	<ol style="list-style-type: none"> 1. Disconnect all server and option power cords from server, wait 30 seconds, reconnect, and retry. 2. Update the ISMP on the xSeries 450 node and RXE with the latest firmware level. 3. RXE backplane if test on RXE unit, I/O board if test on xSeries 450 node.
9105-004-000-000 (ISMP indicates I2C errors on bus A0.)	<ol style="list-style-type: none"> 1. I/O board 2. Midplane board
9105-004-001-000 (ISMP indicates I2C errors on bus A1.)	<ol style="list-style-type: none"> 1. VRMs and microprocessors installed in midplane board 2. Midplane board
9105-004-002-000 (ISMP indicates I2C errors on bus A2.)	<ol style="list-style-type: none"> 1. Memory board 2. Midplane board

Code/explanation	FRU/action
9105-004-003-000 (ISMP indicates I2C errors on bus A3.)	<ol style="list-style-type: none"> 1. I/O board 2. Remote Supervisor Adapter 3. Midplane board
9105-004-004-000 (ISMP indicates I2C errors on bus A4.)	<ol style="list-style-type: none"> 1. PCI devices on PCI-X card 2. PCI-X card 3. Midplane board
9105-004-005-000 (ISMP indicates I2C errors on bus A5.)	<ol style="list-style-type: none"> 1. Power supply 2. Top power board 3. Midplane board
9105-004-006-000 (ISMP indicates I2C errors on bus A6.)	Midplane board
9105-004-007-000 (ISMP indicates I2C errors on bus A7.)	<ol style="list-style-type: none"> 1. Hard disk drive backplane 2. SCSI I2C cable 3. Midplane board
9105-004-008-000 (ISMP indicates I2C errors on bus A8.)	<ol style="list-style-type: none"> 1. Light Path card 2. Light Path cable 3. Midplane board
9105-004-009-000 (ISMP indicates I2C errors on bus A2M0.)	<ol style="list-style-type: none"> 1. Memory DIMMs 1-7 2. Memory board
9105-004-00a-000 (ISMP indicates I2C errors on bus A2M1.)	<ol style="list-style-type: none"> 1. Memory DIMMs 8-14 2. Memory board
9105-004-00b-000 (ISMP indicates I2C errors on bus A2M2.)	<ol style="list-style-type: none"> 1. Memory DIMMs 15-21 2. Memory board
9105-004-00c-000 (ISMP indicates I2C errors on bus A2M3.)	<ol style="list-style-type: none"> 1. Memory DIMMs 22-28 2. Memory board
9105-004-00d-000 (ISMP indicates errors on bus A4J0.)	PCI-X board
9105-004-00e-000 (ISMP indicates errors on bus A4J1.)	PCI-X board
9105-004-00f-000 (ISMP indicates errors on bus A4J2.)	PCI-X board
9105-004-010-000 (ISMP indicates I2C errors on bus A4J3.)	PCI-X board
9105-004-011-000 (ISMP indicates I2C errors on bus A4J1 PCI slot 1.)	<ol style="list-style-type: none"> 1. PCI adapter in PCI-X slot 1 2. PCI-X board
9105-004-012-000 (ISMP indicates I2C errors on bus A4J1 PCI slot 2.)	<ol style="list-style-type: none"> 1. PCI adapter in PCI-X slot 2 2. PCI-X board
9105-004-013-000 (ISMP indicates I2C errors on bus A4J1 PCI slot 3.)	<ol style="list-style-type: none"> 1. PCI adapter in PCI-X slot 3 2. PCI-X board
9105-004-014-000 (ISMP indicates I2C errors on bus A4J1 PCI slot 4.)	<ol style="list-style-type: none"> 1. PCI adapter in PCI-X slot 4 2. PCI-X board
9105-004-015-000 (ISMP indicates I2C errors on bus A4J1 PCI slot 5.)	<ol style="list-style-type: none"> 1. PCI adapter in PCI-X slot 5 2. PCI-X board
9105-004-016-000 (ISMP indicates I2C errors on bus A4J1 PCI slot 6.)	<ol style="list-style-type: none"> 1. PCI adapter in PCI-X slot 6 2. PCI-X board

Code/explanation	FRU/action
9105-001-000-000 or 9105-002-000-000 (ISMP indicates I2C errors on RXE bus X.)	See the <i>Hardware Maintenance Manual for the RXE-100 Remote Expansion Enclosure.</i>
9105-001-001-000 or 9105-002-001-000 (ISMP indicates I2C errors on RXE bus P.)	See the <i>Hardware Maintenance Manual for the RXE-100 Remote Expansion Enclosure.</i>
9105-001-002-000 (ISMP indicates I2C errors on RXE bus I_A.)	See the <i>Hardware Maintenance Manual for the RXE-100 Remote Expansion Enclosure.</i>
9105-002-003-000 (ISMP indicates I2C errors on RXE bus I_B.)	See the <i>Hardware Maintenance Manual for the RXE-100 Remote Expansion Enclosure.</i>
9105-001-004-000 (ISMP indicates I2C errors on RXE bus PCI_A)	See the <i>Hardware Maintenance Manual for the RXE-100 Remote Expansion Enclosure.</i>
9105-001-005-000 or 9105-002-005-000 (ISMP indicates I2C errors on RXE bus F.)	See the <i>Hardware Maintenance Manual for the RXE-100 Remote Expansion Enclosure.</i>
9105-002-006-000 (ISMP indicates I2C errors on RXE bus PCI_B)	See the <i>Hardware Maintenance Manual for the RXE-100 Remote Expansion Enclosure.</i>
9105-001-007-000 (ISMP indicates I2C errors on RXE bus PCI_A slot 1.)	PCI adapter in slot A1
9105-001-008-000 (ISMP indicates I2C errors on RXE bus PCI_A slot 2.)	PCI adapter in slot A2
9105-001-009-000 (ISMP indicates I2C errors on RXE bus PCI_A slot 3.)	PCI adapter in slot A3
9105-001-00a-000 (ISMP indicates I2C errors on RXE bus PCI_A slot 4.)	PCI adapter in slot A4
9105-001-00b-000 (ISMP indicates I2C errors on RXE bus PCI_A slot 5.)	PCI adapter in slot A5
9105-001-00c-000 (ISMP indicates I2C errors on RXE bus PCI_A slot 6.)	PCI adapter in slot A6
9105-002-00d-000 (ISMP indicates I2C errors on RXE bus PCI_B slot 1.)	PCI adapter in slot B1
9105-001-00e-000 (ISMP indicates I2C errors on RXE bus PCI_B slot 2.)	PCI adapter in slot B2
9105-001-00f-000 (ISMP indicates I2C errors on RXE bus PCI_B slot 3.)	PCI adapter in slot B3
9105-001-010-000 (ISMP indicates I2C errors on RXE bus PCI_B slot 4.)	PCI adapter in slot B4
9105-001-011-000 (ISMP indicates I2C errors on RXE bus PCI_B slot 5.)	PCI adapter in slot B5
9105-001-012-000 (ISMP indicates I2C errors on RXE bus PCI_B slot 6.)	PCI adapter in slot B6

Code/explanation	FRU/action
9106-xxx-xxx-xxx (ISMP indicates untested I2C bus.)	<ol style="list-style-type: none"> 1. Run diagnostic test again. 2. Correct other error conditions, including other system-management tests and items logged in Remote Supervisor Adapter system-error log, and retry. 3. Disconnect all server and option power cords, wait 30 seconds, reconnect, and retry. 4. Update the xSeries 450 node with the latest firmware level of diagnostics, ISMP, and ASM. Update RXE with latest ISMP firmware, and retry. 5. If a 9106 error occurs again, follow the FRU/action for error 9105 with respective parameter set.
9107-xxx-000-000 (System Management BIST indicates failed tests.)	<ol style="list-style-type: none"> 1. Run Restart ASM Test and re-run ASM BIST Test. 2. Disconnect all server and option power cords from server, wait 30 seconds, reconnect, and retry. 3. Remote Supervisor Adapter.

RXE port error codes

Code/explanation	FRU/action
9204-091-094-011 (RXE Expansion Port A failure.)	<ol style="list-style-type: none"> 1. RXE cable A 2. RXE expansion board to which cable is connected (Side A or Side B) 3. I/O board
9204-091-094-012 (RXE Expansion Port B failure.)	<ol style="list-style-type: none"> 1. RXE cable B 2. RXE expansion board to which cable is connected (Side A or Side B) 3. Processor board 4. Midplane board
9204-091-094-015 (RXE100 Side A to Side B failure.)	<ol style="list-style-type: none"> 1. Side A card in RXE100 2. Side B card in RXE100
9204-091-094-016 (RXE100 Side B to Side A failure.)	<ol style="list-style-type: none"> 1. Side B card in RXE100 2. Side A card in RXE100
9216-091-094-nnn (Receive Error on any port.)	Restart the server. This usually means that an RXE cable has been attached after SAL/EFI has run.
9220-091-094-011 (Transmit error on Port A.)	<ol style="list-style-type: none"> 1. RXE cable B 2. RXE expansion board to which cable is connected (Side A or Side B) 3. I/O board
9220-091-094-012 (Transmit error on Port B.)	<ol style="list-style-type: none"> 1. RXE cable B 2. RXE expansion board to which cable is connected (Side A or Side B) 3. Processor board 4. Midplane board
9220-091-094-015 (RXE100 Side A to Side B failure.)	<ol style="list-style-type: none"> 1. Side A card in RXE100 2. Side B card in RXE100

Code/explanation	FRU/action
9220-091-094-016 (RXE100 Side B to Side A failure.)	1. Side B card in RXE100 2. Side A card in RXE100
9228-091-094-011 (No incoming power on Port A.)	Missing cable on Port A
9228-091-094-012 (No incoming power on Port B.)	Missing cable on Port B
9228-091-094-014 (No incoming power on port.)	Missing cable on RXE100 Side A Port A
9228-091-094-017 (No incoming power on port.)	Missing cable on RXE100 Side B Port B
9232-091-094-011 (Driver disabled on Port A.)	Missing cable on Port A
9232-091-094-012 (Driver disabled on Port B.)	Missing cable on Port B
9232-091-094-014 (Driver disabled on port.)	Missing cable on RXE100 Side A Port A
9232-091-094-017 (Driver disabled on port.)	Missing cable on RXE100 Side B Port B
9236-091-094-011 (Port A is disabled.)	Missing cable on Port A
9236-091-094-012 (Port B is disabled.)	Missing cable on Port B
9236-091-094-014 (RXE100 Side A Port A is disabled.)	Missing cable on RXE100 Side A Port A
9236-091-094-017 (RXE100 Side B Port B is disabled.)	Missing cable on RXE100 Side B Port B

Memory test error codes

Table 10. Memory test error codes

Error code/symptom	FRU/action
9301-xxx-00-00 (Test Aborted: Memory Hole Size Error.)	1. Restart the server, and run the test again. 2. If the symptom still exists, then update the SAL/EFI.
9302-xxx-00-00 (Test Aborted: DIMM Configuration Error.)	1. Restart the server, and run the test again. 2. If the symptom still exists, then update the SAL/EFI.
9303-xxx-00-00 (EFI operating system error. Test Aborted: Buffer too small.)	1. Restart the server, and run the test again. 2. If the symptom still exists, reload the EFI operating system.
9304-xxx-00-00 (EFI operating system error. Test Aborted: Invalid Parameter.)	1. Restart the server, and run the test again. 2. If the symptom still exists, reload the EFI operating system.
9305-xxx-00-00 (Test Aborted: Memory WRT not complete.)	1. Restart the server, and run the test again. 2. If the symptom still exists, replace the memory board.
9306-xxx-00-00 (Memory Diagnostic Program Error. Test Aborted: Invalid Bank Selected.)	1. Restart the server, and run the test again. 2. If the symptom still exists, reflash the diagnostic code.

Table 10. Memory test error codes (continued)

Error code/symptom	FRU/action
9307-xxx-00-00 (Test Aborted: Choppiest Internal Error.)	<ol style="list-style-type: none"> 1. Restart the server, and run the test again. 2. If the symptom still exists, reflash the diagnostic code.
9308-xxx-00-00 (Diagnostic Program Error. Test Aborted: No DIMMs installed.)	<ol style="list-style-type: none"> 1. Restart the server, and run the test again. 2. If the symptom still exists, reflash the diagnostic code.
9309-xxx-00-00 (Test Aborted: Fast Scrub Error.)	<ol style="list-style-type: none"> 1. Reload the system, and run the test again. 2. If the symptom still exists, replace the memory board.
9310-xxx-nn-nn (Test Failed: ECC errors.) nn= the DIMM connector designation, 1-28.	<ol style="list-style-type: none"> 1. Restart the server, and run the test again. 2. If the symptom still exists, replace the DIMMs.

LED error codes

Table 11. LED error codes

Error code/symptom	FRU/action
9001-180-xxx-xxx (Failed Front LED panel test.)	<ol style="list-style-type: none"> 1. Light Path Diagnostics card 2. Power/reset card assembly 3. Midplane board 4. I/O board
9002-180-xxx-xxx (Failed Memory Board LED test.)	<ol style="list-style-type: none"> 1. Memory board 2. Midplane board
9003-180-xxx-xxx (Failed Active PCI LED test.)	PCI-X board
9004-180-xxx-xxx (Failed Diagnostics LED test.)	<ol style="list-style-type: none"> 1. Light Path Diagnostics card 2. Midplane board
9005-180-xxx-xxx (Failed Fan LED test.)	<ol style="list-style-type: none"> 1. Fan 2. I/O board
9006-180-xxx-xxx (Failed Centerplane LED test.)	Midplane board
9007-180-xxx-xxx (Failed I/O board LED test.)	I/O board
9008-180-xxx-xxx (Failed SCSI Backplane LED test.)	<ol style="list-style-type: none"> 1. SCSI backplane cable 2. SCSI backplane 3. Midplane board

Table 12. LED error codes for the RXE100 port

Error code/symptom	FRU/action
9021-180-xxx-xxx (Failed RXE Operator panel LED test)	<ol style="list-style-type: none"> 1. RXE Operator panel cable 2. RXE Operator panel 3. RXE backplane
9022-180-xxx-xxx (Failed RXE PCIXBackplane Side A LED test)	<ol style="list-style-type: none"> 1. RXE PCI-X backplane (Side A) 2. RXE backplane

Table 12. LED error codes for the RXE100 port (continued)

Error code/symptom	FRU/action
9023-180-xxx-xxx (Failed RXE PCIX Backplane Side B LED test)	<ol style="list-style-type: none"> RXE PCI-X backplane (Side B) RXE backplane
9024-180-xxx-xxx (Failed RXE Fans LED test)	<ol style="list-style-type: none"> RXE fans(s) RXE backplane
9025-180-xxx-xxx (Failed RXE backplane LED test)	RXE backplane

Error symptoms

Symptom	Suggested action
CD-ROM drive problems	<p>Make sure that:</p> <ol style="list-style-type: none"> The IDE channels are enabled in the Configuration/Setup Utility program. All cables and jumpers are installed correctly. The correct device driver is installed for the CD-ROM drive.
CD-ROM drive is not recognized.	
Expansion enclosure problems	<p>Make sure that:</p> <ol style="list-style-type: none"> The cables for all external SCSI options are connected correctly. The last option in each SCSI chain, or the end of the SCSI cable, is terminated correctly. Any external SCSI option is turned on. You must turn on an external SCSI option before turning on the server. <p>For more information, see your SCSI and expansion enclosure documentation.</p>
The SCSI expansion enclosure used to work but does not work now.	
Hard disk drive problems	<ol style="list-style-type: none"> Remove the first drive not recognized, and try the hard disk diagnostic test again. If the remaining drives are recognized, replace the drive you removed with a new one.
Not all drives are recognized by the hard disk diagnostic test (Fixed Disk test).	
System stops responding during hard disk diagnostic.	<ol style="list-style-type: none"> Remove the hard disk drive being tested when the server stopped responding and try the diagnostic again. If the hard disk diagnostic runs successfully, replace the drive you removed with a new one.
SCSI drives not recognized during POST (loose connection)	<ol style="list-style-type: none"> Reseat SCSI cable between I/O and T-docking boards. Reseat hard disk drive.
CD-ROM drive not recognized by SAL/EFI (loose connection)	<ol style="list-style-type: none"> Reseat IDE cable and power cable. Ensure that SAL/EFI setup has these devices enabled.
Not all drives are recognized by fixed disk diagnostic.	<ol style="list-style-type: none"> Remove first drive that does not show up and rerun diagnostic. If remaining drives show up, replace the one that was removed. If remaining drives do not show up, remove successive drives one at a time and rerun diagnostic.
System hangs during fixed disk diagnostic.	Remove hard drive being tested at the time of the hang and rerun the diagnostic. If successful, replace drive that was removed.

Symptom	Suggested action
Intermittent problems	Make sure that:
A problem occurs only occasionally and is difficult to detect.	<ol style="list-style-type: none"> 1. All cables and cords are connected securely to the rear of the server and attached options. 2. When the server is turned on, air is flowing from the rear of the server at the fan grill. If there is no air flow, the fan is not working. This causes the server to overheat and shut down. 3. Ensure that the SCSI bus and devices are configured correctly and that the last external device in each SCSI chain is terminated correctly.
Keyboard, mouse, or pointing-device problems.	<ol style="list-style-type: none"> 1. Make sure that the keyboard cable is properly connected to the server. 2. Make sure that the server and the monitor are turned on. 3. Try using another keyboard.
All or some keys on the keyboard do not work.	
The mouse or pointing device does not work.	<ol style="list-style-type: none"> 1. Make sure that the mouse or pointing-device cable is securely connected and the device drivers are installed correctly. 2. Try using another mouse or pointing device.
Memory problems	Make sure that:
The amount of system memory displayed is less than the amount of physical memory installed.	<ol style="list-style-type: none"> 1. DIMMs are seated properly. 2. You have installed the correct type of memory. 3. If you changed the memory, you updated the memory configuration with the Configuration/Setup Utility program. 4. All banks of memory on the DIMMs are enabled. The server might have automatically disabled a DIMM bank when it detected a problem, or a DIMM bank could have been manually disabled. <p>Look in the POST error log for error message 289:</p> <ul style="list-style-type: none"> • If the DIMM was disabled by the user or by SAL/EFI: <ol style="list-style-type: none"> 1. Start the Configuration/Setup Utility program. 2. Enable the DIMM. 3. Save the configuration and restart the server. • If you continue to get this error, replace the DIMM.
Microprocessor problems	The startup (boot) microprocessor is not working properly.
The server indicates a microprocessor error during POST.	Verify that all microprocessors are seated properly. If they are, replace the failed microprocessors.
The server does not recognize all installed processors (loose connection; bent pin(s) on processor(s))	<ol style="list-style-type: none"> 1. Reseat microprocessors and power modules. 2. Check for bent pins on microprocessors. 3. Check cable connections from processor board to power modules.
Monitor problems	Some IBM monitors have their own self-tests. If you suspect a problem with your monitor, see the information that comes with the monitor for adjusting and testing instructions.
Testing the monitor.	<ol style="list-style-type: none"> 1. Monitor. 2. Run the AMIDiag program. If diagnostics pass, the problem might be a video driver. 3. I/O board.
The screen is blank.	Make sure that:
	<ol style="list-style-type: none"> 1. The server power cord is plugged into the server and a working electrical outlet. 2. The monitor cables are connected properly. 3. The monitor is turned on and the brightness and contrast controls are adjusted correctly.

Symptom	Suggested action
The monitor works when you turn on the server but goes blank when you start some application programs.	<p>Make sure that:</p> <ol style="list-style-type: none"> 1. The primary monitor cable is connected to the server. 2. You installed the necessary device drivers for the applications.
The screen is wavy, unreadable, rolling, distorted, or has screen jitter.	<p>If the monitor self-tests show the monitor is working properly, consider the location of the monitor. Magnetic fields around other devices (such as transformers, appliances, fluorescent lights, and other monitors) can cause screen jitter or wavy, unreadable, rolling, or distorted screen images. If this happens, turn off the monitor. (Moving a color monitor while it is turned on might cause screen discoloration.) Then move the device and the monitor at least 305 mm (12 in.) apart. Turn on the monitor.</p> <p>Notes:</p> <ol style="list-style-type: none"> 1. To prevent diskette drive read/write errors, be sure the distance between monitors and diskette drives is at least 76 mm (3 in.). 2. Non-IBM monitor cables might cause unpredictable problems. 3. An enhanced monitor cable with additional shielding is available for the 9521 and 9527 monitors. For information about the enhanced monitor cable, contact your IBM reseller or IBM marketing representative.
Wrong characters appear on the screen.	<p>If the wrong language is displayed, update the SAL/EFI code with the correct language.</p>
No video (loose connection)	<ol style="list-style-type: none"> 1. Reseat boards, VRMs, and microprocessors. 2. Check for bent pins on all connectors. 3. Reseat memory boards and DIMMs. 4. Ensure proper population of DIMM banks. 5. DIMMs. 6. Power module. 7. VRMs.
<p>Option problems</p> <p>An IBM option that was just installed does not work.</p>	<p>Make sure that:</p> <ol style="list-style-type: none"> 1. The server supports the option. 2. You followed the installation instructions that come with the option. 3. The option is installed correctly. 4. You have not loosened any other installed options or cables. 5. You updated the configuration information using the Configuration/Setup Utility program. Whenever memory or an option is changed, you must update the configuration.
An IBM option that used to work does not work now.	<p>Make sure that all of the option hardware and cable connections are secure.</p> <p>If the option comes with its own test instructions, use those instructions to test the option.</p> <p>If the failing option is a SCSI option, verify that:</p> <ol style="list-style-type: none"> 1. The cables for all external SCSI options are connected correctly. 2. The last option in each SCSI chain, or the end of the SCSI cable, is terminated correctly. 3. Any external SCSI option is turned on. You must turn on an external SCSI option before turning on the server.

Symptom	Suggested action
Power problems	Make sure that:
The server does not turn on.	<ol style="list-style-type: none"> 1. The power cables are properly connected to the server. 2. The electrical outlet functions properly. 3. The type of memory installed is correct. 4. If you just installed an option, remove it, and restart the server. If the server now turns on, you might have installed more options than the power supply supports. 5. The LEDs on the power supply are on. 6. The operations panel functions properly. 7. VRM I/O board functions properly. 8. RSA system reset. 9. See "Power checkout" on page 74 for further problem determination steps.
The server does not turn off.	<p>Verify whether you are using an ACPI or non-ACPI operating system.</p> <p>If you are using a non-ACPI operating system:</p> <ol style="list-style-type: none"> 1. Press Ctrl+Alt+Delete. 2. Turn off the system by using the power-control button.
The server does not turn on once back together (loose connection(s) and/or bent pins)	<ol style="list-style-type: none"> 1. Reseat boards and VRMs. 2. Check front panel cable connections.
The server turns on but then turns off with fault light (bent pin(s); short on board)	<ol style="list-style-type: none"> 1. Reseat microprocessor. 2. Microprocessor.
The server starts up but does not POST (loose connection(s); incorrect processor stepping; system speed too high for processors; memory not stuffed in documented order; unsupported or unvalidated DIMMS)	<ol style="list-style-type: none"> 1. Check that screw or other conductive item has not been dropped into system. 2. Reseat boards and VRMs. 3. Check for bent pins on cables. 4. Check for bent pins on processors.
Software problems	<p>To determine if problems are caused by the software, verify that:</p> <ol style="list-style-type: none"> 1. The server has the minimum memory requirements needed to use the software. For memory requirements, refer to the information that comes with the software. Note: If you have just installed an adapter or memory, you might have a memory address conflict. 2. The software is designed to operate on the server. 3. Other software works on the server. 4. The software that you are using works on another system.
Suspected software problem.	<p>If you received any error messages when using the software program, refer to the information that comes with the software for a description of the messages and solutions to the problem.</p> <p>If the items above are correct and the problem remains, contact your place of purchase.</p>
Universal Serial Bus (USB) port problems	Verify that:
A USB device does not work.	<ol style="list-style-type: none"> 1. The correct USB device driver is installed. 2. Your operating system supports USB devices.

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 LED to come on is:

- Power supply
- Top power board

AC good LED	DC good LED	Front power on light	Power good indicators (midplane)	Description	FRU/action
Off	Off	Off	Off	No power to system or ac problem.	<ol style="list-style-type: none"> 1. Check ac power to system. 2. Power supply. 3. Top power board.
On	Off	Off	Off	DC source power problem	<p>Unplug the three power connectors to the midplane board. If the DC Good LED does not come on:</p> <ol style="list-style-type: none"> 1. Inspect and replace any damaged power cables. 2. Check ac power to system. 3. Power supply. 4. Top power board.
On	On	Blinking	Off	Standby power problem	<ol style="list-style-type: none"> 1. Disconnect the following items from the midplane board to isolate the failing FRU: <ol style="list-style-type: none"> a. Light Path cable and SCSI power cable b. Memory-board assembly c. Processor-board assembly d. PCI or PCI-X adapters e. PCI-X board f. Remote Supervisor Adapter (watch for lit or flashing LEDs on I/O board) g. I/O board cable attachments 2. If LEDs are on after removal, replace the offending device. 3. If no LEDs are lit after step 1, replace the following: <ol style="list-style-type: none"> a. I/O board b. Midplane board
On	On	On	Off	Failure to power up POWER GOOD problem	<ol style="list-style-type: none"> 1. Check indicators for a failing VRM; replace any failing VRMs. 2. Remove the adapters and disconnect cables and power connectors to all internal and external devices. Turn on the server. 3. If the Power Good LED comes on, replace the adapters and devices one at a time until you isolate the problem. 4. Power supply. 5. Top power board. 6. Midplane board.
On	On	On	On	Power is OK.	N/A

Diagnostic display error codes

The diagnostic display is composed of two seven-segment LEDs on the midplane board. While the server is in standby power mode, the display shows the CMOS programmable logic device (CPLD) revision level. The revision levels of the CPLD are individually reported in the display, as shown in the following table.

Display report	Device
P: An	Processor board
C: An	Midplane board
I: An	I/O board

After the server is turned on, the diagnostic display presents a two-digit code with a dot. If the dot is at the bottom between the two digits, then the display indicates a Hardware status error code. If the dot is at the top between the two digits, then the display indicates a SAL/EFI progress code.

When the server is first turned on, the hardware status error codes are displayed first, then the SAL/EFI progress codes are presented in the diagnostic display. When video is enabled, the SAL/EFI progress and status indicators can also be viewed from the system console. Codes on the diagnostic display track the SAL/EFI startup progress until startup has been completed.

Under certain conditions, the service processor event log might not contain a message about a FRU fault. For these faults, the server will usually not startup after power on or after reset, and a hardware status error code will appear on the diagnostic display, which will point to the failing FRU.

Hardware status error codes

If the diagnostic display on the midplane board shows a single-digit LED display, replace the I/O board.

Table 13. Phase 1 initial VRM determination error codes

Error message/explanation	FRU/action
01 (5v VRM not installed)	I/O board
02 (+5v PowerGood Fault)	1. I/O board 2. Midplane board
03 (+3.3v VRM not installed)	Midplane board
04 (+3.3v PowerGood Fault)	Midplane board
05 (+2.5v VRM not installed)	Memory board 2.5v VRM (J32)
06 (+2.5v PowerGood Fault)	Memory board 2.5v VRM (J32)
07 (+2.5v VRM not installed)*	1. Memory board port 1 2.5v VRM (J33) 2. Memory board port 2 2.5v VRM (J30)
08 (+2.5v PowerGood Fault)	1. Memory board port 1 2.5v VRM (J33) 2. Memory board port 2 2.5v VRM (J30)
09 (+1.8v VRM not installed)	Memory board 1.8v VRM (J31)

Table 13. Phase 1 initial VRM determination error codes (continued)

Error message/explanation	FRU/action
0a (+1.8v PowerGood Fault)	Memory board 1.8v VRM (J31)
0b (+1.8v VRM not installed)	Processor board 1.8v VRM (J133)
0c (+1,8v PowerGood Fault)	Processor board 1.8v VRM (J133)
0d (+1.2v PowerGood Fault)	Processor board
0E (PPOD PowerGood Fault)	Processor board

*This code is displayed for a few moments after server reset or power on; then, the server continues with the startup process.

Table 14. Phase 2 clock status error codes

Error message/explanation	FRU/action
11 (33 MHz clock)	I/O board
12 (14.3 MHz clock)	I/O board
13 (62.5 MHz clock)	Midplane board
14 (200 MHz clock)	<ol style="list-style-type: none"> Processor board I/O board

Table 15. Phase 3 subsystem control status error codes

Error message/explanation	FRU/action
21 (PCI-X board fault or VRM not installed)	PCI-X board
22 (PCI-X board fault)	PCI-X board
23 (I/O board fault)	I/O board
24 (Compatibility RESET failed to deassert)	I/O board
25 (Cyclone initialization fault)	<ol style="list-style-type: none"> Memory board Midplane board I/O board
26 (Tornado initialization fault)	<ol style="list-style-type: none"> Processor board Midplane board
27 (Front-side RESET fault. Reset failed to assert.)	<ol style="list-style-type: none"> Processor board Midplane board
28 (Front-side RESET fault. Reset failed to de-assert.)	<ol style="list-style-type: none"> Processor board Midplane board
29 (First Instruction Fetch Failed.)	I/O board

Table 16. Phase 4 I2C status error codes

Error message/explanation	FRU/action
31 (DMC SDA stuck low)	I/O board
32 (DMC SCL stuck low)	I/O board
33 (Midplane SDA stuck low)	Midplane board
34 (Midplane SCL stuck low)	Midplane board

Table 17. I/O board PCI status error codes

Error message/explanation	FRU/action
S:0 (PCI SERR Bus 0)	I/O board
S:1 (PCI SERR Bus 1)	I/O board
P:0 (PCI SERR Bus 0)	I/O board
P:1 (PCI SERR Bus 1)	I/O board

SAL/EFI progress codes

Error message/explanation	FRU/action
00 (Processors are fetching and executing code)	<ol style="list-style-type: none"> Microprocessors Processor board Memory board I/O board Midplane board
1x (FLASH verification in progress)	<ol style="list-style-type: none"> I/O board Processor board Memory board Midplane board
21 (Chipset initialization in progress)	<ol style="list-style-type: none"> Processor board Memory board I/O board
22 (Memory configuration in progress)	<ol style="list-style-type: none"> Check the system-error log. Memory board. Processor board. I/O board.
23 (Memory testing in progress)	<ol style="list-style-type: none"> Check the system-error log. Memory board. Processor board. I/O board.
2C (FLASH code is being shadowed into memory)	<ol style="list-style-type: none"> Check the system-error log. Memory board. I/O board.
30 (System has started up sufficiently to attempt a FLASH recovery)	<ol style="list-style-type: none"> Check the system-error log. Update system firmware. Memory board. I/O board.
3x (SAL initialization is in progress)	<ol style="list-style-type: none"> Check the system-error log. Update system firmware. Memory board. Processor board. I/O board.

Error message/explanation	FRU/action
4x (PCI initialization is in progress)	<ol style="list-style-type: none"> 1. Check the system-error log. 2. PCI-X board. 3. I/O board.
53 (Video initialization is in progress)	<ol style="list-style-type: none"> 1. Check the system-error log. 2. Update system firmware. 3. I/O board.
8x (EFI initialization is in progress)	<ol style="list-style-type: none"> 1. Check the system-error log. 2. Update system firmware. 3. I/O board.
91 (PCI initialization is in progress)	<ol style="list-style-type: none"> 1. Check the system-error log. 2. Update system firmware. 3. I/O board.
92 (ACPI initialization is in progress)	<ol style="list-style-type: none"> 1. Check the system-error log. 2. Update system firmware. 3. I/O board.
93 (MCA/INIT initialization is in progress)	<ol style="list-style-type: none"> 1. Check the system-error log. 2. I/O board.
94 (SMBIOS initialization is in progress)	<ol style="list-style-type: none"> 1. Check the system-error log. 2. Remote Supervisor Adapter. 3. I/O board.
95 (EFI is being started)	<ol style="list-style-type: none"> 1. Check the system-error log. 2. Update system firmware. 3. I/O board.

SCSI error messages

Error message	FRU/action
<p>All SCSI Errors</p> <p>One or more of the following might be causing the problem:</p> <ul style="list-style-type: none"> • A failing SCSI device (adapter, drive, controller) • An improper SCSI configuration or SCSI termination jumper setting • Duplicate SCSI IDs in the same SCSI chain • A missing or improperly installed SCSI terminator • A defective SCSI terminator • An improperly installed cable • A defective cable 	<ol style="list-style-type: none"> 1. External SCSI devices must be powered-on before you power-on the server. 2. The cables for all external SCSI devices are connected correctly. 3. If you have attached an external SCSI device to the server, make sure the external SCSI termination is set to automatic. 4. The last device in each SCSI chain is terminated correctly. 5. The SCSI devices are configured correctly.

Ethernet error messages

Diagnostic error messages prompted by the Ethernet controller are on the *Resource CD*.

Undetermined problems

You are here because the diagnostic tests did not identify the failure, the Devices List is incorrect, or the system is inoperative.

Notes:

1. If you suspect a software mismatch is causing failures (solid or intermittent), be sure to see “Error symptoms” on page 176.
2. A damaged CMOS can cause undetermined problems.
3. Damaged SAL/EFI code can cause undetermined problems. See “Recovering SAL/EFI code” on page 71.

Check the LEDs on all the power supplies (see “Power supply LED errors” on page 180). If the LEDs indicate the power supplies are working correctly, return here and do the following:

1. Turn off the server.
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 server and reconfigure each time).
 - Any external devices
 - Surge suppressor device (on the server)
 - Modem, printer, mouse, or non-IBM devices
 - Each adapter
 - Hard disk drives
 - Memory modules (minimum requirement = 1 GB (4 x 512 MB DIMMs))

Note: Minimum operating requirements are:

- a. 1 microprocessor with power module
 - b. 4 x 512 MB DIMMs
 - c. 1 power supply
 - d. 1 processor board
 - e. 1 memory board
 - f. Midplane board
 - g. I/O board
 - h. PCI-X board
4. Turn on the server. If the problem remains, suspect the following FRUs in the order listed:
 - Power supply
 - Top power board
 - Processor board
 - Memory board
 - Midplane board
 - PCI-X board
 - I/O board

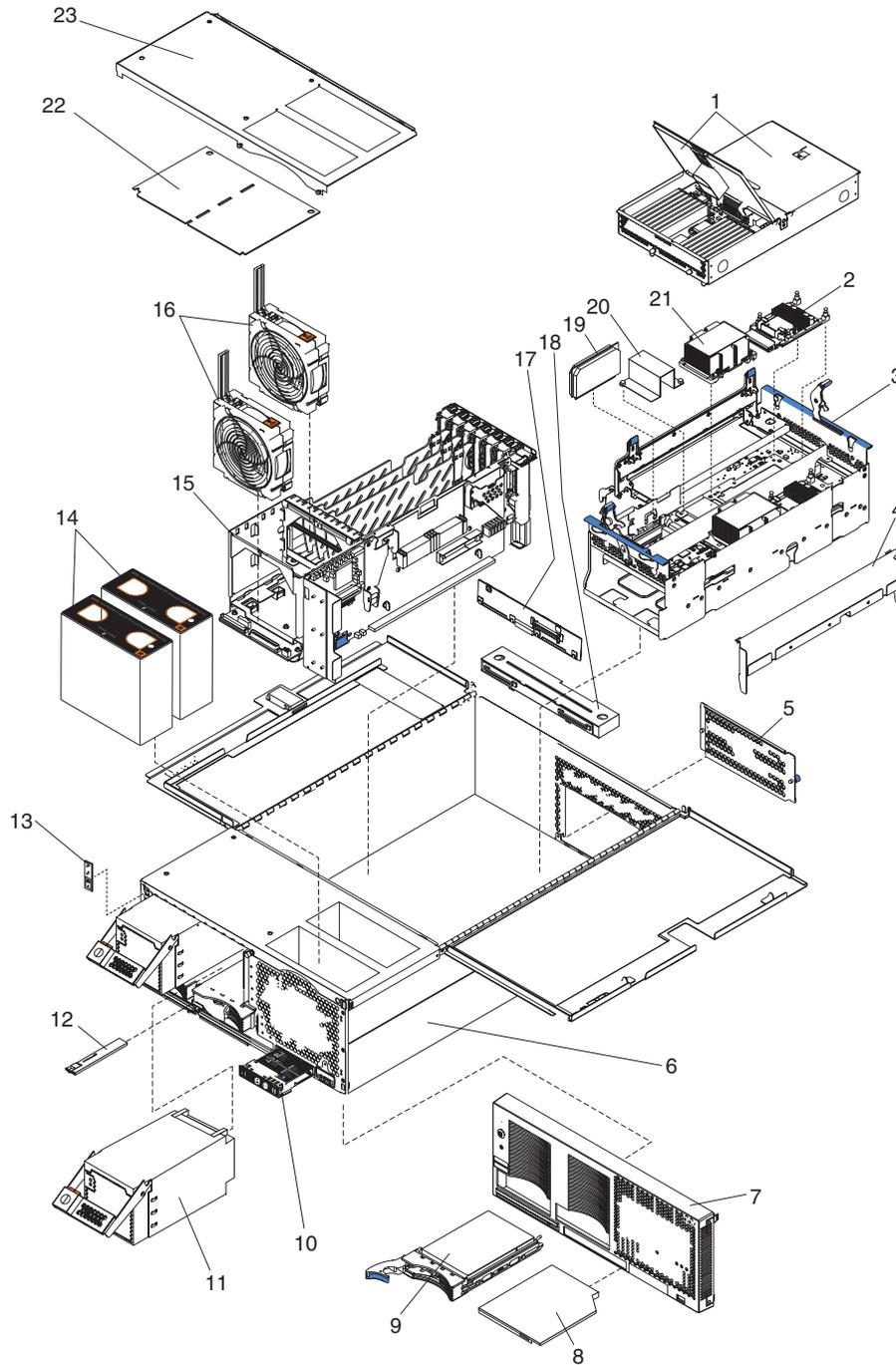
Notes:

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 PCI-X board.
2. If you suspect a networking problem and all the system tests pass, suspect a network cabling problem external to the system.

Chapter 7. Parts listing xSeries 450 Type 8688

The following Parts information is for the xSeries 450, Type 8688, Models 4RX,5RX, 6RX.

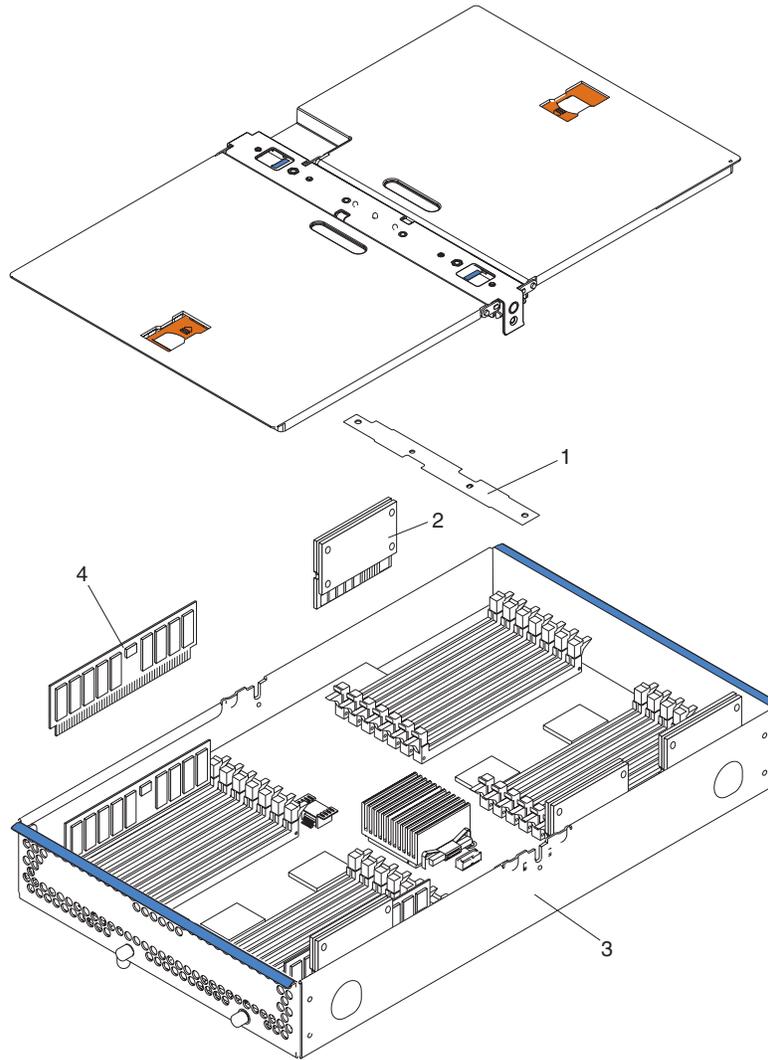
System



Index	xSeries 450 (Models 4RX, 5RX, 6RX)	FRU No.	CRU/FRU
1	Memory-board assembly (4RX, 5RX, 6 RX) see "Figure A" on page 190.	59P3676	FRU
2	Power module (4RX, 5RX, 6 RX)	59P3671	FRU
3	Processor-board assembly (4RX, 5RX, 6 RX)	59P3674	FRU
4	Retention bracket (4RX, 5RX, 6 RX)	48P7116	FRU
5	Panel, rear (4RX, 5RX, 6 RX)	73P6864	FRU
6	Chassis, 4U x 26 in. (4RX, 5RX, 6 RX)	49P3184	FRU
7	Bezel, 4U front (4RX, 5RX, 6 RX)	24P1259	CRU
8	CD-RW/DVD drive (4RX, 5RX, 6 RX)	08K9820	CRU
9	Bezel, slim hard disk drive (4RX, 5RX, 6 RX)	06P6245	FRU
10	Light Path card (4RX, 5RX, 6 RX)	03K9039	FRU
11	Power supply with mounting, 1050W (4RX, 5RX, 6 RX)	74P4347	CRU
12	Media extract mechanism (4RX, 5RX, 6 RX)	03K9047	FRU
13	Power/reset card assembly (4RX, 5RX, 6 RX)	59P5814	FRU
14	Fan (CPU fan assembly)	03K9048	CRU
15	PCI-X frame assembly — See "Figure B" on page 191.	73P6849	FRU
16	PCI fan assembly (4RX, 5RX, 6 RX)	03K9049	CRU
17	Hard disk drive card (4RX, 5RX, 6 RX)	59P3678	FRU
18	Media bay card (4RX, 5RX, 6 RX)	03K9036	FRU
19	Processor-board VRM (4RX, 5RX, 6 RX)	74P4343	FRU
20	Baffle, Microprocessor module (4RX, 5RX, 6RX)	59P3672	FRU
21	Microprocessor, 400/900 with hex wrench - 1.5 GHz (4RX)	73P9697	FRU
21	Microprocessor, 400/1000 with hex wrench - 1.5 GHz (5RX)	73P9698	FRU
21	Microprocessor, 400/1000 with hex wrench - 3.0 GHz (6RX)	73P9699	FRU
22	Top power board (4RX, 5RX, 6 RX)	03K9038	FRU
23	Top cover assembly (4RX, 5RX, 6 RX)	03K9043	FRU
	AC box assembly mechanism (4RX, 5RX, 6 RX)	49P2990	FRU
	Battery, 3.0V (4RX, 5RX, 6 RX)	33F8354	CRU
	Bezel, media bay (4RX, 5RX, 6 RX)	24P1081	FRU
	Cable, DC (4RX, 5RX, 6 RX)	24P1057	FRU
	Cable, DC power 16 POS (4RX, 5RX, 6 RX)	24P1059	FRU
	Cable, I2C SCSI (4RX, 5RX, 6 RX)	24P1061	FRU
	Cable, SCSI (4RX, 5RX, 6 RX)	24P1063	FRU
	Cable, active PCI (4RX, 5RX, 6 RX)	24P1067	FRU
	Cable, Light Path (4RX, 5RX, 6 RX)	03K9332	FRU
	Cable, media bay (4RX, 5RX, 6 RX)	03K9333	FRU
	Cable, CPU fan (4RX, 5RX, 6 RX)	03K9334	FRU
	Cable, I2C etc. (4RX, 5RX, 6 RX)	03K9335	FRU
	Cable, USB (4RX, 5RX, 6 RX)	03K9336	FRU
	Cable, external SCSI (4RX, 5RX, 6 RX)	32P8314	FRU
	Cable, pigtail, SMP fan assembly (4RX, 5RX, 6 RX)	32P8328	FRU
	Cable, memory LED (4RX, 5RX, 6 RX)	59P3680	FRU
	Cable, power module (4RX, 5RX, 6 RX)	59P6918	FRU
	Cover, system service label (4RX, 5RX, 6 RX)	73P7085	FRU
	Enterprise cable management arm (4RX, 5RX, 6 RX)	31P6119	FRU
	Frame (4RX, 5RX, 6 RX)	73P6849	FRU
	Insulator, PCI cover (4RX, 5RX, 6 RX)	24P1094	FRU
	Label group (4RX, 5RX, 6 RX)	73P6916	FRU
	Label, system service (4RX, 5RX, 6 RX)	73P9665	FRU
	Left EIA side flange assembly (4RX, 5RX, 6 RX)	00N7190	FRU
	Microprocessor cam assembly (4RX, 5RX, 6 RX)	24P1071	FRU

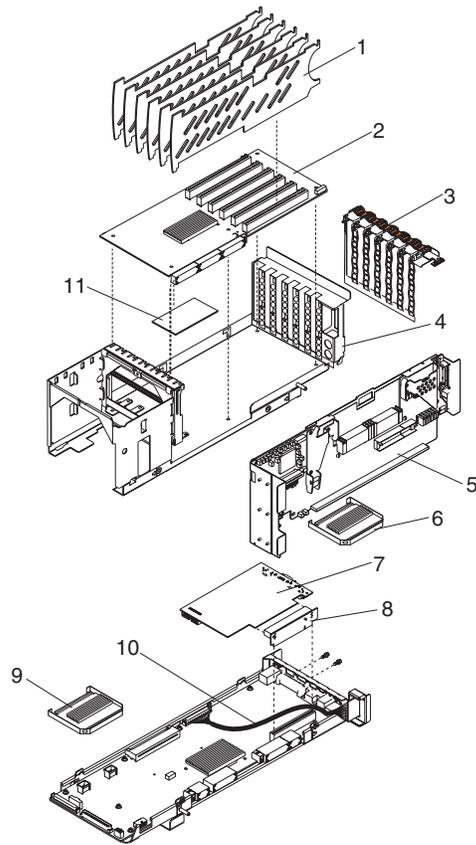
Index	xSeries 450 (Models 4RX, 5RX, 6RX)	FRU No.	CRU/FRU
	Miscellaneous parts kit (4RX, 5RX, 6 RX)	24P1217	CRU
	• I/O brackets (3)		
	• Small EMC clips (10)		
	• Adapter arm bracket cable (1)		
	• PCI card guide (1)		
	• PCI door latch (1)		
	• Switch, Light Path card (1)		
	• Slide rails, Light Path card (2)		
	• EMC shields (2)		
	• VRM clips (2)		
	• Slotted screws (10)		
	PCI hot-swap card (4RX, 5RX, 6 RX)	73P6869	FRU
	PDU cord (4RX, 5RX, 6 RX)	36L8886	FRU
	Power backplane (4RX, 5RX, 6 RX)	03K9038	FRU
	Right EIA side flange assembly (4RX, 5RX, 6 RX)	00N7192	FRU
	Slides with brackets (4RX, 5RX, 6 RX)	37L6579	FRU
	VRM, 40A, 12V (4RX, 5RX, 6 RX)	49P2120	FRU
	VRM clip, right angle (4RX, 5RX, 6 RX)	24P1285	FRU

Figure A



Index	xSeries 450 (Models 4RX, 5RX, 6RX)	FRU No.	CRU/FRU
1	Memory switch card (4RX, 5RX, 6 RX)	59P3677	FRU
2	Memory VRM, 16, 12V (4RX, 5RX, 6RX)	73P4343	FRU
3	Memory-board assembly (4RX, 5RX, 6 RX)	59P3676	FRU
4	Memory, 512 DIMM PC2100 ECC (4RX, 5RX, 6RX)	73P2032	CRU
4	Memory, 1 GB DIMM PC2100 ECC (4RX, 5RX, 6 RX)	73P2033	CRU
4	Memory, 2 GB DIMM PC2100 ECC (4RX, 5RX, 6 RX)	73P2035	CRU

Figure B



Index	xSeries 450 (Models 4RX, 5RX, 6RX)	FRU No.	CRU/FRU
1	PCI spacer (4RX, 5RX, 6 RX)	03K9050	FRU
2	PCI-X board (4RX, 5RX, 6 RX)	02R2399	FRU
3	Active PCI assembly (4RX, 5RX, 6 RX)	73P6869	FRU
4	PCI-X frame assembly (4RX, 5RX, 6 RX)	73P6849	FRU
5	Midplane board (4RX, 5RX, 6 RX)	59P3675	FRU
6	Midplane VRM, 16, 12V (4RX, 5RX, 6 RX)	49P2120	FRU
7	Remote system management adapter (4RX, 5RX, 6 RX)	59P2952	FRU
8	Riser card (4RX, 5RX, 6 RX)	03K9031	FRU
9	VRM, 40, 12V (4RX, 5RX, 6 RX)	49P2120	FRU
10	I/O board (4RX, 5RX, 6 RX)	73P9660	FRU
	PCI insulator (4RX, 5RX, 6 RX)	24P1094	FRU

Keyboard CRUs

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 (179)	37L2579
Turkish (440)	37L2580
UK English	37L2581
Yugosl/Lat	37L2582
US English-EMEA	37L2583
Chinese/US	37L2585
Thailand	37L2587
French Canadian	37L0913

Power cord CRUs

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, China (Hong Kong S.A.R.), Cyprus, Dubai, Fiji, Ghana, 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, China (Macau S.A.R.), Czech Republic, Egypt, Finland, France, French Guiana, Germany, Greece, Guinea, Hungary, Iceland, Indonesia, Iran, Ivory Coast, Jordan, Lebanon, Luxembourg, 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)

Appendix A. Getting help and technical assistance

If you need help, service, or technical assistance or just want more information about IBM products, you will find a wide variety of sources available from IBM to assist you. This appendix contains information about where to go for additional information about IBM and IBM products, what to do if you experience a problem with your xSeries or IntelliStation[®] system, and whom to call for service, if it is necessary.

Before you call

Before you call, make sure that you have taken these steps to try to solve the problem yourself:

- Check all cables to make sure that they are connected.
- Check the power switches to make sure that the system is turned on.
- Use the troubleshooting information in your system documentation, and use the diagnostic tools that come with your system.
- Go to the IBM Support Web site at <http://www.ibm.com/pc/support/> to check for technical information, hints, tips, and new device drivers.
- Use an IBM discussion forum on the IBM Web site to ask questions.

You can solve many problems without outside assistance by following the troubleshooting procedures that IBM provides in the online help or in the publications that are provided with your system and software. The information that comes with your system also describes the diagnostic tests that you can perform. Most xSeries and IntelliStation systems, operating systems, and programs come with information that contains troubleshooting procedures and explanations of error messages and error codes. If you suspect a software problem, see the information for the operating system or program.

Using the documentation

Information about your IBM xSeries or IntelliStation system and preinstalled software, if any, is available in the documentation that comes with your system. That documentation includes printed books, online books, readme files, and help files. See the troubleshooting information in your system documentation for instructions for using the diagnostic programs. The troubleshooting information or the diagnostic programs might tell you that you need additional or updated device drivers or other software. IBM maintains pages on the World Wide Web where you can get the latest technical information and download device drivers and updates. To access these pages, go to <http://www.ibm.com/pc/support/> and follow the instructions. Also, you can order publications through the IBM Publications Ordering System at <http://www.elink.ibm.com/public/applications/publications/cgibin/pbi.cgi>.

Getting help and information from the World Wide Web

On the World Wide Web, the IBM Web site has up-to-date information about IBM xSeries and IntelliStation products, services, and support. The address for IBM xSeries information is <http://www.ibm.com/eserver/xseries/>. The address for IBM IntelliStation information is <http://www.ibm.com/pc/intellistation/>.

You can find service information for your IBM products, including supported options, at <http://www.ibm.com/pc/support/>.

Software service and support

Through IBM Support Line, you can get telephone assistance, for a fee, with usage, configuration, and software problems with xSeries servers, IntelliStation workstations, and appliances. For information about which products are supported by Support Line in your country or region, go to <http://www.ibm.com/services/sl/products/>.

For more information about Support Line and other IBM services, go to <http://www.ibm.com/services/>, or go to <http://www.ibm.com/planetwide/> for support telephone numbers. In the U.S. and Canada, call 1-800-IBM-SERV (1-800-426-7378).

Hardware service and support

You can receive hardware service through IBM Integrated Technology Services or through your IBM reseller, if your reseller is authorized by IBM to provide warranty service. Go to <http://www.ibm.com/planetwide/> for support telephone numbers, or in the U.S. and Canada, call 1-800-IBM-SERV (1-800-426-7378).

In the U.S. and Canada, hardware service and support is available 24 hours a day, 7 days a week. In the U.K., these services are available Monday through Friday, from 9 a.m. to 6 p.m.

Appendix B. Related service information

The service procedures are designed to help you isolate problems. They assume that you have model-specific training on all servers, or that you are familiar with the servers, 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 server.

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. Turn off the server. 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 static-sensitive devices

Any server part containing transistors or integrated circuits (ICs) should be considered sensitive to electrostatic discharge (ESD), or static-sensitive. ESD damage can occur when there is a difference in charge between objects. Protect against ESD damage by equalizing the charge so that the server, 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 static-sensitive parts:

- Keep the parts in protective packages until they are inserted into the product.
- Avoid contact with other people.
- Wear a properly grounded wrist strap against your skin to help eliminate static electricity from 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 static-sensitive devices.
- Select a grounding system, such as those in the following list, to provide protection that meets the specific service requirement.

Note: The use of a grounding system is desirable but not required to protect against electrostatic discharge 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 servers.

Grounding requirements

Electrical grounding of the server is required for operator safety and correct system function. Proper grounding of the electrical outlet can be verified by a certified electrician.

Safety notices (multilingual translations)

The caution and danger safety notices in this section are provided in the following languages:

- English
- Brazilian/Portuguese
- Chinese
- French
- German
- Italian
- Japanese
- 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:

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

To Disconnect:

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

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 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.

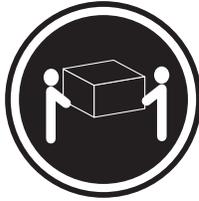


DANGER

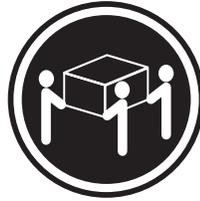
Some laser products contain an embedded Class 3A or Class 3B laser diode. Note the following.

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

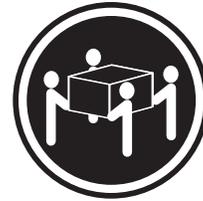
Statement 4:



≥ 18 kg (39.7 lb)



≥ 32 kg (70.5 lb)



≥ 55 kg (121.2 lb)

CAUTION:
Use safe practices when lifting.

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.



Statement 8:



CAUTION:

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



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

Statement 23:



CAUTION:

Do not place any object weighing more than 50 kg (110 lb) on top of rack-mounted devices.



>50 kg (110 lb)

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:
<ol style="list-style-type: none">1. DESLIGUE Tudo.2. Primeiramente, conecte todos os cabos aos dispositivos.3. Conecte os cabos de sinal aos conectores.4. Conecte os cabos de alimentação às tomadas.5. LIGUE os dispositivos.	<ol style="list-style-type: none">1. DESLIGUE Tudo.2. Primeiramente, remova os cabos de alimentação das tomadas.3. Remova os cabos de sinal dos conectores.4. Remova todos os cabos dos 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 módulo com uma bateria de lítio, substitua-o apenas pelo mesmo tipo de módulo, 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 ótica, 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

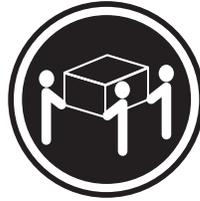
Alguns produtos a laser contêm um diodo laser da Classe 3A ou Classe 3B embutido. Observe o seguinte:

Radiação de laser quando aberto. Não olhe diretamente para o raio a olho nu ou com instrumentos óticos, e evite exposição direta ao raio.

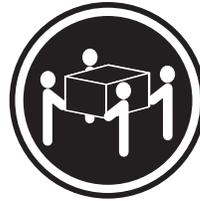
Instrução 4



≥18 kg (37 lbs)



≥32 kg (70.5 lbs)



≥55 kg (121.2 lbs)

CUIDADO:

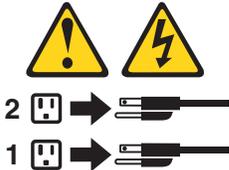
Ao levantar a máquina, faça-o com segurança.

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 8



CUIDADO:

Nunca remova a tampa de uma fonte de alimentação ou de qualquer peça que tenha esta etiqueta afixada.



Níveis perigosos de voltagem, corrente e energia estão presentes em qualquer componente que tenha esta etiqueta afixada. Nenhuma peça localizada no interior desses componentes pode ser consertada. Se você suspeitar de algum problema em alguma dessas peças, entre em contato com um técnico IBM.

Instrução 10

CUIDADO:

Não coloque nenhum objeto com peso superior a 82 kg (180 lbs.) sobre dispositivos montados em rack.



重要:

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：

1. 关闭所有设备。

2. 首先将所有电缆连接至设备。

3. 将信号电缆连接至接口。

4. 将电源线连接至插座。

断开连接时：

1. 关闭所有设备。

2. 首先从插座中拔出电源线。

3. 从接口上拔下信号电缆。

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)



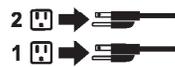
≥55 kg (121.2 磅)

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。



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按下热插拔风扇电缆。

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)

重要資訊：

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。

欲避免電擊危險：

- 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。
- 請將電源線接至接線及接地正確的電源插座。
- 請將本產品隨附的設備連接至接線正確的插座。
- 儘可能使用單手來連接或切斷信號電纜線。
- 當設備有火燒或泡水的痕跡，或有結構性損害時，請勿開啓該設備的電源。
- 在安裝及架構之時，若非非常熟悉，在開啓裝置蓋子之前，請切斷電源線、電信系統、網路及數據機。
- 在安裝、移動本產品或附加裝置，或開啓其蓋子時，請依照下表中「連接」及「切斷」電纜線的步驟執行。

連接：

1. 關閉所有開關。
2. 先將所有電纜線接上裝置。
3. 將信號電纜接上接頭。
4. 再將電源線接上電源插座。
5. 開啓裝置的電源。

切斷：

1. 關閉所有開關。
2. 先自電源插座拔掉電源線。
3. 拔掉接頭上的所有信號電纜。
4. 再拔掉裝置上的所有電纜線。

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 °C (212 °F)
- 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：

開啓時會產生雷射輻射。請勿凝視光束，不要使用光學儀器直接觀察，且應避免直接暴露在光束下。

聲明 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 8



注意：

嚴禁移除電源供應器的蓋子，或任何貼有下列標籤的組件。



貼有此標籤的元件內均有危險的電壓、電流及能源。這些元件中沒有需要維修的組件。若察覺問題發生在上述組件時，請與服務人員聯絡。

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)

聲明 13



危險

分支電路超載可能會引發火災，在特定情況下會有電擊之虞。為避免這些危險發生，請確定您的系統電力需求不超過分支電路的保護需求。請參閱 IBM 電力規格裝置所附的資訊。

聲明 14



注意：

可能會有危險的電壓、電流或能源量。僅授權合格的維修技師在貼上以下標籤之處移除外殼。



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
<ol style="list-style-type: none">1. Mettez les unités hors tension.2. Commencez par brancher tous les cordons sur les unités.3. Branchez les câbles d'interface sur des connecteurs.4. Branchez les cordons d'alimentation sur des prises.5. Mettez les unités sous tension.	<ol style="list-style-type: none">1. Mettez les unités hors tension.2. Débranchez les cordons d'alimentation des prises.3. Débranchez les câbles d'interface des connecteurs.4. Débranchez tous les câbles des unités.



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.

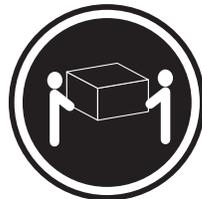


DANGER

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 (37 lbs)



≥32 kg (70.5 lbs)



≥55 kg (121.2 lbs)

ATTENTION:

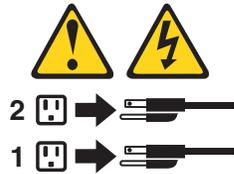
Faites-vous aider pour soulever ce produit.

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° 8



ATTENTION:

N'ouvrez jamais le bloc d'alimentation ou tout élément sur lequel est apposée l'étiquette ci-dessous.



Des tensions et des courants dangereux sont présents à l'intérieur de tout composant sur lequel est apposée cette étiquette. Ces éléments ne peuvent pas être réparés. Si vous pensez qu'ils peuvent être à l'origine d'un incident, prenez contact avec un technicien de maintenance.

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 Servern oder angeschlossenen Einheiten gelten.

Kabel anschließen:	Kabel lösen:
<ol style="list-style-type: none">1. Alle Geräte ausschalten und Netzstecker ziehen.2. Zuerst alle Kabel an Einheiten anschließen.3. Signalkabel an Anschlußbuchsen anschließen.4. Netzstecker an Steckdose anschließen.5. Gerät einschalten.	<ol style="list-style-type: none">1. Alle Geräte ausschalten.2. Zuerst Netzstecker von Steckdose lösen.3. Signalkabel von Anschlußbuchsen lösen.4. Alle Kabel von Einheiten lösen.

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.

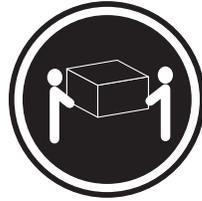


VORSICHT

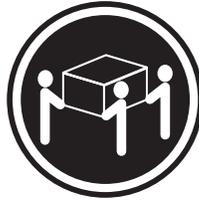
Manche CD-ROM-Laufwerke enthalten eine eingebaute Laserdiode der Klasse 3A oder 3B. Die nachfolgend aufgeführten Punkte beachten.

Laserstrahlung bei geöffneter Tür. Niemals direkt in den Laserstrahl sehen, nicht direkt mit optischen Instrumenten betrachten und den Strahlungsbereich meiden.

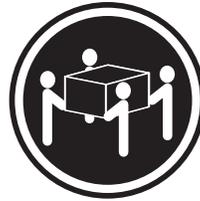
Hinweis 4



≥18 kg



≥32 kg



≥55 kg

ACHTUNG:

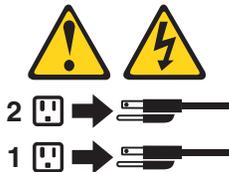
Beim Anheben der Maschine die vorgeschriebenen Sicherheitsbestimmungen beachten.

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 8



ACHTUNG:

Die Abdeckung oder eine Komponente eines Netzteils, die wie nachfolgend aufgeführt gekennzeichnet ist, darf keinesfalls entfernt werden.



In Komponenten, die so gekennzeichnet sind, können gefährliche Spannungen anliegen. In diesen Komponenten sind keine Teile vorhanden, die vom Benutzer gewartet werden müssen. Besteht der Verdacht, dass an einem dieser Teile ein Fehler aufgetreten ist, ist ein IBM Kundendiensttechniker zu verständigen.

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:
<ol style="list-style-type: none">1. SPEGNERE tutti i dispositivi.2. Collegare prima tutti i cavi alle unità.3. Collegare i cavi di segnale ai connettori.4. Collegare i cavi di alimentazione alle prese elettriche.5. ACCENDERE le unità.	<ol style="list-style-type: none">1. SPEGNERE tutti i dispositivi.2. Rimuovere prima i cavi di alimentazione dalle prese elettriche.3. Rimuovere i cavi di segnale dai connettori.4. Rimuovere tutti i cavi dalle 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.

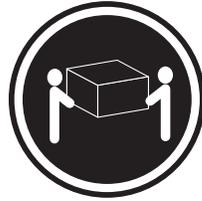


PERICOLO

Alcuni prodotti laser contengono all'interno un diodo laser di Classe 3A o Classe 3B. Prestare attenzione a quanto segue:

Aperto l'unità vengono emesse radiazioni laser. Non fissare il fascio, non guardarlo direttamente con strumenti ottici ed evitare l'esposizione diretta al fascio.

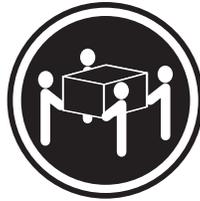
Avviso 4



≥18 kg



≥32 kg



≥55 kg

ATTENZIONE:

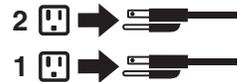
Durante il sollevamento della macchina seguire delle norme di sicurezza.

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.



Avviso 8



ATTENZIONE:

Non togliere mai il coperchio di un alimentatore o qualsiasi parte su cui è posta la seguente etichetta.



Tensioni pericolose, corrente e livelli di energia sono presenti all'interno del componente su cui è posta questa etichetta. All'interno di questi componenti non vi sono parti su cui effettuare l'assistenza tecnica. Se si sospetta un problema in una di queste parti, rivolgersi ad un tecnico di manutenzione.

Avviso 10

ATTENZIONE:

Non poggiare oggetti che pesano più di 82 kg sulla parte superiore delle unità montate in rack.



重要 :

Nefinity Server ライブラリーにあるすべての注意および危険の記述は数字で始まります。この数字は、英語版の注意および危険の記述と翻訳された注意および危険の記述を相互参照するために使用します。

例えば、もし注意の記述が数字の 1 で始まっている場合は、その注意の翻訳は、記述 1 の下にあります。

手順を実施する前に、すべての注意、

危険

感電を防止するため、雷の発生時には、いかなるケーブルの取り付けまたは取り外しも行わないでください。また導入、保守、再構成などの作業も行わないでください。

感電を防止するため：

- 電源コードは正しく接地および配線が行われている電源に接続してください。
- 本製品が接続されるすべての装置もまた正しく配線された電源に接続されている必要があります。

できれば、信号ケーブルに取り付けまたは取り外しのときは片方の手のみで行うようにしてください。これにより、電位差がある二つの表面に触ることによる感電を防ぐことができます。

電源コード、電話ケーブル、通信ケーブルからの電流は身体に危険を及ぼします。設置、移動、または製品のカバーを開けたり装置を接続したりするときには、以下のようにケーブルの接続、取り外しを行ってください。

接続するには	取り外すには
1. すべての電源を切る	1. すべての電源を切る
2. まず、装置にすべてのケーブルを接続する。	2. まず、電源コンセントから電源コードを取り外す
3. 次に、通信ケーブルをコネクタに接続する	3. 次に、通信ケーブルをコネクタから取り外す。
4. その後、電源コンセントに電源コードを接続する	4. その後、装置からすべてのケーブルを取り外す
5. 装置の電源を入れる。	

注意

本製品には、システム・ボード上にリチウム電池が使用されています。電池の交換方法や取り扱いを誤ると、発熱、発火、破裂のおそれがあります。

電池の交換には、IBM部品番号33F8354の電池またはメーカー推奨の同等の電池を使用してください。

交換用電池の購入については、お買い求めの販売店または弊社の営業担当までお問い合わせください。

電池は幼児の手の届かない所に置いてください。

万一、幼児が電池を飲み込んだときは、直ちに医師に相談してください。

以下の行為は絶対にしないでください。

- 水にぬらすこと
- 100度C 以上の過熱や焼却
- 分解や充電
- ショート

電池を廃棄する場合、および保存する場合にはテープなどで絶縁してください。他の金属や電池と混ざると発火、破裂の原因となります。電池は地方自治体の条例、または規則に従って廃棄してください。ごみ廃棄場で処分されるごみの中に捨てないでください。

・記述 3

⚠ 注意

レーザー製品 (CD-ROM、DVD、または光ファイバー装置または送信器など) が組み込まれている場合は、下記に御注意ください。

- ここに記載されている制御方法、調整方法、または性能を超えて使用すると、危険な放射線を浴びる可能性があります。
- ドライブのカバーを開けると、危険な放射線を浴びる可能性があります。ドライブの内部に修理のために交換可能な部品はありません。カバーを開けないでください。

⚠ 危険

一部 CD-ROM ドライブは、Class 3A または Class 3B レーザー・ダイオードを使用しています。次の点に注意してください。

CD-ROMドライブのカバーを開けるとレーザーが放射されます。光線を見つめたり、光学器械を使って直接見たりしないでください。また直接光線を浴びないようにしてください。

・記述 4

⚠ 注意



18Kg 以上



32Kg 以上



55Kg 以上

装置を持ち上げる場合は、安全に持ち上げる方法に従ってください。

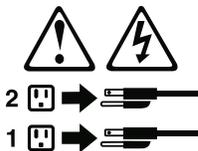
・記述 5

⚠ 注意 ⚡

サーバーの前面にある電源制御ボタンは、サーバーに供給された電流を遮断しません。

サーバーには、複数の電源コードが接続されているかもしれません。

サーバーから電流を完全に遮断するために、すべての電源コードが電源から取り外されていることを確認してください。



・記述 8

注意

この機器のなかにある電源のカバーは取り外さないでください。
また、下記のラベルが貼られているいかなる部品（電源のバック・ブレインおよびACボックス）も取り外さないでください。



電源、電源のバックブレインおよび AC ボックスの内部には危険な電圧、電流およびエネルギーがあり危険です。
電源、電源のバックブレインおよび AC ボックスの内部には保守部品はありません。
これらの部品に問題があるときは販売店または保守サービス会社にご連絡ください。

・記述 23

注意

ラック・モデルのサーバーの上に 50 Kg 以上の物を置かないでください。



> 50 Kg

중요:

본 *Server Library*에 있는 모든 주의 및 위험 경고문은 번호로 시작합니다. 이 번호는 영문 주의 혹은 위험 경고문과 이 절에 나오는 번역된 버전의 주의 혹은 위험 경고문을 상호 참조하는 데 사용됩니다.

예를 들어, 주의 경고문이 번호 1로 시작하면, 번역된 해당 주의 경고문을 본 절의 경고문 1에서 찾아볼 수 있습니다.

모든 지시사항을 수행하기 전에 반드시 모든 주의 및 위험 경고문을 읽으십시오.

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.
- 가능한 신호 케이블을 한 손으로 연결하거나 끊으십시오.
- 화재, 수해 또는 구조상의 손상이 있을 경우 장비를 켜지 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:

1. 모든 스위치를 끕니다.
2. 먼저 모든 케이블을 장치에 연결합니다.
3. 신호 케이블을 커넥터에 연결합니다.
4. 콘센트에 전원 코드를 연결합니다.
5. 장치 스위치를 켭니다.

연결을 끊으려면:

1. 모든 스위치를 끕니다.
2. 먼저 콘센트에서 전원 코드를 뽑습니다.
3. 신호 케이블을 커넥터에서 제거합니다.
4. 장치에서 모든 케이블을 제거합니다.

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.

다음은 주의하십시오.

- 던지거나 물에 담그지 않도록 하십시오.
- 100°C(212°F) 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 클래스 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 있는지 확인하십시오.



경고문 8



주의:
다음 레이블이 붙어 있는 전원 공급기나 부품의 덮개를 제거하지
마십시오.



이 레이블이 부착되어 있는 컴포넌트 안에는 위험한 전압, 전류 및
에너지 레벨이 있습니다. 이 컴포넌트 안에는 서비스 받을 수
있는 부품이 없습니다. 이들 부품에 문제가 있을 경우 서비스
기술자에게 문의하십시오.

경고문 23



주의:
서랍형 모델의 장치 상단에 50 kg(110 lbs.)이 넘는 물체를 올려
놓지 마십시오.



> 50 kg (110 lbs)

Importante:

Todas las declaraciones de precaución de esta IBM documentation empiezan con un número. Dicho número se emplea para establecer una referencia cruzada de una declaración de precaución o peligro en inglés con las versiones traducidas que de dichas declaraciones pueden encontrarse en esta sección.

Por ejemplo, si una declaración de peligro empieza con el número 1, las traducciones de esta declaración de precaución aparecen en esta sección bajo Declaración 1.

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

Declaración 1



PELIGRO

La corriente eléctrica de los cables telefónicos, de alimentación y de comunicaciones es perjudicial.

Para evitar una descarga eléctrica:

- No conecte ni desconecte ningún cable ni realice las operaciones de instalación, mantenimiento o reconfiguración de este producto durante una tormenta.
- Conecte cada cable de alimentación a una toma de alimentación eléctrica con conexión a tierra y cableado correctos.
- Conecte a tomas de alimentación 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 señal.
- No encienda nunca un equipo cuando haya riesgos de incendio, de inundación o de daños estructurales.
- Desconecte los cables de alimentación, sistemas de telecomunicaciones, redes y módems conectados antes de abrir las cubiertas del dispositivo a menos que se indique lo contrario en los procedimientos de instalación y configuración.
- Conecte y desconecte los cables tal como se describe en la tabla siguiente cuando desee realizar una operación de instalación, de traslado o de apertura de las cubiertas para este producto o para los dispositivos conectados.

Para la conexión	Para la desconexión
<ol style="list-style-type: none">1. APÁGUELO todo.2. En primer lugar, conecte los cables a los dispositivos.3. Conecte los cables de señal a los conectores.4. Conecte cada cable de alimentación a la toma de alimentación.5. ENCIENDA el dispositivo.	<ol style="list-style-type: none">1. APÁGUELO todo.2. En primer lugar, retire cada cable de alimentación de la toma de alimentación.3. Retire los cables de señal de los conectores.4. Retire los cables de los dispositivos.

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 módulo que contiene una batería de litio, sustitúyalo únicamente por el mismo tipo de módulo, 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 legislación local.

Declaración 3



PRECAUCIÓN:

Cuando instale productos láser (como, por ejemplo, CD-ROM, unidades DVD, dispositivos de fibra óptica o transmisores), tenga en cuenta las advertencias siguientes:

- No retire las cubiertas. Si retira las cubiertas del producto láser, puede quedar expuesto a radiación láser perjudicial. Dentro del dispositivo no existe ninguna pieza que requiera mantenimiento.
- El uso de controles o ajustes o la realización de procedimientos que no sean los que se han especificado aquí pueden dar como resultado una exposición perjudicial a las radiaciones.

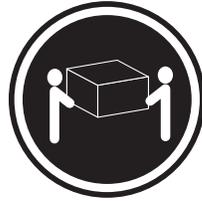


PELIGRO

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 radiación láser. No mire fijamente el rayo ni lleve a cabo ningún examen directamente con instrumentos ópticos; evite la exposición directa al rayo.

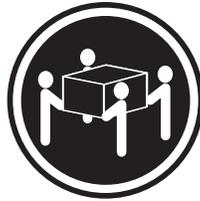
Declaración 4



≥18 kg



≥32 kg



≥55 kg

PRECAUCIÓN:

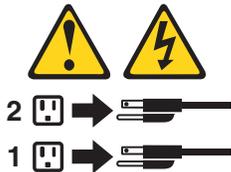
Tome medidas de seguridad al levantar el producto.

Declaración 5



PRECAUCIÓN:

El botón de control de alimentación del dispositivo y el interruptor de alimentación de la fuente de alimentación no apagan la corriente eléctrica suministrada al dispositivo. Es posible también que el dispositivo tenga más de un cable de alimentación. Para eliminar la corriente eléctrica del dispositivo, asegúrese de desconectar todos los cables de alimentación de la fuente de alimentación.



Declaración 8



PRECAUCIÓN:

No retire nunca la cubierta de una fuente de alimentación ni ninguna pieza que tenga adherida la etiqueta siguiente.



Existen niveles perjudiciales de energía, corriente y voltaje en los componentes que tienen adherida esta etiqueta. Dentro de estos componentes no existe ninguna pieza que requiera mantenimiento. Si sospecha que alguna de estas piezas tiene un problema, póngase en contacto con un técnico de servicio.

Declaración 23



PRECAUCIÓN:



No coloque ningún objeto que pese más de 50 kg (110 libras) encima de los dispositivos montados en bastidor.

WARNING: Handling the cord on this product or cords associated with accessories sold with this product, will expose you to lead, a chemical known to the State of California to cause cancer, and birth defects or other reproductive harm. ***Wash hands after handling.***

ADVERTENCIA: El contacto con el cable de este producto o con cables de accesorios que se venden junto con este producto, pueden exponerle al plomo, un elemento químico que en el estado de California de los Estados Unidos está considerado como un causante de cancer y de defectos congénitos, además de otros riesgos reproductivos. ***Lávese las manos después de usar el producto.***

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Important notes

Processor speeds indicate the internal clock speed of the microprocessor; other factors also affect application performance.

CD-ROM drive speeds list the variable read rate. Actual speeds vary and are often less than the maximum possible.

When referring to processor storage, real and virtual storage, or channel volume, KB stands for approximately 1000 bytes, MB stands for approximately 1 000 000 bytes, and GB stands for approximately 1 000 000 000 bytes.

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

Maximum internal hard disk drive capacities assume the replacement of any standard hard disk drives and population of all hard disk drive bays with the largest currently supported drives available from IBM.

Maximum memory may require replacement of the standard memory with an optional memory module.

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Some software may differ from its retail version (if available), and may not include user manuals or all program functionality.

Product recycling and disposal

This unit contains materials such as circuit boards, cables, electromagnetic compatibility gaskets, and connectors which may contain lead and copper/beryllium alloys that require special handling and disposal at end of life. Before this unit is disposed of, these materials must be removed and recycled or discarded according to applicable regulations. IBM offers product-return programs in several countries. Information on product recycling offerings can be found on IBM's Internet site at <http://www.ibm.com/ibm/environment/products/prp.shtml>.

Battery return program

This product may contain a sealed lead acid, nickel cadmium, nickel metal hydride, lithium, or lithium ion battery. Consult your user manual or service manual for specific battery information. The battery must be recycled or disposed of properly. Recycling facilities may not be available in your area. For information on disposal of batteries outside the United States, go to <http://www.ibm.com/ibm/environment/products/batteryrecycle.shtml> or contact your local waste disposal facility.

In the United States, IBM has established a collection process for reuse, recycling, or proper disposal of used IBM sealed lead acid, nickel cadmium, nickel metal hydride, and battery packs from IBM equipment. For information on proper disposal of these batteries, contact IBM at 1-800-426-4333. Have the IBM part number listed on the battery available prior to your call.

In the Netherlands, the following applies.



Electronic emission notices

Federal Communications Commission (FCC) statement

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense.

Properly shielded and grounded cables and connectors must be used in order to meet FCC emission limits. Properly shielded and grounded cables and connectors must be used in order to meet FCC emission limits. IBM is not responsible for any radio or television interference caused by using other than recommended cables and connectors or by using other than recommended cables and connectors or by unauthorized changes or modifications to this equipment. Unauthorized changes or modifications could void the user's authority to operate the equipment.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Industry Canada Class A emission compliance statement

This Class A digital apparatus complies with Canadian ICES-003.

Avis de conformité à la réglementation d'Industrie Canada

Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.

Australia and New Zealand Class A statement

Attention: This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

United Kingdom telecommunications safety requirement

Notice to Customers

This apparatus is approved under approval number NS/G/1234/J/100003 for indirect connection to public telecommunication systems in the United Kingdom.

European Union EMC Directive conformance statement

This product is in conformity with the protection requirements of EU Council Directive 89/336/EEC on the approximation of the laws of the Member States relating to electromagnetic compatibility. IBM cannot accept responsibility for any failure to satisfy the protection requirements resulting from a nonrecommended modification of the product, including the fitting of non-IBM option cards.

This product has been tested and found to comply with the limits for Class A Information Technology Equipment according to CISPR 22/European Standard EN 55022. The limits for Class A equipment were derived for commercial and industrial environments to provide reasonable protection against interference with licensed communication equipment.

Attention: This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

Taiwanese Class A warning statement

警告使用者：
這是甲類的資訊產品，在居住的環境中使用時，可能會造成射頻干擾，在這種情況下，使用者會被要求採取某些適當的對策。

Chinese Class A warning statement

聲 明
此為 A 級產品。在生活環境中，該產品可能會造成無線電干擾。在這種情況下，可能需要用戶對其干擾採取切实可行的措施。

Japanese Voluntary Control Council for Interference (VCCI) statement

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Power cords

For your safety, IBM provides a power cord with a grounded attachment plug to use with this IBM product. To avoid electrical shock, always use the power cord and plug with a properly grounded outlet.

IBM power cords used in the United States and Canada are listed by Underwriter's Laboratories (UL) and certified by the Canadian Standards Association (CSA).

For units intended to be operated at 115 volts: Use a UL-listed and CSA-certified cord set consisting of a minimum 18 AWG, Type SVT or SJT, three-conductor cord, a maximum of 15 feet in length and a parallel blade, grounding-type attachment plug rated 15 amperes, 125 volts.

For units intended to be operated at 230 volts (U.S. use): Use a UL-listed and CSA-certified cord set consisting of a minimum 18 AWG, Type SVT or SJT, three-conductor cord, a maximum of 15 feet in length and a tandem blade, grounding-type attachment plug rated 15 amperes, 250 volts.

For units intended to be operated at 230 volts (outside the U.S.): Use a cord set with a grounding-type attachment plug. The cord set should have the appropriate safety approvals for the country in which the equipment will be installed.

IBM power cords for a specific country or region are usually available only in that country or region.

IBM power cord part number	Used in these countries and regions
02K0546	China
13F9940	Australia, Fiji, Kiribati, Nauru, New Zealand, Papua New Guinea
13F9979	Afghanistan, Albania, Algeria, Andorra, Angola, Armenia, Austria, Azerbaijan, Belarus, Belgium, Benin, Bosnia and Herzegovina, Bulgaria, Burkina Faso, Burundi, Cambodia, Cameroon, Cape Verde, Central African Republic, Chad, Comoros, Congo (Democratic Republic of), Congo (Republic of), Cote D'Ivoire (Ivory Coast), Croatia (Republic of), Czech Republic, Dahomey, Djibouti, Egypt, Equatorial Guinea, Eritrea, Estonia, Ethiopia, Finland, France, French Guyana, French Polynesia, Germany, Greece, Guadeloupe, Guinea, Guinea Bissau, Hungary, Iceland, Indonesia, Iran, Kazakhstan, Kyrgyzstan, Laos (People's Democratic Republic of), Latvia, Lebanon, Lithuania, Luxembourg, Macedonia (former Yugoslav Republic of), Madagascar, Mali, Martinique, Mauritania, Mauritius, Mayotte, Moldova (Republic of), Monaco, Mongolia, Morocco, Mozambique, Netherlands, New Caledonia, Niger, Norway, Poland, Portugal, Reunion, Romania, Russian Federation, Rwanda, Sao Tome and Principe, Saudi Arabia, Senegal, Serbia, Slovakia, Slovenia (Republic of), Somalia, Spain, Suriname, Sweden, Syrian Arab Republic, Tajikistan, Tahiti, Togo, Tunisia, Turkey, Turkmenistan, Ukraine, Upper Volta, Uzbekistan, Vanuatu, Vietnam, Wallis and Futuna, Yugoslavia (Federal Republic of), Zaire
13F9997	Denmark
14F0015	Bangladesh, Lesotho, Maceo, Maldives, Namibia, Nepal, Pakistan, Samoa, South Africa, Sri Lanka, Swaziland, Uganda
14F0033	Abu Dhabi, Bahrain, Botswana, Brunei Darussalam, Channel Islands, China (Hong Kong S.A.R.), Cyprus, Dominica, Gambia, Ghana, Grenada, Iraq, Ireland, Jordan, Kenya, Kuwait, Liberia, Malawi, Malaysia, Malta, Myanmar (Burma), Nigeria, Oman, Polynesia, Qatar, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, Seychelles, Sierra Leone, Singapore, Sudan, Tanzania (United Republic of), Trinidad and Tobago, United Arab Emirates (Dubai), United Kingdom, Yemen, Zambia, Zimbabwe
14F0051	Liechtenstein, Switzerland
14F0069	Chile, Italy, Libyan Arab Jamahiriya

IBM power cord part number	Used in these countries and regions
14F0087	Israel
1838574	Antigua and Barbuda, Aruba, Bahamas, Barbados, Belize, Bermuda, Bolivia, Brazil, Caicos Islands, Canada, Cayman Islands, Costa Rica, Colombia, Cuba, Dominican Republic, Ecuador, El Salvador, Guam, Guatemala, Haiti, Honduras, Jamaica, Japan, Mexico, Micronesia (Federal States of), Netherlands Antilles, Nicaragua, Panama, Peru, Philippines, Taiwan, United States of America, Venezuela
24P6858	Korea (Democratic People's Republic of), Korea (Republic of)
34G0232	Japan
36L8880	Argentina, Paraguay, Uruguay
49P2078	India
49P2110	Brazil
6952300	Antigua and Barbuda, Aruba, Bahamas, Barbados, Belize, Bermuda, Bolivia, Caicos Islands, Canada, Cayman Islands, Colombia, Costa Rica, Cuba, Dominican Republic, Ecuador, El Salvador, Guam, Guatemala, Haiti, Honduras, Jamaica, Mexico, Micronesia (Federal States of), Netherlands Antilles, Nicaragua, Panama, Peru, Philippines, Saudi Arabia, Thailand, Taiwan, United States of America, Venezuela

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