



System x3850 M2 and System x3950 M2 Types 7141 and 7233

Installation Guide

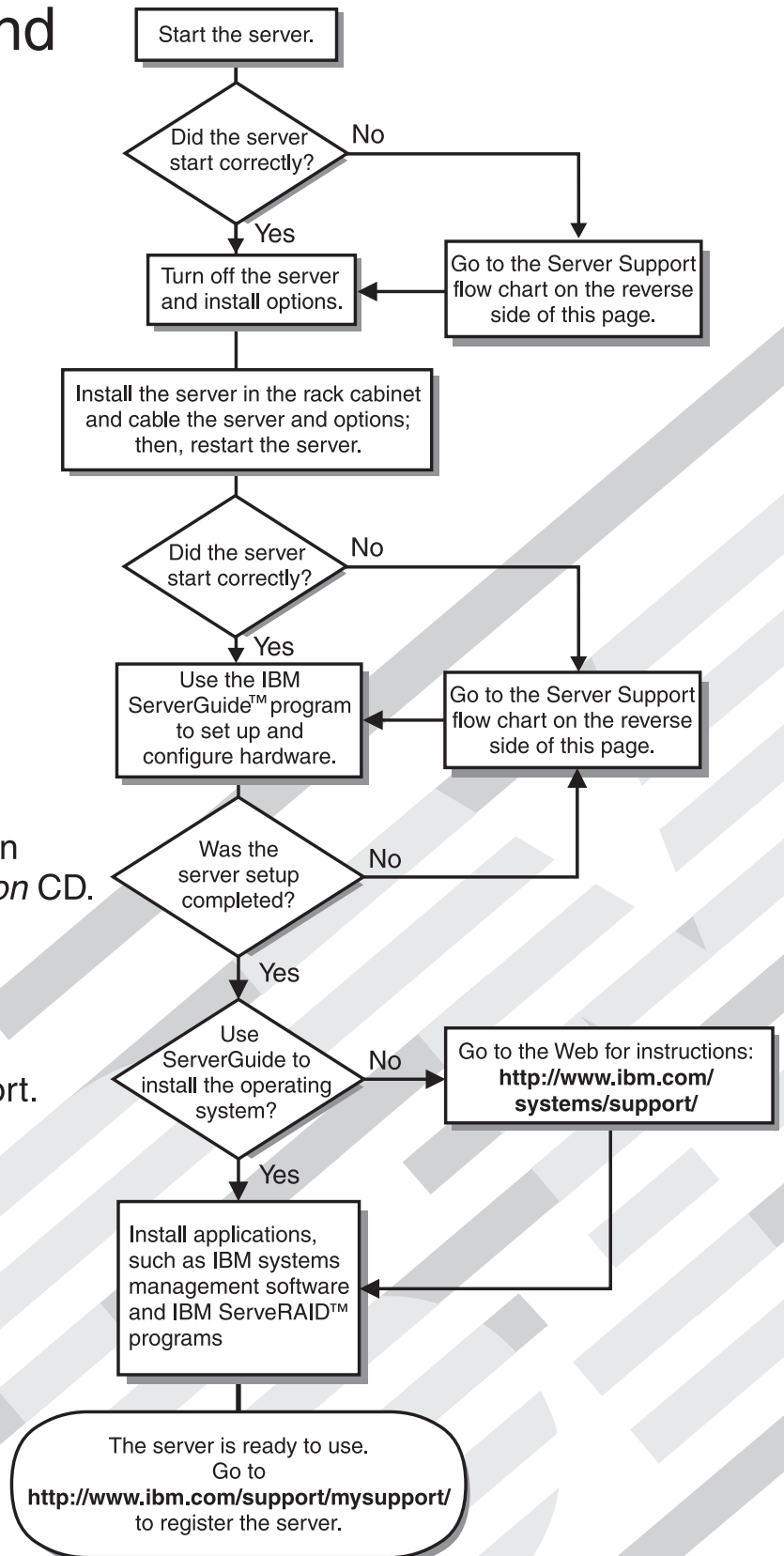
Welcome.

Thank you for buying an IBM server. Your server is based on the X-Architecture technology, and it features superior performance, availability, and affordability.

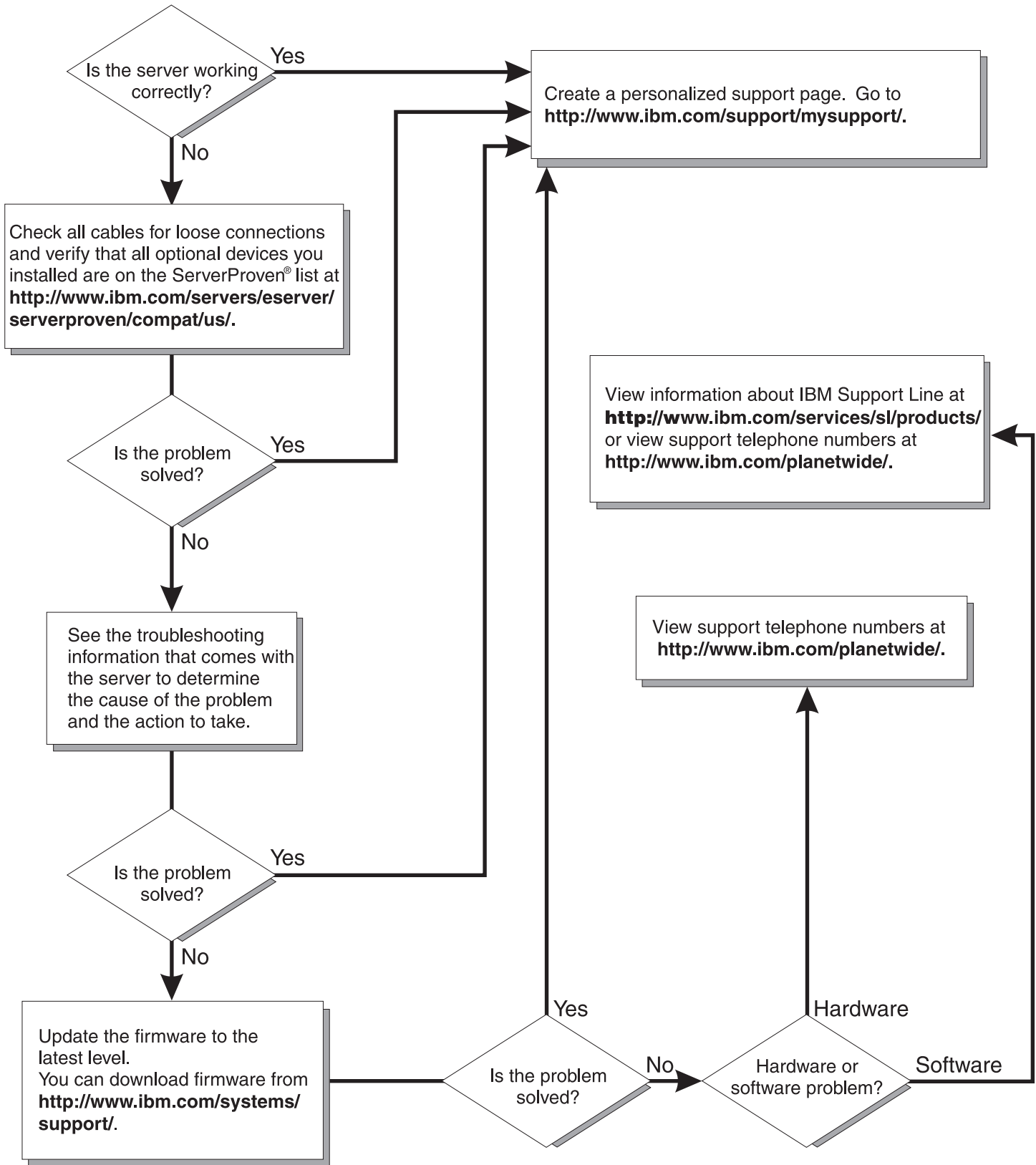
This server *Installation Guide* contains information for setting up and configuring your server.

For detailed information about your server, view the documentation on the IBM *System x Documentation CD*.

You can also find the most current information about your server at <http://www.ibm.com/systems/support>.



Server Support



IBM System x3850 M2 and System x3950 M2
Types 7141 and 7233



Installation Guide

Note: Before using this information and the product it supports, read the general information in “Notices” on page 79.

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Contents

Safety	v
Chapter 1. Introduction	1
The IBM Documentation CD	2
Hardware and software requirements	2
Using the Documentation Browser	2
Notices and statements in this document	3
Features and specifications	4
Major components of the server	6
Chapter 2. Installing optional devices	9
Installation guidelines	9
Limitations in a single-power-supply server operating at 110 V ac installation	10
System reliability guidelines	10
Working inside the server with the power on	11
Handling static-sensitive devices	11
Installing a hot-swap power supply	12
Installing a hot-swap hard disk drive	14
Installing a DVD drive	15
Installing additional DIMMs	16
Installing a DIMM	19
Installing a memory card	21
Installing an additional microprocessor	22
Installing a ServeRAID-MR10k SAS controller	25
Installing an adapter	26
Completing the installation.	28
Connecting the cables	29
Updating the server configuration	29
SMP Expansion cabling.	30
Chapter 3. Server controls, connectors, LEDs, and power.	37
Front view	37
Rear view	39
Server power features	41
Turning on the server	41
Turning off the server	42
Chapter 4. Configuring the server	45
Using the ServerGuide Setup and Installation CD	45
Using the Configuration/Setup Utility program	45
Using the baseboard management controller utility programs	46
Using the LSI Logic Configuration Utility program	46
Using the LSI Logic MegaRAID Storage Manager program.	46
Using the Scalable Partition Web interface.	46
Chapter 5. Updating IBM Director	51
Chapter 6. Solving problems	53
Diagnostic tools overview	53
POST beep codes	54
POST error codes.	54
Troubleshooting tables	57
CD or DVD drive problems	57

General problems	58
Hard disk drive problems	58
Intermittent problems.	59
USB keyboard, mouse, or pointing-device problems	59
Memory problems	60
Microprocessor problems	61
Monitor problems	61
Optional-device problems	64
Power problems	65
Serial-device problems	66
ServerGuide problems	67
Software problems	68
Universal Serial Bus (USB) port device problems	68
Video problems.	68
Light path diagnostics	68
Diagnosing problems using light path diagnostics	69
Remind button	71
Light path diagnostics panel	71
Appendix. Getting help and technical assistance	77
Before you call	77
Using the documentation	77
Getting help and information from the World Wide Web	77
Software service and support	78
Hardware service and support	78
IBM Taiwan product service	78
Notices	79
Trademarks	79
Important notes.	80
Particulate contamination	81
Documentation format	81
Electronic emission notices	82
Federal Communications Commission (FCC) statement	82
Industry Canada Class A emission compliance statement	82
Avis de conformité à la réglementation d'Industrie Canada	82
Australia and New Zealand Class A statement	82
United Kingdom telecommunications safety requirement.	82
European Union EMC Directive conformance statement.	83
Taiwanese Class A warning statement	83
Germany Electromagnetic Compatibility Directive	83
People's Republic of China Class A warning statement	84
Japanese Voluntary Control Council for Interference (VCCI) statement	84
Korean Class A warning statement	84
Index	85

Safety

Before installing this product, read the Safety Information.

قبل تركيب هذا المنتج، يجب قراءة الملاحظات الأمنية

Antes de instalar este produto, leia as Informações de Segurança.

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

安裝本產品之前，請先閱讀「安全資訊」。

Prije instalacije ovog produkta obavezno pročitajte Sigurnosne Upute.

Před instalací tohoto produktu si přečtěte příručku bezpečnostních instrukcí.

Læs sikkerhedsforskrifterne, før du installerer dette produkt.

Lees voordat u dit product installeert eerst de veiligheidsvoorschriften.

Ennen kuin asennat tämän tuotteen, lue turvaohjeet kohdasta Safety Information.

Avant d'installer ce produit, lisez les consignes de sécurité.

Vor der Installation dieses Produkts die Sicherheitshinweise lesen.

Πριν εγκαταστήσετε το προϊόν αυτό, διαβάστε τις πληροφορίες ασφάλειας (safety information).

לפני שתתקינו מוצר זה, קראו את הוראות הבטיחות.

A termék telepítése előtt olvassa el a Biztonsági előírásokat!

Prima di installare questo prodotto, leggere le Informazioni sulla Sicurezza.

製品の設置の前に、安全情報をお読みください。

본 제품을 설치하기 전에 안전 정보를 읽으십시오.

Пред да се инсталира овој продукт, прочитајте информацијата за безбедност.

Les sikkerhetsinformasjonen (Safety Information) før du installerer dette produktet.

Przed zainstalowaniem tego produktu, należy zapoznać się z książką "Informacje dotyczące bezpieczeństwa" (Safety Information).

Antes de instalar este produto, leia as Informações sobre Segurança.

Перед установкой продукта прочтите инструкции по технике безопасности.

Pred inštaláciou tohto zariadenia si pečítajte Bezpečnostné predpisy.

Pred namestitvijo tega proizvoda preberite Varnostne informacije.

Antes de instalar este producto, lea la información de seguridad.

Läs säkerhetsinformationen innan du installerar den här produkten.

Important:

Each caution and danger statement in this document is labeled with a number. This number is used to cross reference an English-language caution or danger statement with translated versions of the caution or danger statement in the *Safety Information* document.

For example, if a caution statement is labeled “Statement 1,” translations for that caution statement are in the *Safety Information* document under “Statement 1.”

Be sure to read all caution and danger statements in this document before you perform the procedures. Read any additional safety information that comes with the server or optional device before you install the device.

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 15F8409 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.

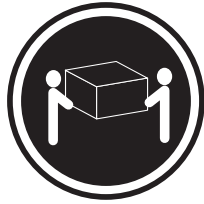


DANGER

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.

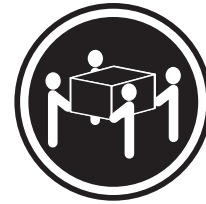
Statement 4:



≥ 18 kg (39.7 lb)



≥ 32 kg (70.5 lb)



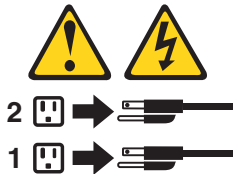
≥ 55 kg (121.2 lb)

CAUTION:
Use safe practices when lifting.

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 26:



CAUTION:

Do not place any object on top of rack-mounted devices.



Statement 27:



CAUTION:

Hazardous moving parts are nearby.



Chapter 1. Introduction

This *Installation Guide* contains instructions for setting up your IBM® System x3850 M2 and System x3950 M2 Types 7141 and 7233 servers and basic instructions for installing some optional devices. More detailed instructions for installing optional devices are in the *User's Guide* on the IBM System x® *Documentation CD*, which comes with the server. This document contains information about:

- Setting up and cabling the server
- Starting and configuring the server
- Installing some optional devices
- Solving problems

If firmware and documentation updates are available, you can download them from the IBM Web site. The server might have features that are not described in the documentation that comes with the server, and the documentation might be updated occasionally to include information about those features, or technical updates might be available to provide additional information that is not included in the server documentation. To check for updates, complete the following steps.

Note: Changes are made periodically to the IBM Web site. Procedures for locating firmware and documentation might vary slightly from what is described in this document.

1. Go to <http://www.ibm.com/systems/support/>.
2. Under **Product support**, click **System x**.
3. Under **Popular links**, click **Software and device drivers** for firmware updates, or click **Publications lookup** for documentation updates.

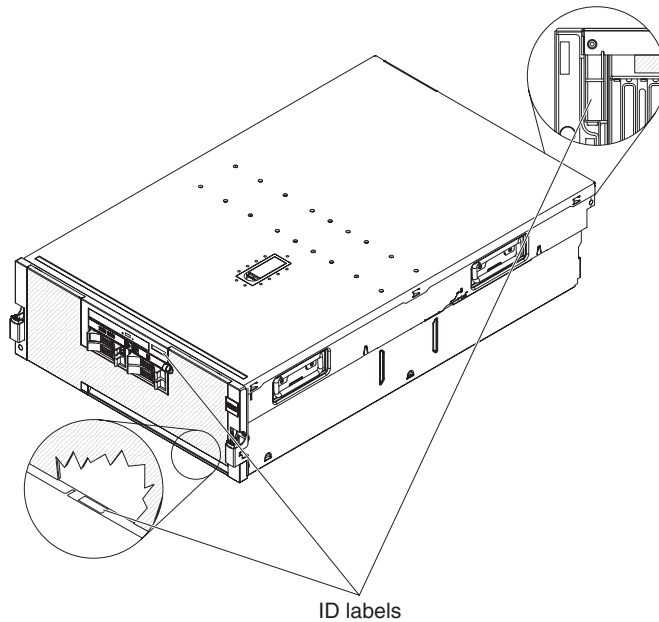
The server comes with an IBM *ServerGuide™ Setup and Installation CD* to help you configure the hardware, install device drivers, and install the operating system.

The server comes with a limited warranty. You can obtain up-to-date information about the server and other IBM server products at <http://www.ibm.com/systems/x/>.

Record information about the server in the following table. You will need this information when you register the server with IBM.

Product name	IBM System x3850 M2 or System x3950 M2 server
Machine type	7141 or 7233
Model number	_____
Serial number	_____

The model number and serial number are on the ID labels, one on the bezel, one on the front of the chassis, and the other at the rear of the server, as shown in the following illustration.



For a list of supported optional devices for the server, see <http://www.ibm.com/servers/eserver/serverproven/compat/us/>.

See the *Rack Installation Instructions* document for complete rack installation and removal instructions.

The IBM Documentation CD

The IBM *Documentation* CD contains documentation for the server in Portable Document Format (PDF) and includes the IBM Documentation Browser to help you find information quickly.

Hardware and software requirements

The IBM *Documentation* CD requires the following minimum hardware and software:

- Microsoft® Windows® XP, Windows 2000, or Red Hat Linux
- 100 MHz microprocessor
- 32 MB of RAM
- Adobe® Acrobat Reader 3.0 (or later) or xpdf, which comes with Linux operating systems

Using the Documentation Browser

Use the Documentation Browser to browse the contents of the CD, read brief descriptions of the documents, and view documents, using Adobe Acrobat Reader or xpdf. The Documentation Browser automatically detects the regional settings in your server and displays the documents in the language for that region (if available). If a document is not available in the language for that region, the English-language version is displayed.

Use one of the following procedures to start the Documentation Browser:

- If Autostart is enabled, insert the CD into the CD or DVD drive. The Documentation Browser starts automatically.

- If Autostart is disabled or is not enabled for all users, use one of the following procedures:
 - If you are using a Windows operating system, insert the CD into the CD or DVD drive and click **Start --> Run**. In the **Open** field, type
`e:\win32.bat`

where *e* is the drive letter of the CD or DVD drive, and click **OK**.
 - If you are using Red Hat Linux, insert the CD into the CD or DVD drive; then, run the following command from the `/mnt/cdrom` directory:
`sh runlinux.sh`

Select the server from the **Product** menu. The **Available Topics** list displays all the documents for the server. Some documents might be in folders. A plus sign (+) indicates each folder or document that has additional documents under it. Click the plus sign to display the additional documents.

When you select a document, a description of the document is displayed under **Topic Description**. To select more than one document, press and hold the Ctrl key while you select the documents. Click **View Book** to view the selected document or documents in Acrobat Reader or xpdf. If you selected more than one document, all the selected documents are opened in Acrobat Reader or xpdf.

To search all the documents, type a word or word string in the **Search** field and click **Search**. The documents in which the word or word string appears are listed in order of the most occurrences. Click a document to view it, and press Ctrl+F to use the Acrobat search function, or press Alt+F to use the xpdf search function within the document.

Click **Help** for detailed information about using the Documentation Browser.

Notices and statements in this document

The caution and danger statements in this document are also in the multilingual *Safety Information* document, which is on the IBM *System x Documentation* CD. Each statement is numbered for reference to the corresponding statement in your language in the *Safety Information* document.

The following notices and statements are used in this document:

- **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 potential damage to programs, devices, or data. An attention notice is placed just before the instruction or situation in which damage might 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 information is a summary of the features and specifications of the server. Depending on the server model, some features might not be available, or some specifications might not apply.

Notes:

1. Racks are marked in vertical increments of 4.45 cm (1.75 inches). Each increment is referred to as a unit, or “U.” A 1-U-high device is 4.45 cm (1.75 inches) tall.
2. Power consumption and heat output vary depending on the number and type of optional features that are installed and the power-management optional features that are in use.
3. 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.

Table 1. Features and specifications

<p>Microprocessor:</p> <ul style="list-style-type: none"> • Intel® Xeon® multi-core microprocessor with 8 MB Level-2 cache • 1066 MHz front-side bus (FSB) • Single node minimum: One microprocessor per core • Multi-node minimum: One microprocessor per core in each node • Support for up to four microprocessors <p>Note: Use the Configuration/Setup Utility program to determine the type and speed of the microprocessors.</p> <p>Memory:</p> <ul style="list-style-type: none"> • Single-node minimum: 2 GB depending on server model, expandable to 256 GB • Multi-node minimum: 4 GB in node 1 and 2 GB in all other nodes expandable to a total of 1 TB • Type: Registered, ECC, PC2-5300 double data rate (DDR) II, SDRAM • Sizes: 1 GB, 2 GB, 4 GB or 8 GB (when available) in pairs • Connectors: Two-way interleaved, eight dual inline memory module (DIMM) connectors per memory card • Maximum: Four memory cards, each card containing four pairs of PC2-5300 DDR II DIMMs <p>Drives:</p> <ul style="list-style-type: none"> • Slim DVD-ROM: IDE and SATA (optional in some models) • Serial Attached SCSI (SAS) hard disk drives <p>Expansion bays:</p> <ul style="list-style-type: none"> • Four SAS, 2.5-inch bays • One 12.7 mm removable-media drive bay (DVD drive installed, standard on some models only) <p>Expansion slots:</p> <p>Seven PCI Express x8 (half-length) slots:</p> <ul style="list-style-type: none"> • Five non-hot-swap • Two hot-swap 	<p>Upgradeable microcode:</p> <p>System BIOS, FPGA, diagnostics, service processor, BMC, and SAS microcode</p> <p>Power supply:</p> <ul style="list-style-type: none"> • Standard: One or two dual-rated power supplies, depending on the model <ul style="list-style-type: none"> – 1440 watts at 220 V ac input – 720 watts at 110 V ac input • Hot-swappable and redundant at 220 V ac, only with two power supplies • If the server is operating at 110 V ac, a second power supply must be installed to maintain a fully functional server. <p>Size:</p> <ul style="list-style-type: none"> • 4U • Height: 128.35 mm (5.05 in.) • Depth: 715 mm (28.15 in.) • Width: 440 mm (17.32 in.) • Weight: approximately 43.1 kg (95 lb) when fully configured or 31.75 kg (70 lb) minimum <p>Integrated functions:</p> <ul style="list-style-type: none"> • Baseboard management controller • IBM EXA-4 chip set with integrated memory and I/O controller • Remote Supervisor Adapter II • Light path diagnostics • Six Universal Serial Bus (USB) ports (2.0) <ul style="list-style-type: none"> – Three on rear of server – Two on front of server – One internal • Broadcom 5709 dual 10/100/1000 Gigabit Ethernet controller • ATI RN50 video <ul style="list-style-type: none"> – 16 MB video memory – SVGA compatible • Serial-attached SCSI (SAS) controller with RAID capabilities • Support for ServeRAID-MR10k SAS controller • Serial connector • SMP Expansion Ports <p>Acoustical noise emissions:</p> <ul style="list-style-type: none"> • Sound power, idle: 6.6 bel declared • Sound power, operating: 6.6 bel declared 	<p>Environment:</p> <ul style="list-style-type: none"> • Air temperature: <ul style="list-style-type: none"> – Server on: <ul style="list-style-type: none"> - 10° to 35°C (50° to 95°F); altitude: 0 to 914 m (3000 ft). If the server has a dual-core microprocessor, at maximum power reduce the 35°C by 1°C per 300 m above sea level, or the microprocessor might throttle to remain within the internal thermal specifications. - 10° to 32°C (50° to 90°F); altitude: 914 m to 2133 m (7000 ft). – Server off: 10° to 43°C (50.0° to 109.4°F); maximum altitude: 2133 m (6998.0 ft) • Humidity: <ul style="list-style-type: none"> – Server on: 8% to 80% – Server off: 8% to 80% • Particulate contamination: <p>Attention: Airborne particulates and reactive gases acting alone or in combination with other environmental factors such as humidity or temperature might pose a risk to the server. For information about the limits for particulates and gases, see “Particulate contamination” on page 81.</p> <p>Heat output:</p> <p>Approximate heat output:</p> <ul style="list-style-type: none"> • Minimum configuration: 1297 Btu (380 watts) per hour • Typical configuration: 2730 Btu (800 watts) per hour • Maximum configuration: <ul style="list-style-type: none"> – 5527 Btu per hour (1620 watts) at 110 V ac – 5425 Btu per hour (1590 watts) at 220 V ac <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 • Approximate input kilovolt-amperes (kVA): <ul style="list-style-type: none"> – Minimum: 0.39 kVA – Typical: 0.8 kVA – Maximum: 1.65 kVA
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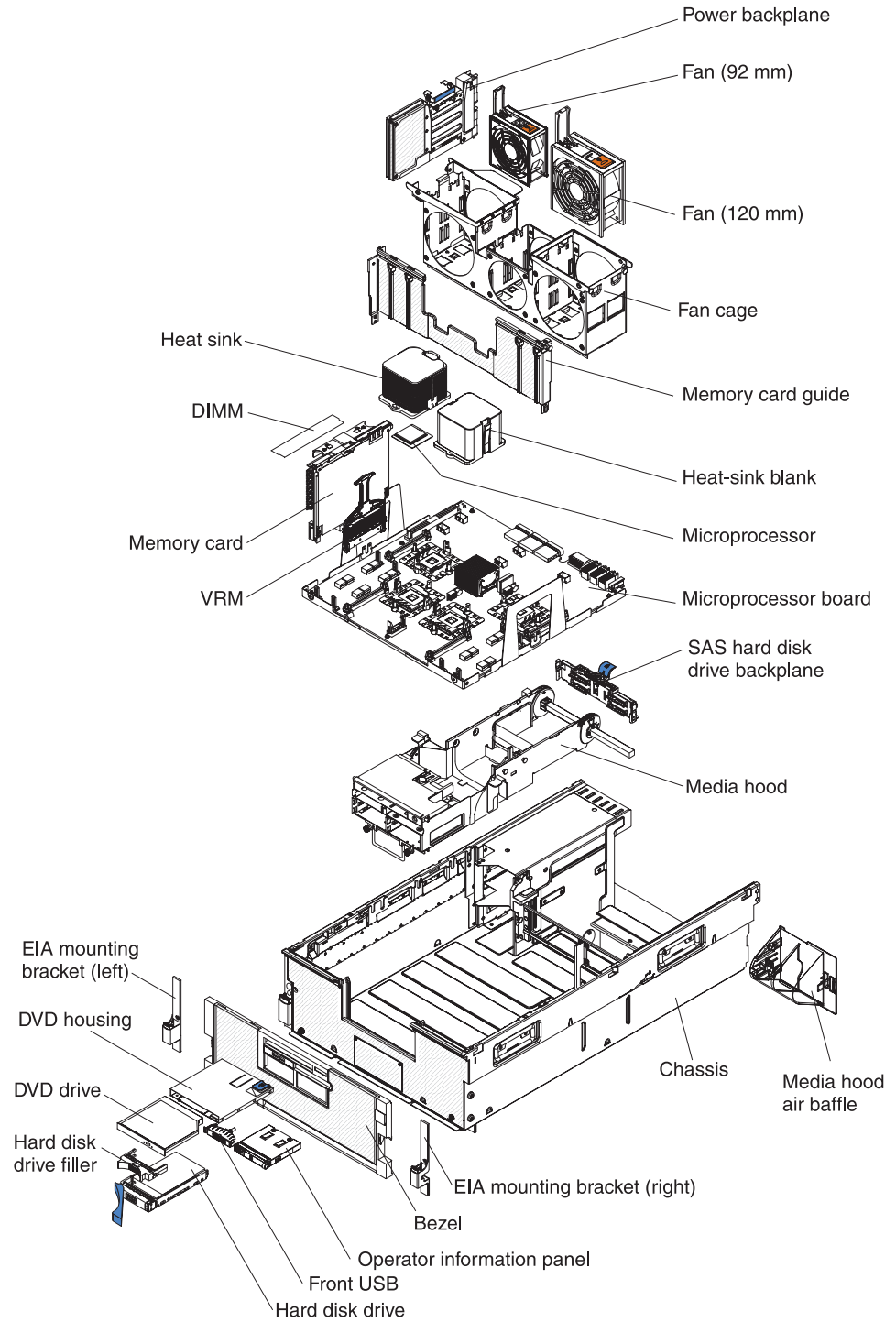
Major components of the server

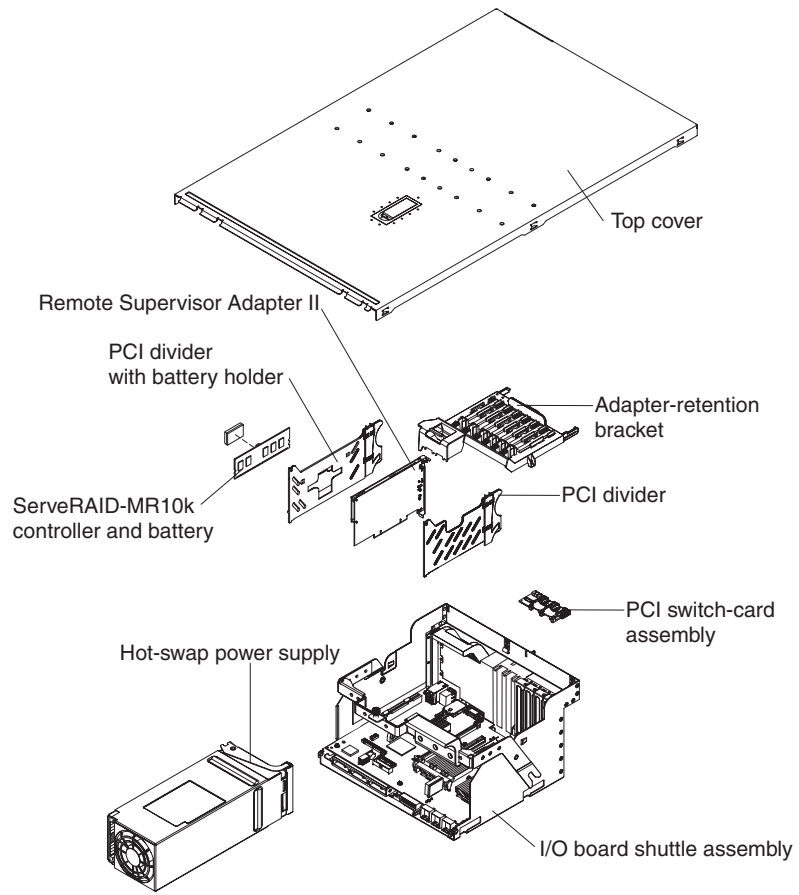
Blue on a component indicates touch points, where you can grip the component to remove it from or install it in the server, open or close a latch, and so on.

Orange on a component or an orange label on or near a component indicates that the component can be hot-swapped, which means that if the server and operating system support hot-swap capability, you can remove or install the component while the server is running. (Orange can also indicate touch points on hot-swap components.) See the instructions for removing or installing a specific hot-swap component for any additional procedures that you might have to perform before you remove or install the component.

The following illustration shows the major components in the server.

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





Chapter 2. Installing optional devices

This chapter provides basic instructions for installing optional hardware devices in the server. These instructions are intended for users who are experienced with setting up IBM server hardware. If you need more detailed instructions, see the *User's Guide* on the IBM *Documentation CD*.

Installation guidelines

Before you begin installing options, read the following information:

- Read the safety information that begins on page v, “Working inside the server with the power on” on page 11, and the guidelines in “Handling static-sensitive devices” on page 11. This information will help you work safely.
- When you install your new server, take the opportunity to download and apply the most recent firmware updates. This step will help to ensure that any known issues are addressed and that your server is ready to function at maximum levels of performance. To download firmware updates for your server, complete the following steps.

Note: Changes are made periodically to the IBM Web site. The actual procedure might vary slightly from what is described in this document.

1. Go to <http://www.ibm.com/systems/support/>.
2. Under **Product support**, click **System x**.
3. Under **Popular links**, click **Software and device drivers**.
4. Click **System x3850 M2** or **System x3950 M2** to display the matrix of downloadable files for the server.

For additional information about tools for updating, managing, and deploying firmware, see the System x and xSeries Tools Center at <http://publib.boulder.ibm.com/infocenter/toolsctr/v1r0/index.jsp>.

- Before you install optional hardware devices, make sure that the server is working correctly. Start the server, and make sure that the operating system starts, if an operating system is installed, or that a 19990305 error code is displayed, indicating that an operating system was not found but the server is otherwise working correctly. If the server is not working correctly, see Chapter 6, “Solving problems,” on page 53 for diagnostic information.
- Observe good housekeeping in the area where you are working. Place removed covers and other parts in a safe place.
- If you must start the server while the cover is removed, make sure that no one is near the server and that no tools or other objects have been left inside the server.
- Do not attempt to lift an object that you think is too heavy for you. If you have to lift a heavy object, observe the following precautions:
 - Make sure that you can stand safely without slipping.
 - Distribute the weight of the object equally between your feet.
 - Use a slow lifting force. Never move suddenly or twist when you lift a heavy object.
 - To avoid straining the muscles in your back, lift by standing or by pushing up with your leg muscles.
- Make sure that you have an adequate number of properly grounded electrical outlets for the server, monitor, and other devices.

- Back up all important data before you make changes to disk drives.
- Have a small flat-blade screwdriver available.
- You do not have to turn off the server to install or replace hot-swap power supplies, hot-swap fans, hot-plug adapters, or hot-plug Universal Serial Bus (USB) devices. However, you must turn off the server before you perform any steps that involve removing or installing adapter cables.
- Blue on a component indicates touch points, where you can grip the component to remove it from or install it in the server, open or close a latch, and so on.
- Orange on a component or an orange label on or near a component indicates that the component can be hot-swapped, which means that if the server and operating system support hot-swap capability, you can remove or install the component while the server is running. (Orange can also indicate touch points on hot-swap components.) See the instructions for removing or installing a specific hot-swap component for any additional procedures that you might have to perform before you remove or install the component.
- When you are finished working on the server, reinstall all safety shields, guards, labels, and ground wires.
- For a list of supported optional devices for the server, see <http://www.ibm.com/servers/eserver/serverproven/compat/us/>.

Limitations in a single-power-supply server operating at 110 V ac installation

If your server has only one power supply operating at 110 V ac, it will not support some optional devices. In a single-power-supply server operating at 110 V ac the following resources are supported:

- Up to two 2.66 GHz microprocessors or up to four slower microprocessors
- Sixteen DIMMs
- Three PCI expansion slots, if you do not install a video adapter or other high powered PCI devices

System reliability guidelines

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

- Each of the drive bays has a drive or a filler panel installed in it.
- There is adequate space around the server to allow the server cooling system to work properly. Leave approximately 50 mm (2 in.) of open space around the front and rear of the server. Do not place objects in front of the fans. For proper cooling and airflow, replace the server cover before you turn on the server. Operating the server for extended periods of time (more than 30 minutes) with the server cover removed might damage server components.
- You have followed the cabling instructions that come with optional adapters.
- You have replaced a failed fan within 48 hours.
- You have replaced a hot-swap drive within 2 minutes of removal.
- For redundant and hot-swappable power supply operation, the power supplies are connected to 200-240 V ac.
- Microprocessor socket 2 always contains either a heat-sink blank or a microprocessor and heat sink.

Working inside the server with the power on

Attention: Static electricity that is released to internal server components when the server is powered-on might cause the server to halt, which might result in the loss of data. To avoid this potential problem, always use an electrostatic-discharge wrist strap or other grounding system when you work inside the server with the power on.

The server supports hot-swap devices and is designed to operate safely while it is turned on and the cover is removed. Follow these guidelines when you work inside a server that is turned on:

- Avoid wearing 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, necklaces, rings, and loose-fitting wrist watches.
- Remove items from your shirt pocket, such as pens and pencils, that might fall into the server as you lean over it.
- Avoid dropping any metallic objects, such as paper clips, hairpins, and screws, into the server.

Handling static-sensitive devices

Attention: Static electricity can damage the server and other electronic devices. To avoid damage, keep static-sensitive devices in their static-protective packages until you are ready to install them.

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

- Limit your movement. Movement can cause static electricity to build up around you.
- The use of a grounding system is recommended. For example, wear an electrostatic-discharge wrist strap, if one is available. Always use an electrostatic-discharge wrist strap or other grounding system when you work inside the server with the power on.
- Handle the device carefully, holding it by its edges or its frame.
- Do not touch solder joints, pins, or exposed circuitry.
- Do not leave the device where others can handle and damage it.
- While the device is still in its static-protective package, touch it to an unpainted metal part on the outside of the server 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 server without setting down the device. If it is necessary to set down the device, put it back into its static-protective package. Do not place the device on the server cover or on a metal surface.
- Take additional care when you handle devices during cold weather. Heating reduces indoor humidity and increases static electricity.

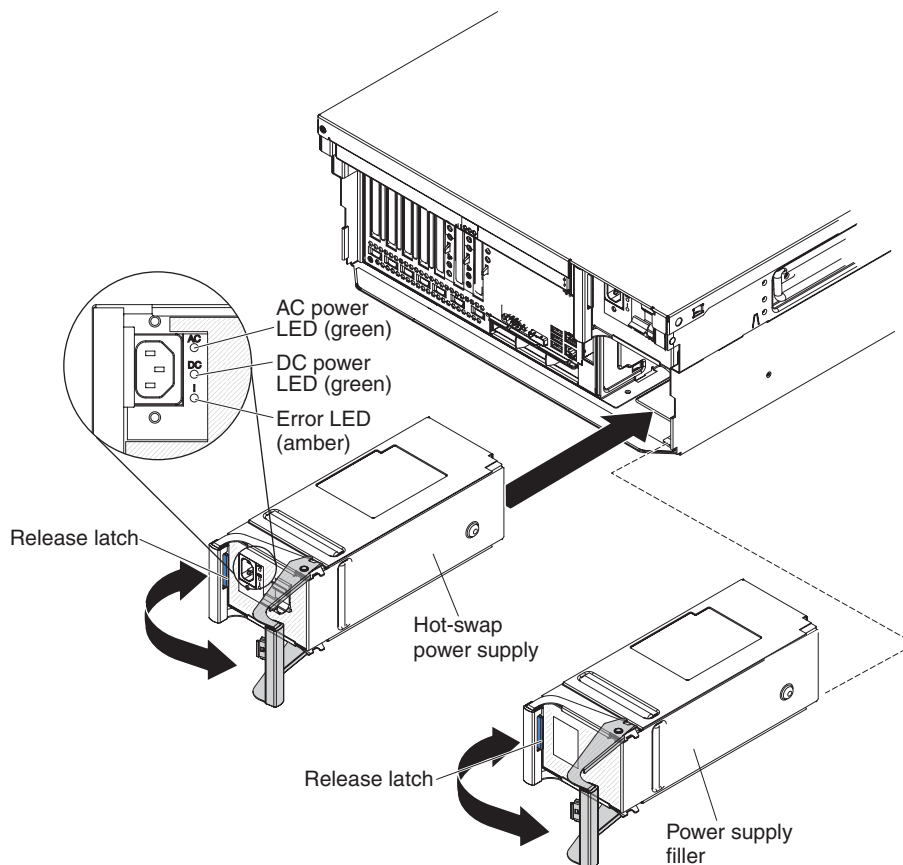
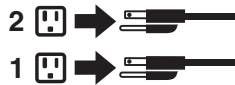
Installing a hot-swap power supply

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.



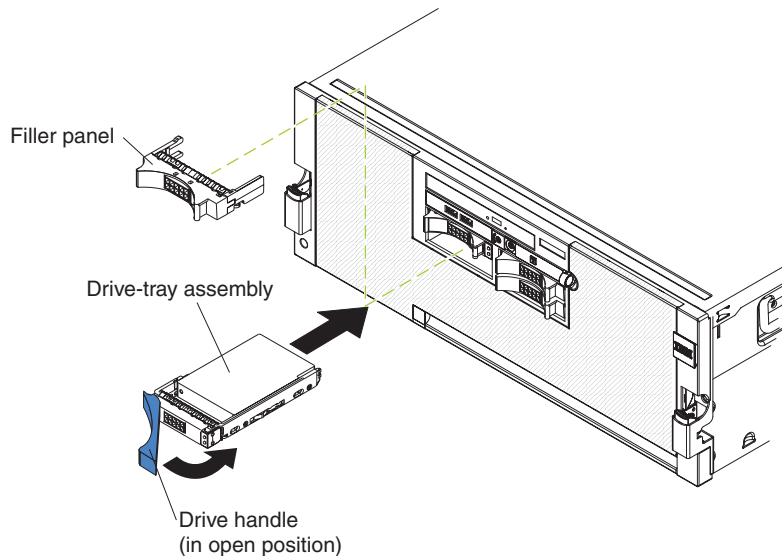
To install an additional hot-swap power supply, complete the following steps:

1. Read the safety information that begins on page v and “Handling static-sensitive devices” on page 11.
2. Press the blue release latch on the filler-panel handle and pull the handle to the open position, then remove the filler panel from power-supply bay 2.

3. Press the orange release latch on the power-supply handle and pull the handle to the open position.
4. Slide the power supply into the bay and fully close the locking handle.
5. Connect one end of the power cord for the new power supply into the ac connector on the back of the power supply, and connect the other end of the power cord into a properly grounded electrical outlet.
6. Make sure that the ac power LED on the power supply is lit, indicating that the power supply is operating correctly. If the server is turned on, make sure that the dc power LED on the top of the power supply is lit also.

Installing a hot-swap hard disk drive

The following illustration shows how to install a hot-swap hard disk drive.



Attention: Static electricity that is released to internal server components when the server is powered-on might cause the server to halt, which might result in the loss of data. To avoid this potential problem, always use an electrostatic-discharge wrist strap or other grounding system when you work inside the server with the power on.

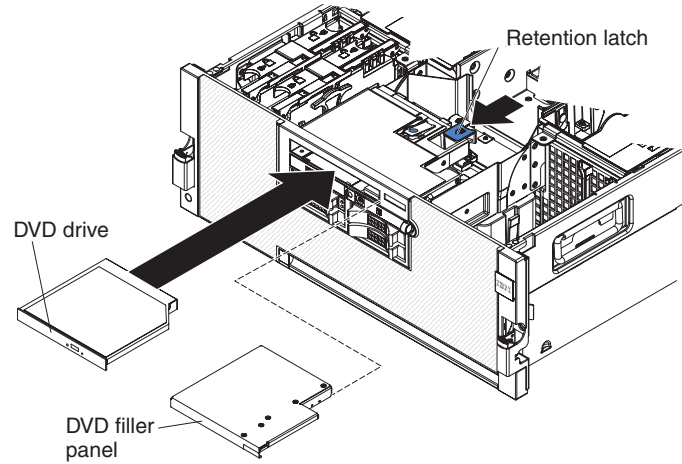
To install a hot-swap hard disk drive, complete the following steps:

1. Read the safety information that begins on page v and “Installation guidelines” on page 9.
2. Remove the filler panel from one of the empty hot-swap bays.
3. Make sure that the tray handle is open; then, install the hard disk drive into the hot-swap bay.

Note: When you turn on the server, check the hard disk drive status LEDs to make sure that the hard disk drive is operating correctly. If the amber hard disk drive status LED for a drive is lit continuously, that drive is faulty and must be replaced. If the green hard disk drive activity LED is flashing, the drive is being accessed.

If you have other devices to install or remove, do so now. Otherwise, go to “Completing the installation” on page 28.

Installing a DVD drive



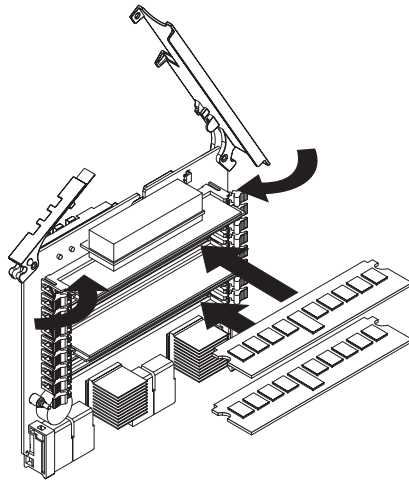
To install a DVD drive, complete the following steps:

1. Remove the DVD drive filler from the drive bay.
2. Slide the DVD drive into the server until it engages the interposer card or the SATA cable.

If you have other devices to install or remove, do so now. Otherwise, go to “Completing the installation” on page 28.

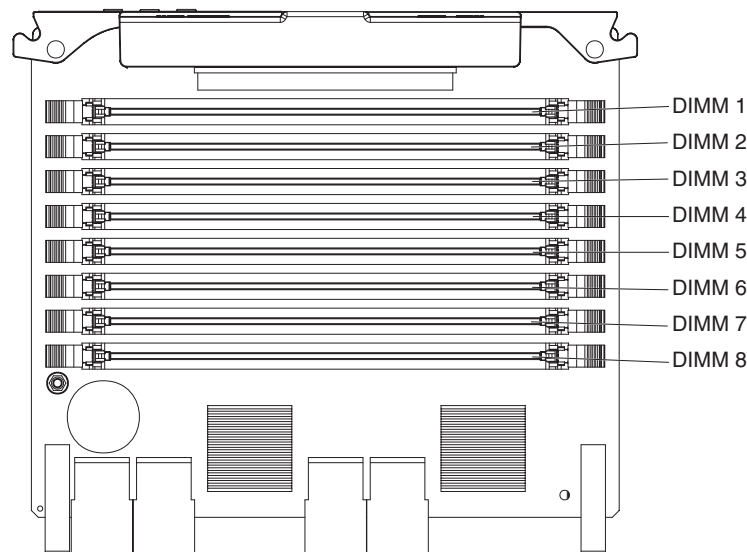
Installing additional DIMMs

The following illustration shows how to install a dual inline memory module (DIMM) on a memory card.



The following notes describe information that you must consider when you install DIMMs:

- Make sure you read any specific instructions that ship with the DIMMs before installing them in the server.
- You can configure the server to use memory mirroring and memory scrubbing. For detailed information about configuring the server and using these features, see the *User's Guide* on the IBM *Documentation CD*.
- To use the hot-add and hot-swap memory features, you must reconfigure the server by using the Configuration/Setup Utility program. See the *User's Guide* on the IBM *Documentation CD* for additional information.
- At least one memory card with one pair of DIMMs must be installed for the server to operate correctly. Each server comes with a minimum of one memory card installed.
- When you install additional DIMMs on a memory card, be sure to install them in pairs. The DIMMs in each pair must be the same size and type.
- The following illustration shows the DIMM connectors on the memory card.



- Install the DIMMs on each memory card in the order shown in the following tables, depending on which memory configuration you want to use. You must install at least one pair of DIMMs on each memory card.

Table 2. Low-cost memory-card installation sequence

DIMM pair installation order	Memory card	Connector numbers
First	1	1 and 5
Second	2	1 and 5
Third	1	2 and 6
Fourth	2	2 and 6
Fifth	1	3 and 7
Sixth	2	3 and 7
Seventh	1	4 and 8
Eighth	2	4 and 8
Ninth	3	1 and 5
Tenth	4	1 and 5
Eleventh	3	2 and 6
Twelfth	4	2 and 6
Thirteenth	3	3 and 7
Fourteenth	4	3 and 7
Fifteenth	3	4 and 8
Sixteenth	4	4 and 8

Table 3. High-performance memory-card installation sequence

DIMM pair installation order	Memory card	Connector numbers
First	1	1 and 5
Second	2	1 and 5
Third	3	1 and 5
Fourth	4	1 and 5
Fifth	1	2 and 6
Sixth	2	2 and 6
Seventh	3	2 and 6
Eighth	4	2 and 6
Ninth	1	3 and 7
Tenth	2	3 and 7
Eleventh	3	3 and 7
Twelfth	4	3 and 7
Thirteenth	1	4 and 8
Fourteenth	2	4 and 8
Fifteenth	3	4 and 8
Sixteenth	4	4 and 8

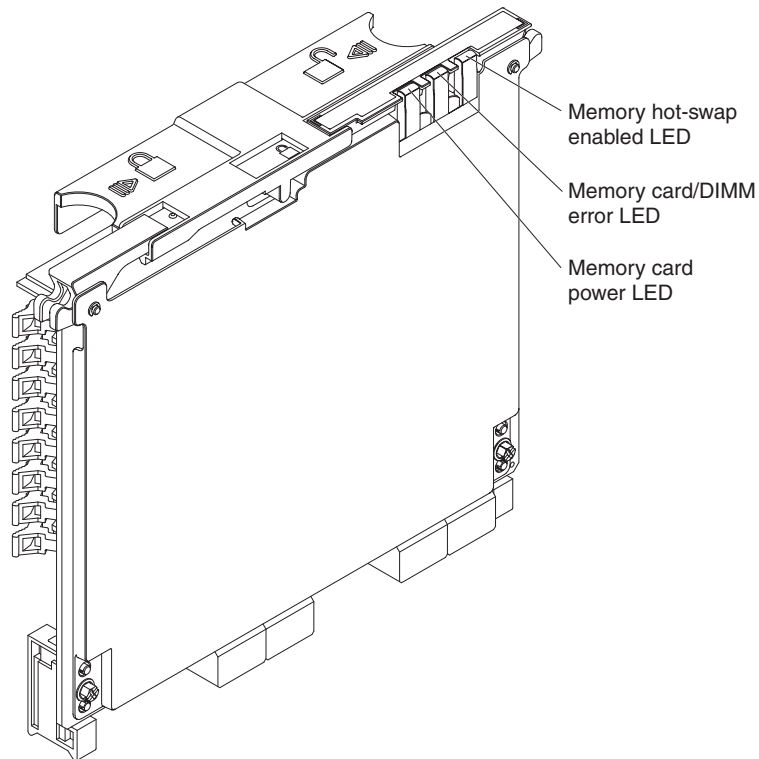
Table 4. Memory-card installation sequence for memory-mirroring configuration

DIMM pair installation order	Memory card	Connector numbers
First	1	1 and 5
	2	1 and 5
Second	3	1 and 5
	4	1 and 5
Third	1	2 and 6
	2	2 and 6
Fourth	3	2 and 6
	4	2 and 6
Fifth	1	3 and 7
	2	3 and 7
Sixth	3	3 and 7
	4	3 and 7
Seventh	1	4 and 8
	2	4 and 8
Eighth	3	4 and 8
	4	4 and 8

- If memory mirroring is enabled, you can hot-replace one memory card at a time on each memory power bus.

If a problem with a DIMM is detected, light path diagnostics will light the system-error LED on the front of the server, indicating that there is a problem and guiding you to the defective DIMM. When this occurs, first identify the defective DIMM; then, remove and replace the DIMM.

The following illustration shows the LEDs that are visible from the top of the memory card.



Memory hot-swap enabled LED: When this LED is lit, it indicates that hot-swap memory is enabled.

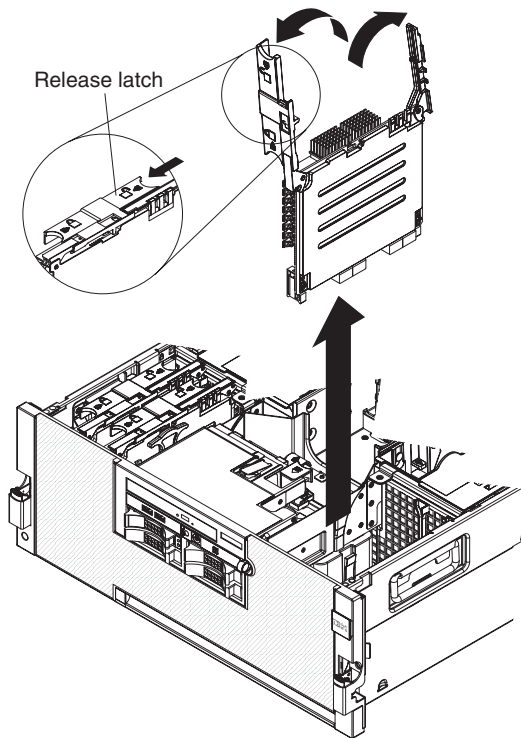
Memory card/DIMM error LED: When this LED is lit, it indicates that a memory card or DIMM has failed.

Memory card power LED: When this LED is off, it indicates that power is removed from the card and that you can remove the memory card and replace a failed DIMM. This LED will also turn off when the release levers are opened.

Installing a DIMM

To install additional DIMMs, complete the following steps:

1. Read the safety information that begins on page v and “Installation guidelines” on page 9.
2. If you are not hot-swapping a DIMM, turn off the server and peripheral devices, and disconnect the power cords and all external cables as necessary to replace the device.
3. Remove the server cover.
4. If you are hot-swapping a DIMM, make sure that the memory hot-swap enabled LED is lit.

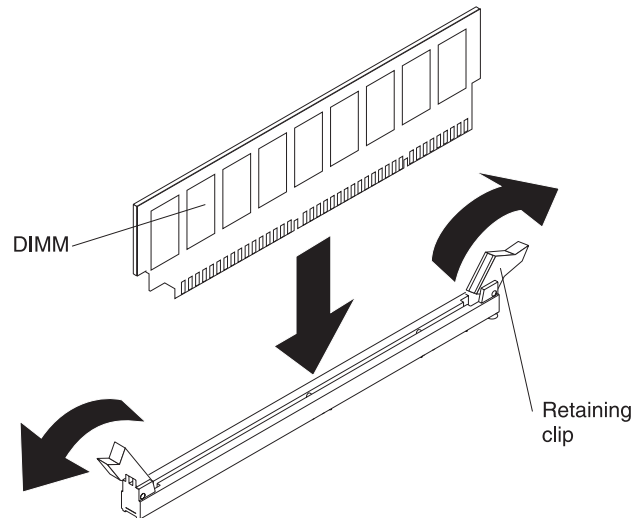


Attention: When you move the memory card, do not allow it to touch any components or structures inside the server.

5. Remove the memory card:
 - a. Slide the orange release latch to the unlocked position.

Attention: To avoid loss of data, make sure that the memory port power LED is off before you remove the memory card.
 - b. Open the retention levers on the top of the memory card.
 - c. While you hold the retention levers open, lift the memory card out of the server.
6. Place the memory card on a flat, static-protective surface, with the DIMM connectors facing up.

Attention: To avoid breaking the DIMM retaining clips or damaging the DIMM connectors, open and close the clips gently.
7. Open the retaining clip on each end of the DIMM connector.
8. Touch the static-protective package that contains the DIMM to any unpainted metal surface on the server. Then, remove the DIMM from the package.
9. Turn the DIMM so that the DIMM keys align correctly with the slot.



10. 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.

Important: 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.

If you have other devices to install or remove, do so now. Otherwise, go to “Completing the installation” on page 28.

Installing a memory card

At least one memory card with one pair of DIMMs must be installed in the server to operate correctly. Each server is shipped with a minimum of one memory card and a pair of DIMMs installed.

To install a memory card, complete the following steps:

1. Read the safety information that begins on page v and “Installation guidelines” on page 9.
2. If you are not hot-adding the memory card, turn off the server and peripheral devices, and disconnect the power cords and all external cables as necessary to replace the device.
3. Remove the server cover.

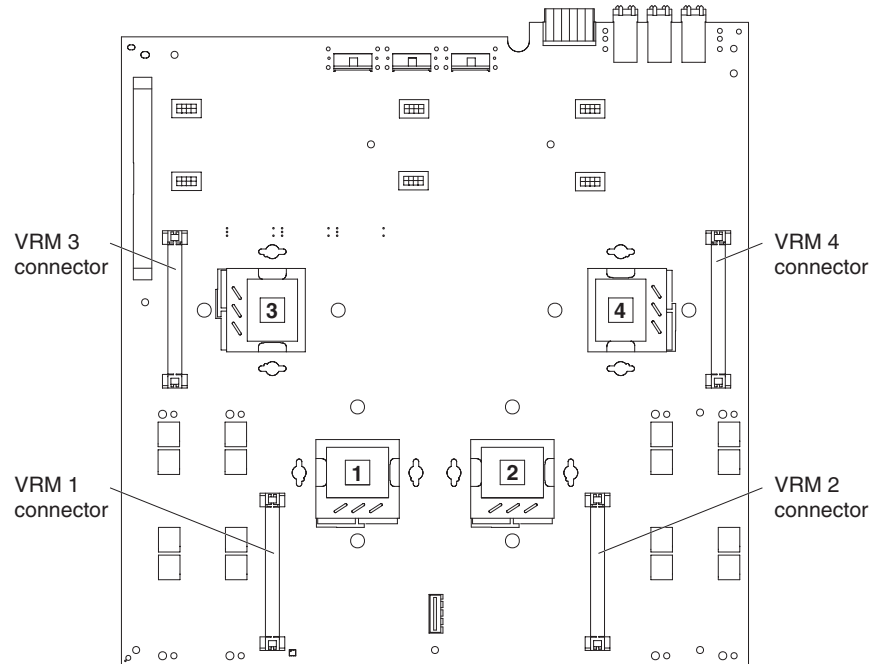
Attention: When you move the memory card, do not allow it to touch any components or structures inside the server.
4. Make sure that the retention levers on the edge of the memory card are fully open, and insert the memory card into the memory-card connector on the microprocessor board.
5. Press the memory card into the connector and close the small retention lever.
6. Wait 2 seconds and close the large retention lever.
7. Slide the orange release latch to the locked position.

If you have other devices to install or remove, do so now. Otherwise, go to “Completing the installation” on page 28.

Installing an additional microprocessor

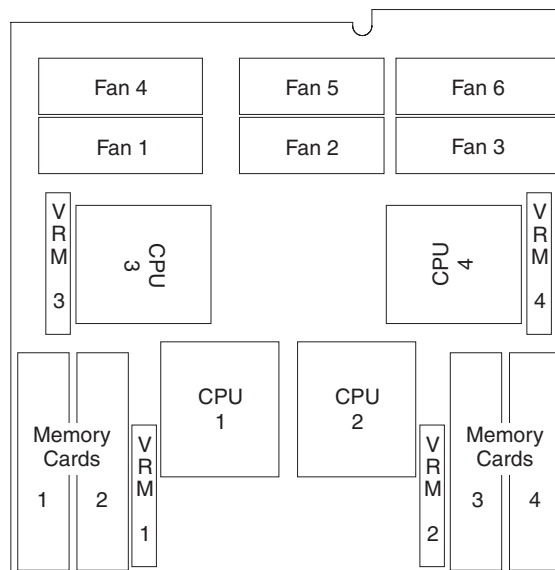
The following notes describe information that you must consider when you install a microprocessor:

- The voltage regulators that come with the optional microprocessor must be installed on the microprocessor board.
- Install the microprocessors in the order shown in the following illustration.



Notes:

1. Microprocessor sockets 3 and 4 are mounted on the microprocessor board with the microprocessor-release levers on opposite sides. These sockets are oriented 180° from each other on the microprocessor board. Be sure to verify the orientation of the socket before you install the microprocessor in either of these sockets. The following illustration shows the orientation of the microprocessor sockets.



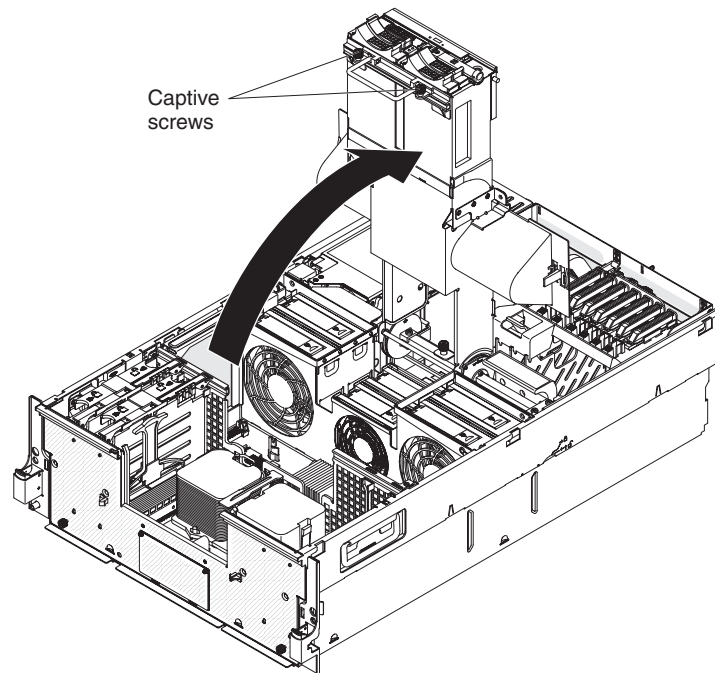
2. Microprocessor socket 2 must always contain either a heat-sink blank or a microprocessor and heat sink.
3. The microprocessor air-baffle must always be installed between microprocessor socket 1 and socket 2.

To install an additional microprocessor, complete the following steps:

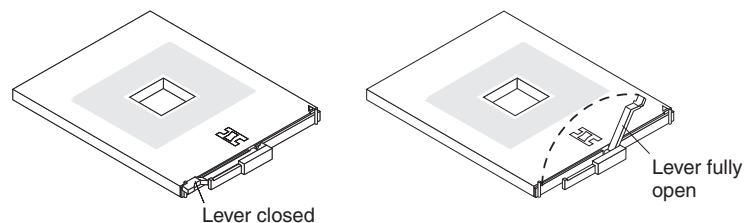
1. Read the safety information that begins on page v and “Installation guidelines” on page 9.
2. Turn off the server and peripheral devices, and disconnect the power cords and all external cables as necessary to replace the device.
3. Remove the server cover and bezel.

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 11.

4. Loosen the captive screws and rotate the media hood to the fully open position.



5. If necessary, remove the microprocessor air baffle from between socket 1 and socket 2.
6. If you are installing a microprocessor in microprocessor socket 2, remove the heat-sink blank and store it for future use.
7. Remove the protective cover, tape, or label from the surface of the microprocessor socket, if any is present.

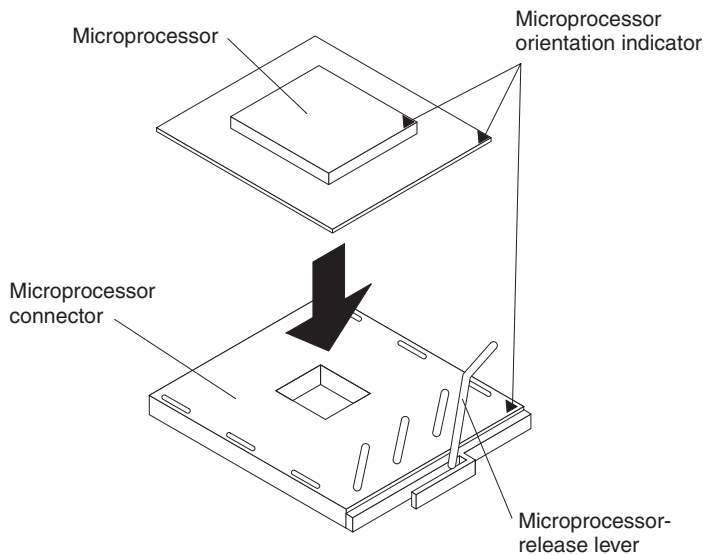


8. Lift the microprocessor-release lever to the fully-open position (approximately 135° angle).

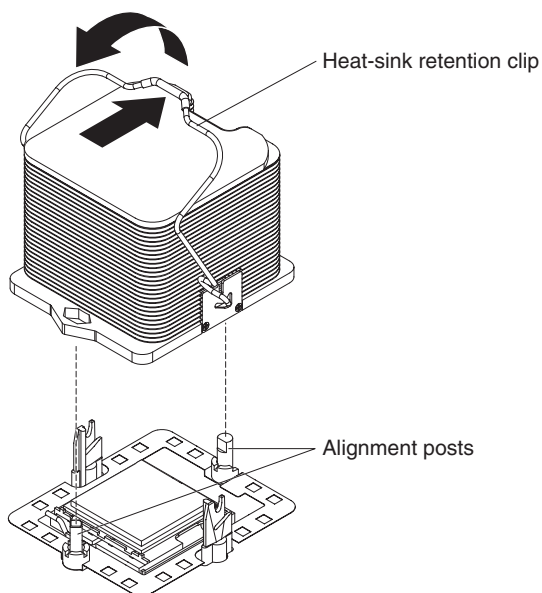
9. Touch the static-protective package that contains the new microprocessor to any unpainted metal surface on the server; then, remove the microprocessor from the package.

Attention: To avoid bending the pins on the microprocessor, do not use excessive force when you press it into the socket.

10. Position the microprocessor over the microprocessor socket as shown in the following illustration. Carefully press the microprocessor into the socket.



11. Close the microprocessor-release lever to secure the microprocessor.



12. Remove the heat sink from its package and open the heat-sink retention clip:
 - a. Release the heat-sink retention clip from the locked position.
 - b. Rotate the heat-sink clip to its fully open position.
13. Remove the cover from the bottom of the heat sink.
14. Position the heat sink above the microprocessor and align the heat sink with the alignment posts; then, press on the top of the heat sink, rotate the heat-sink release lever, and move the lever to the locked position.
15. Install a VRM in the connector next to the microprocessor socket.

Note: Make sure that the “Front” label on the VRM is facing the front of the server.

16. Replace the microprocessor air baffle between socket 1 and socket 2, if you removed it.
17. Rotate the media hood to the closed position and tighten the captive screws.

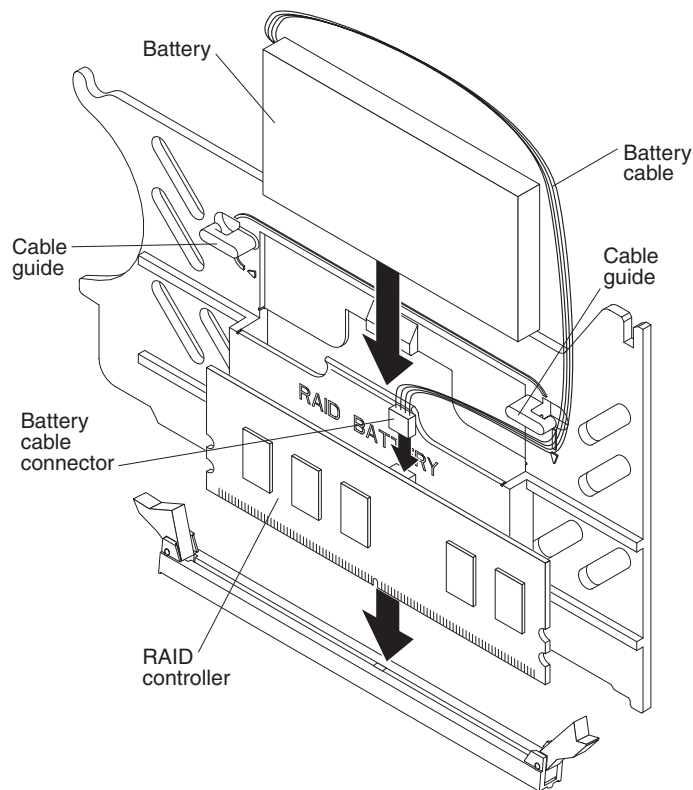
If you have other devices to install or remove, do so now. Otherwise, go to “Completing the installation” on page 28.

Installing a ServeRAID-MR10k SAS controller

The following notes describe information that you must consider when you install a ServeRAID™-MR10k SAS controller:

- A ServeRAID-MR10k SAS controller can be installed only in the dedicated slot on the I/O board.
- The ServeRAID-MR10k SAS controller is not cabled to the server, and no rerouting of the SAS cables is required.

The following illustration shows how to install a ServeRAID-MR10k SAS controller.



1. Read the safety information that begins on page v and “Installation guidelines” on page 9.
2. Turn off the server and peripheral devices, and disconnect the power cords and all external cables as necessary to replace the device.
3. Remove 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 11.

4. Rotate the adapter-retention bracket to the open position.
5. Remove the divider that contains the battery holder from the server.
6. Open the retaining clip on each end of the connector.
7. Touch the static-protective package that contains the ServeRAID-MR10k SAS controller to any unpainted metal surface on the outside of the server; then, remove the controller from the package.
8. Turn the controller so that the keys align correctly with the slot.
9. Insert the controller into the connector by aligning the edges of the controller with the slots at the ends of the connector.
Attention: Incomplete insertion might cause damage to the server or the ServeRAID-MR10k SAS controller.
10. Firmly press the controller straight down into the connector by applying pressure on both ends simultaneously. The retaining clips snap into the locked position when the controller is seated in the connector.
11. Install the battery in the divider that contains the battery holder.
12. Connect the battery cable to the ServeRAID-MR10k SAS controller.
13. Install the divider that contains the battery holder in the server.
14. Route the battery cable through the cable routing guides on the divider to the controller.
15. Rotate the adapter-retention bracket to the closed position.

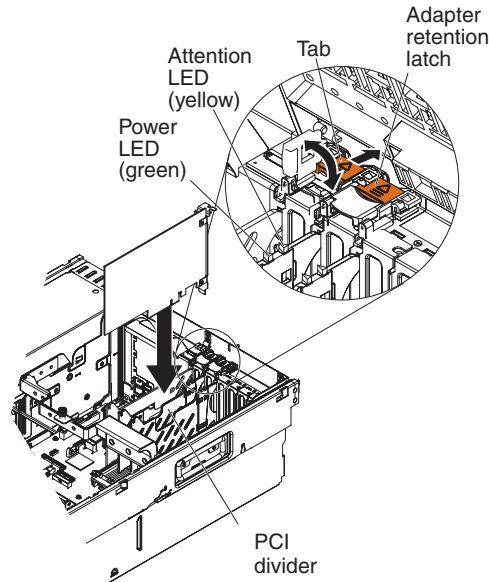
If you have other devices to install or remove, do so now. Otherwise, go to “Completing the installation” on page 28.

Installing an adapter

Note: For hot-pluggable adapters, make sure that the PCI Express hot-plug device driver is installed. For details, see the documentation that comes with the adapter. For more detailed instructions and information about installing PCI Express adapters, see the section about installing optional devices in the *User's Guide* on the IBM *Documentation CD*.

To install a non-hot-plug or hot-plug PCI Express adapter, complete the following steps:

1. Read the safety information that begins on page v and “Installation guidelines” on page 9.
2. If the adapter is not hot-pluggable, turn off the server and peripheral devices, and disconnect the power cords and all external cables as necessary to remove or install the adapter.
3. Remove the server cover and determine which PCI Express expansion slot you will use for the adapter.



Note: The adapter-retention bracket is not shown in the illustration.

4. See the documentation that comes with the adapter for instructions for setting jumpers or switches and for cabling.

Note: Route adapter cables before you install the adapter.

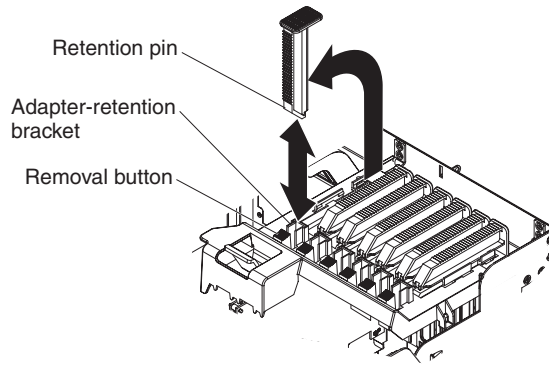
5. Rotate the adapter-retention bracket to the open position.
6. If you are installing the adapter in slot 6 or slot 7, push the orange adapter retention latch toward the rear of the server and open the tab. The power LED for the slot turns off.
7. Remove the expansion-slot cover.

Attention: When you install an adapter, avoid touching the components and gold-edge connectors on the adapter. Make sure that the adapter is correctly seated in the connector. Incorrectly seated adapters might cause damage to the I/O board or to the adapter.

8. Touch the static-protective package that contains the adapter to any unpainted surface on the outside of the server; then, grasp the adapter by the top edge or upper corners of the adapter and remove it from the package.
9. Carefully grasp the adapter by its top edge or upper corners, and align it with the connector on the I/O board.
10. Press the adapter *firmly* into the adapter connector.
11. Optionally, if you are installing the adapter in slot 1 through slot 5, install an expansion-slot screw to secure the adapter.

Note: The expansion-slot screws are on the adapter-retention bracket.

12. If you are installing the adapter in slot 6 or slot 7, close the tab; then, push down on the orange adapter retention latch until it clicks into place, securing the adapter.
13. Rotate the adapter-retention bracket to the closed position.
14. If you are installing a low-profile adapter, install a ratchet pin in the adapter-retention bracket to secure the adapter. Press the ratchet pin so that it touches the top edge of the adapter.



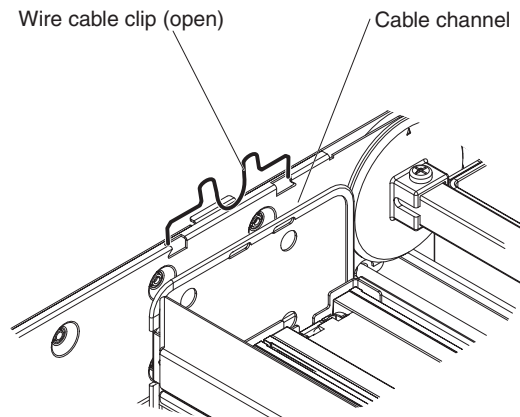
Note: Press the removal button and pull up on the ratchet pin to remove the ratchet pin from the adapter-retention bracket.

15. Connect any required cables to the adapter.

If you have other devices to install or remove, do so now. Otherwise, go to “Completing the installation.”

Completing the installation

To complete the installation, complete the following steps.



1. Make sure that all internal cables are correctly routed. In the order listed, route the following cables through the cable channel; then, connect the cables to the I/O board.
 - a. SAS power cable
 - b. SAS 4x signal cable
 - c. Operator information panel cable
 - d. Dual USB ports cable
 - e. DVD cable

2. Install the top cover.

3. Install the server in a rack. See the *Rack Installation Instructions* that come with the server for complete rack installation and removal instructions.

Attention: Do not use the media hood handle to lift the server. Damage to the server might result. Only use the lift handles on each side of the chassis to lift the server.

4. Connect the cables and power cords. See “Connecting the cables” on page 29 for more information.

- Update the server configuration. See “Updating the server configuration” for more information.

Connecting the cables

See the documentation that comes with optional devices for additional cabling instructions. It might be easier for you to route cables before you install certain optional devices.

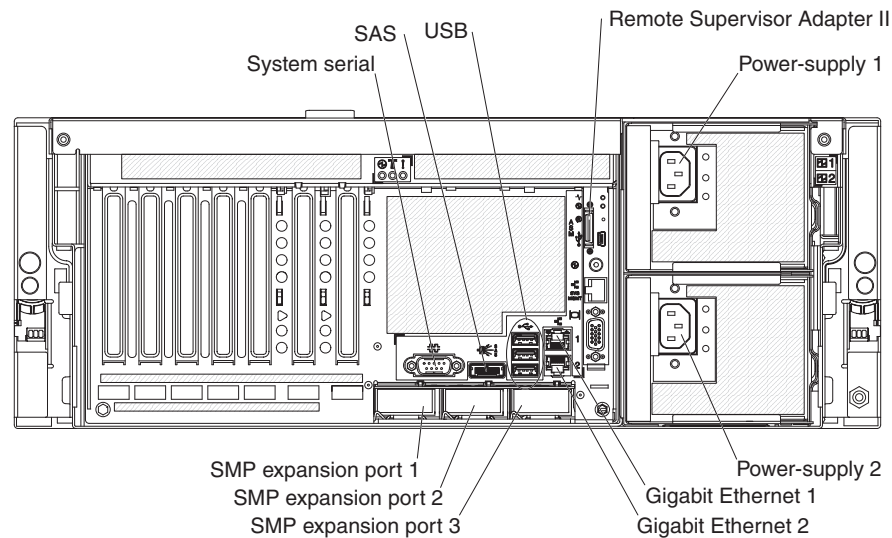
Cable identifiers are printed on the cables that come with the server and optional devices. Use these identifiers to connect the cables to the correct connectors.

For details about the locations and functions of the input and output connectors, see Chapter 3, “Server controls, connectors, LEDs, and power,” on page 37.

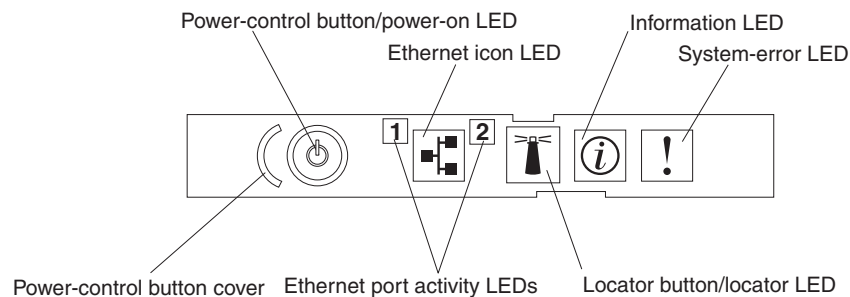
When available, you can install one or more optional SMP Expansion kits to interconnect the SMP Expansion ports of two or more servers.

The following illustrations show the locations of the input and output connectors on the server. Detailed cabling instructions are in the *Rack Installation Instructions* that come with the server.

Rear view



Front view



Updating the server configuration

When you start the server for the first time after you add or remove an internal optional device or external SAS or SCSI device, you might receive a message that

the configuration has changed. The Configuration/Setup Utility program starts automatically so that you can save the new configuration settings. For more information, see the section about configuring the server in the *User's Guide* on the *IBM System x Documentation CD*.

Some optional devices have device drivers that you must install. See the documentation that comes with each option for information about installing device drivers.

The server can operate as a symmetric multiprocessing (SMP) server. You might have to upgrade the operating system to support SMP. For more information, see the section about using the *ServerGuide Setup and Installation CD* in the *User's Guide* on the *IBM System x Documentation CD* and the operating-system documentation.

If the server has a RAID configuration that uses an optional RAID controller and you have installed or removed a hard disk drive, see the documentation that comes with the RAID controller for information about reconfiguring the disk arrays.

If the server has a RAID configuration that uses the integrated SAS controller with RAID capabilities and you have installed or removed a hard disk drive, you might have to reconfigure the disk arrays.

For information about configuring the integrated Gigabit Ethernet controller, see the *User's Guide* on the *IBM System x Documentation CD*.

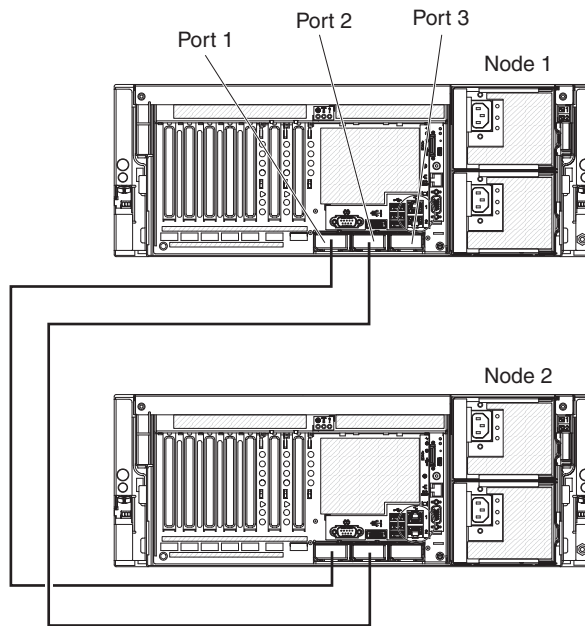
SMP Expansion cabling

(Requires scalability enablement) The cabling information in this section is for multi-node configurations that consist of two, three, or four servers, for up to a 16-socket operation. A node is a server that is interconnected with other servers or nodes through the SMP Expansion Ports to share system resources.

Two-node configuration

A two-node configuration requires two 3.0 m (9.8-foot) ScaleXpander cables. To cable a two-node configuration for up to eight-socket operation, complete the following steps:

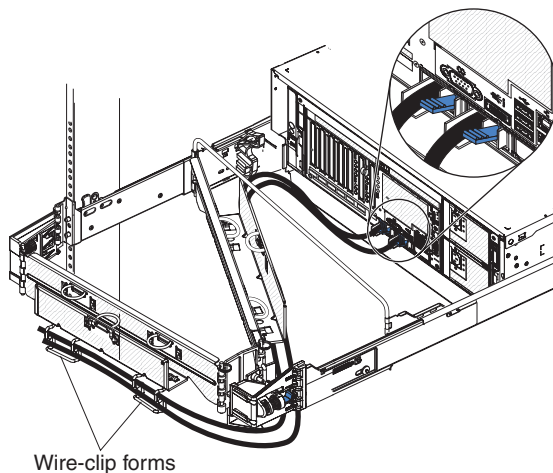
1. Label each end of each ScaleXpander cable according to where it will be connected to each server.



2. Connect the ScaleXpander cables:

Note: Do not squeeze the blue cable tabs when connecting the cables. Use the blue tabs only when disconnecting the cables from the servers.

- a. Connect one end of a ScaleXpander cable to port 1 on node 1; then, connect the other end to port 1 on node 2.
- b. Connect one end of the second ScaleXpander cable to port 2 on node 1; then, connect the other end to port 2 on node 2.

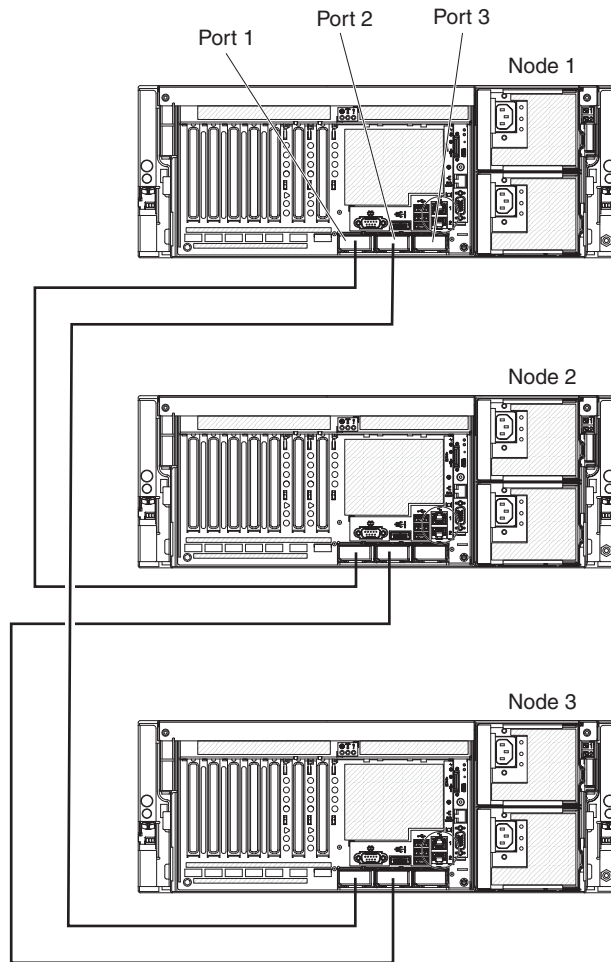


3. Route the ScaleXpander cables through the cable-management arm. Be sure to route each cable through the wire-form clip that is associated with the server to which it is connected.

Three-node configuration

A three-node configuration requires three 3.0 m (9.8-foot) ScaleXpander cables. To cable a three-node configuration for up to a 12-socket operation, complete the following steps:

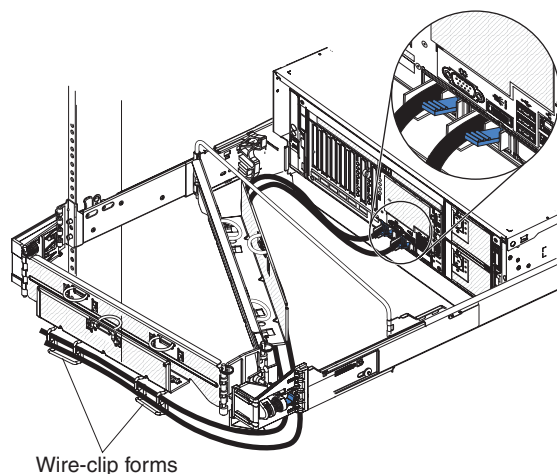
1. Label each end of each ScaleXpander cable according to where it will be connected to each server.



2. Connect the ScaleXpander cables:

Note: Do not squeeze the blue cable tabs when connecting the cables. Use the blue tabs only when disconnecting the cables from the servers.

- a. Connect one end of a ScaleXpander cable to port 1 on node 1; then, connect the other end to port 1 on node 2.
- b. Connect one end of the second ScaleXpander cable to port 2 on node 1; then, connect the other end to port 1 on node 3.
- c. Connect one end of the third ScaleXpander cable to port 2 on node 2; then connect the other end to port 2 on node 3.



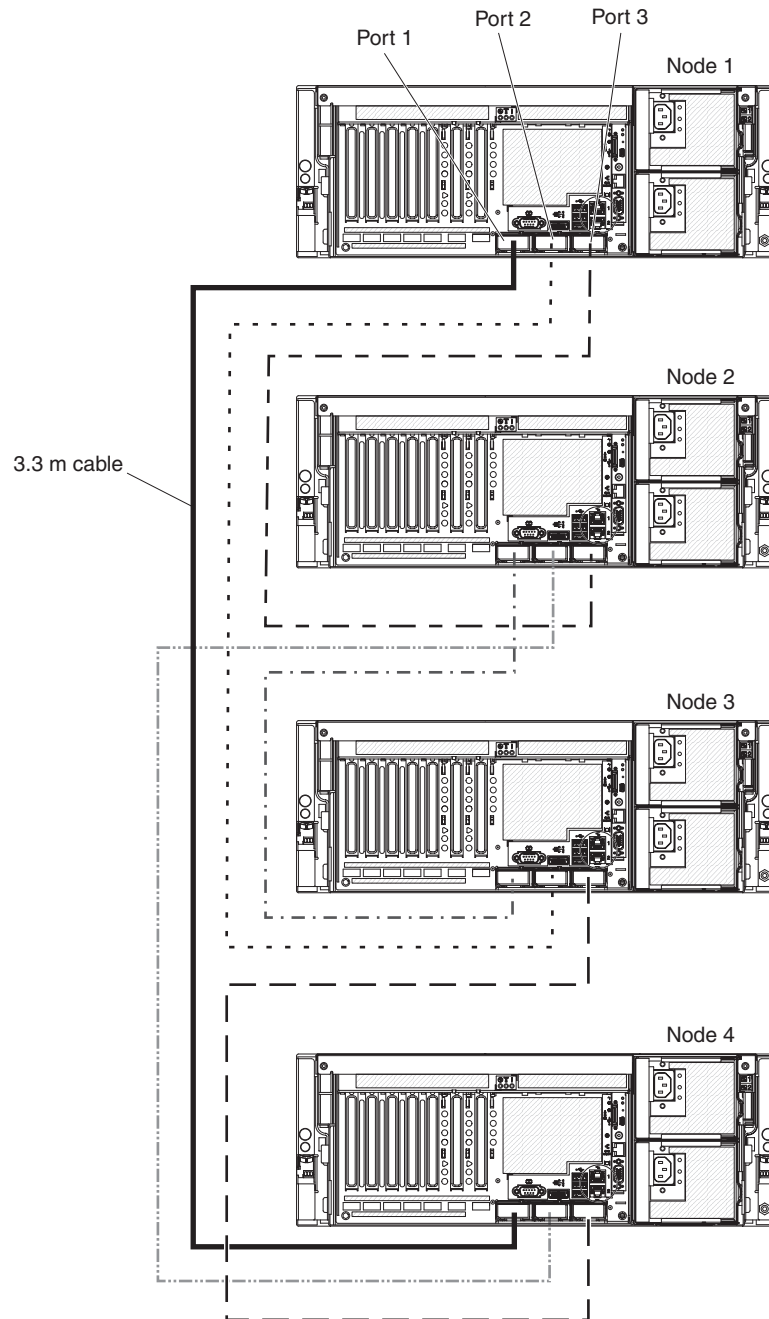
3. Route the ScaleXpander cables through the cable-management arm. Be sure to route each cable through the wire-form clip that is associated with the server to which it is connected.

Four-node configuration

A four-node configuration requires five 3.0 m (9.8-foot) ScaleXpander cables, one 3.3 m (10.8-foot) ScaleXpander cable, four scalability cable-management arms, four scalability keys, and four System x3950 M2 bezels. The Scalability Cable Option kit contains one of the 3.0 m (9.8-foot) ScaleXpander cables and the 3.3 m (10.8-foot) ScaleXpander cable. If you have System x3950 M2 servers, the Scalability Cable Option kit contains all the parts that you need to configure a 4-node system. If you have System x3850 M2 servers, you must purchase four ScaleXpander Option Kits (to obtain the additional four 3.0 m cables, scalability cable-management arms, scalability keys, and the System x3950 bezels) in addition to the Scalability Cable Option kit.

To cable a four-node configuration for up to a 16-socket operation, complete the following steps:

1. Label each end of each ScaleXpander cable according to where it will be connected to each server.

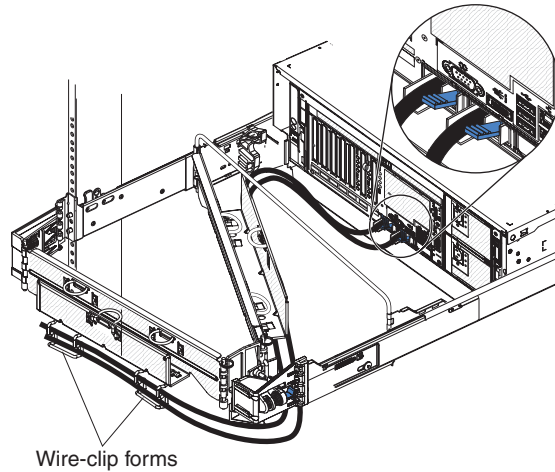


2. Connect the ScaleXpander cables:

Note: Do not squeeze the blue cable tabs when connecting the cables. Use the blue tabs only when disconnecting the cables from the servers.

- a. Connect one end of the 3.3 m (10.8-foot) ScaleXpander cable to port 1 on node 1; then, connect the other end to port 1 on node 4.
- b. Connect one end of a 3.0 m (9.8-foot) ScaleXpander cable to port 2 on node 1; then, connect the other end to port 2 on node 3.
- c. Connect one end of a 3.0 m (9.8-foot) ScaleXpander cable to port 3 on node 1; then, connect the other end to port 3 on node 2.
- d. Connect one end of a 3.0 m (9.8-foot) ScaleXpander cable to port 1 on node 2; then, connect the other end to port 1 on node 3.

- e. Connect one end of a 3.0 m (9.8-foot) ScaleXpander cable to port 2 on node 2; then, connect the other end to port 2 on node 4.
- f. Connect one end of a 3.0 m (9.8-foot) ScaleXpander cable to port 3 on node 3; then, connect the other end to port 3 of node 4.



3. Route the ScaleXpander cables through the cable-management arm. Be sure to route each cable through the wire-form clip that is associated with the server to which it is connected.

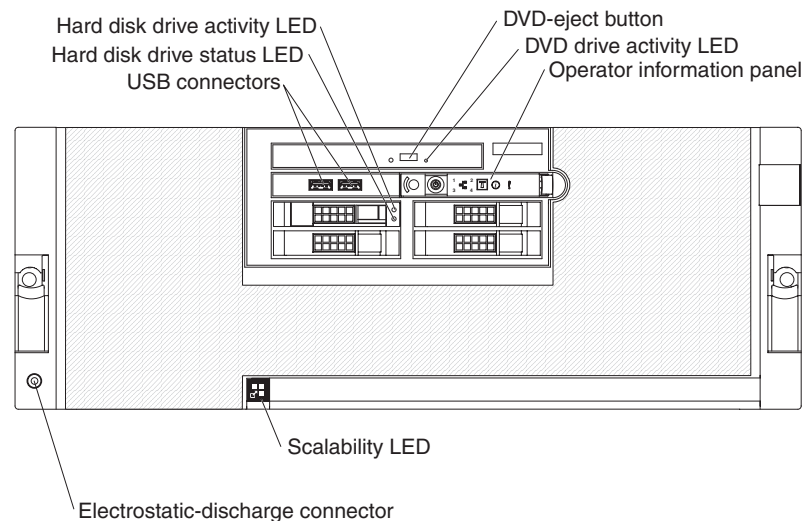
Note: When disconnecting the cables from the server, carefully push down on the blue tabs, then pull the cables out of the connectors.

Chapter 3. Server controls, connectors, LEDs, and power

This chapter describes the controls, connectors, and light-emitting diodes (LEDs) and how to turn the server on and off.

Front view

The following illustration shows the controls, LEDs, and connectors on the front of the server.



Hard disk drive activity LED: On some server models, each hot-swap hard disk drive has an activity LED. When this LED is flashing, it indicates that the drive is in use.

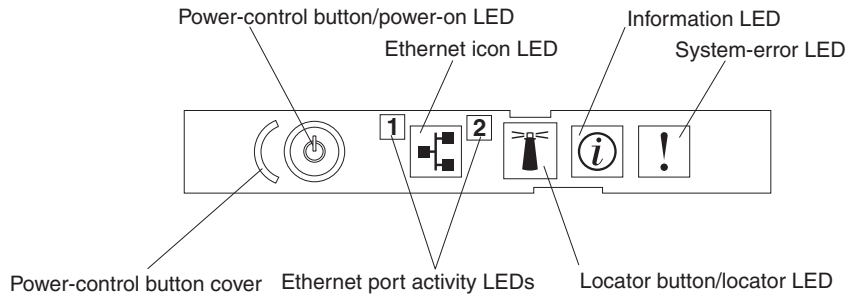
Hard disk drive status LED: On some server models, each hot-swap hard disk drive has a status LED. When this LED is lit continuously, that individual drive is faulty. When the drive is connected to the integrated SAS controller with RAID capabilities, a flashing status LED indicates that the drive is a secondary drive in a mirrored pair and the drive is being synchronized.

USB connectors: Connect USB devices to these connectors.

DVD-eject button: Press this button to release a CD or DVD from the DVD drive.

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

Operator information panel: This panel contains controls and LEDs. The following illustration shows the controls and LEDs on the operator information panel.



The following controls and LEDs are on the operator information panel:

- **Power-control button cover:** Slide this cover over the power-control button to prevent the server from being turned off accidentally.
- **Power-control button:** Press this button to turn the server on and off manually.
- **Power-on LED:** When this LED is lit and not flashing, it indicates that the server is turned on. When this LED is flashing, it indicates that the server is turned off and still connected to an ac power source. When this LED is off, it indicates that ac power is not present or the power supply or the LED itself has failed.

Note: If this LED is off, it does not mean that there is no electrical power in the server. The LED might be burned out. To remove all electrical power from the server, you must disconnect the power cords from the electrical outlets.

- **Ethernet-icon LED:** This LED lights the Ethernet icon.
- **Ethernet activity LEDs:** When these LEDs flash, they indicate that there is activity between the server and the network on the indicated port.
- **Locator LED:** Use this LED to visually locate the server among other servers. You can use IBM Director to light this LED remotely or press the locator button to light the LED manually. This LED is also lit during startup.

In multi-node configurations, when this LED flashes, it indicates that the server is the primary node. When this LED is lit continuously, it indicates that the server is a secondary node.

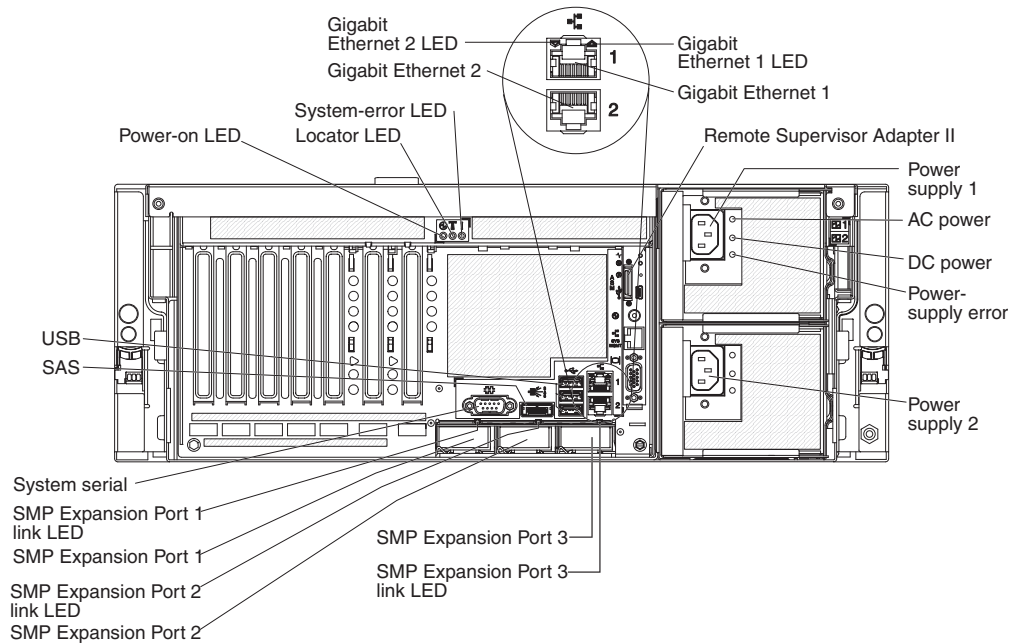
- **Locator button:** Press this button to turn the locator LED on and off manually. In multi-node configurations, press this button to turn the locator LED on and off in all nodes in the configuration.
- **Information LED:** When this LED is lit, it indicates that there is a suboptimal condition in the server and that light path diagnostics will light an additional LED to help isolate the condition. This LED and LEDs on the light path diagnostics panel remain lit until you resolve the condition or you press the remind button.
- **System-error LED:** When this LED is lit, it indicates that a system error has occurred. An LED on the light path diagnostics panel is also lit to help isolate the error.

Electrostatic-discharge connector: Connect an electrostatic-discharge wrist strap to this connector.

Scalability LED: When this LED is lit, it indicates that an optional scalability key is installed in the server, which enables support for connecting the server to other servers to form multi-node configurations.

Rear view

The following illustration shows the connectors and LEDs on the rear of the server.



Power-on LED: When this LED is lit and not flashing, it indicates that the server is turned on. When this LED is flashing, it indicates that the server is turned off and still connected to an ac power source. When this LED is off, it indicates that ac power is not present or the power supply or the LED itself has failed.

Note: If this LED is off, it does not mean that there is no electrical power in the server. The LED might be burned out. To remove all electrical power from the server, you must disconnect the power cords from the electrical outlets.

Locator LED: Use this LED to visually locate the server among other servers. You can use IBM Director to light this LED remotely or press the locator button to light the LED manually. This LED is also lit during startup.

System-error LED: When this LED is lit, it indicates that a system error has occurred. An LED on the light path diagnostics panel is also lit to help isolate the error.

Gigabit Ethernet 2 LED: When this LED flashes, it indicates that there is activity between the server and the network. When this LED is lit continuously, it indicates that there is an active connection on the Ethernet port.

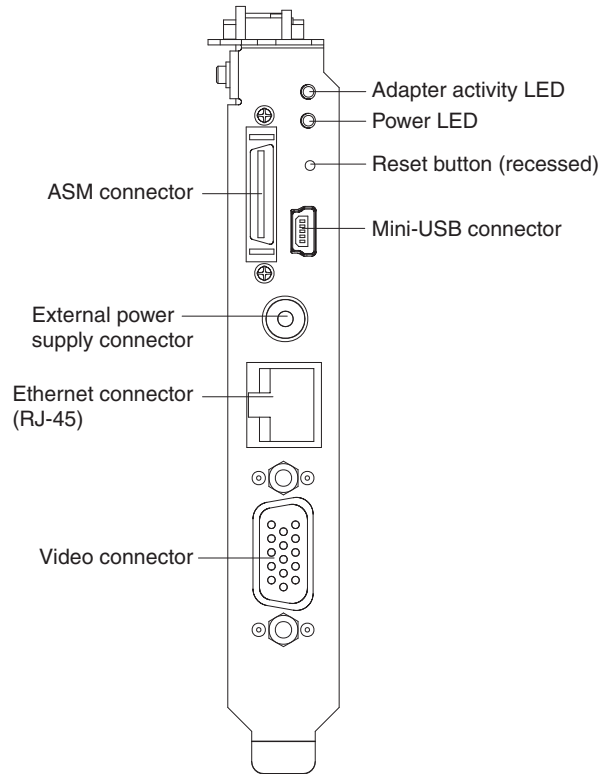
Gigabit Ethernet 2 connector: Use this connector to connect the server to a network.

Gigabit Ethernet 1 LED: When this LED flashes, it indicates that there is activity between the server and the network. When this LED is lit continuously, it indicates that there is an active connection on the Ethernet port.

Gigabit Ethernet 1 connector: Use this connector to connect the server to a network. This connector is shared with the baseboard management controller

(BMC) and is assigned two MAC addresses. For information about configuring the controller, see the *Broadcom NetXtreme Gigabit Ethernet Software CD* that comes with the server.

Remote Supervisor Adapter II controls, connectors, and LEDs: These controls, connectors, and LEDs are used for systems-management information and control.



The following controls, connectors, and LEDs are on the Remote Supervisor Adapter II:

- **Adapter activity LED:** When this LED is flashing, the Remote Supervisor Adapter II is functioning normally. When this LED is lit continuously, there is a problem with the Remote Supervisor Adapter II. When the LED is off, the Remote Supervisor Adapter II is not functioning.
- **Power LED:** When this LED is lit, the Remote Supervisor Adapter II is receiving power from the server, or from an external power-supply.
- **Reset button:** (Trained service technician only) Insert and press the open end of a paper clip (or similar object) into the recessed reset button to manually reset the Remote Supervisor Adapter II.
- **Mini-USB connector:** This connector is not supported.
- **Video connector:** Use this connector to connect the server monitor.
- **Ethernet connector (RJ45):** Use this connector to connect a Category 3 (10 Mbps) or Category 5 (100 Mbps) Ethernet cable to enable a LAN connection.
- **External power-supply connector:** Use this connector to connect an external power-supply to the Remote Supervisor Adapter II.
- **ASM connector:** This connector is not supported.

Power supply 1 connector: Connect the power cord to this connector.

AC power LED: This green LED provides status information about the power supply. During typical operation, both the ac and dc power LEDs are lit. For any other combination of LEDs, see the *Problem Determination and Service Guide* on the IBM System x Documentation CD.

DC power LED: This green LED provides status information about the power supply. During typical operation, both the ac and dc power LEDs are lit. For any other combination of LEDs, see the *Problem Determination and Service Guide* on the IBM System x Documentation CD.

Power-supply error LED: When this amber LED is lit, it indicates that there is an error condition within the power supply. For more information, see the *Problem Determination and Service Guide* on the IBM System x Documentation CD.

Power supply 2 connector: Connect the power cord to this connector.

SMP Expansion Port 3 connector: Use this connector to connect the server to other servers to form multi-node configurations (requires scalability enablement).

SMP Expansion Port 3 link LED: When this LED is lit, it indicates that there is an active connection on SMP Expansion Port 3.

SMP Expansion Port 1 link LED: When this LED is lit, it indicates that there is an active connection on SMP Expansion Port 1.

SMP Expansion Port 1 connector: Use this connector to connect the server to other servers to form multi-node configurations (requires scalability enablement).

SMP Expansion Port 2 link LED: When this LED is lit, it indicates that there is an active connection on SMP Expansion Port 2.

SMP Expansion Port 2 connector: Use this connector to connect the server to other servers to form multi-node configurations (requires scalability enablement).

System serial connector: Connect a 9-pin serial device to this connector.

SAS connector: Connect an internal SAS device to this connector.

USB connectors: Connect USB devices to these connectors.

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 one or more fans might start running to provide cooling while the server is connected to power. 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 the server is installed in a static partition, you can turn on the server and start the operating system by pressing the power-control button on the primary node in the partition.
- If your operating system supports the systems-management software for the Remote Supervisor Adapter II, the systems-management software can turn on the server.
- If your operating system supports the Wake on LAN[®] feature, the Wake on LAN feature can turn on the server.

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. While the server remains connected to ac power, one or more fans might continue to run. 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 installed in a static partition, pressing the power-control button on the primary node in the partition will start an orderly shutdown of the operating system and turn off the server.

- The server can be turned off from the Remote Supervisor Adapter II user interface.
- If the Wake on LAN feature turned on the server, the Wake on LAN feature can turn off the server.
- You can turn off the server through a request from the service processor.

Chapter 4. Configuring the server

The *ServerGuide Setup and Installation* CD provides software setup tools and installation tools that are specifically designed for your IBM server. Use this CD during the initial installation of the server to configure basic hardware features and to simplify the operating-system installation.

In addition to the *ServerGuide Setup and Installation* CD, you can use the following configuration programs to customize the server hardware:

- Configuration/Setup Utility program
- Baseboard management controller utility programs
- RAID configuration programs
 - LSI Logic Configuration Utility program
 - LSI Logic MegaRAID Storage Manager program
- Scalable Partition Web interface

For more information about these programs, see “Configuring the server” in the *User’s Guide* on the *IBM System x Documentation* CD.

Using the ServerGuide Setup and Installation CD

The *ServerGuide Setup and Installation* CD provides programs to detect the server model and installed optional hardware devices, configure the server hardware, provide device drivers, and help you install the operating system. For information about the supported operating-system versions, see the label on the CD. If the *ServerGuide Setup and Installation* CD did not come with the server, you can download the latest version from <http://www.ibm.com/pc/qtechinfo/MIGR-4ZKPPT.html>.

To start the *ServerGuide Setup and Installation* CD, complete the following steps:

1. Insert the CD, and restart the server. If the CD does not start, see “ServerGuide problems” on page 67.
2. Follow the instructions on the screen to:
 - a. Select your language.
 - b. Select your keyboard layout and country.
 - c. View the overview to learn about ServerGuide features.
 - d. View the readme file to review installation tips about your operating system and adapter.
 - e. Start the setup and hardware configuration programs.
 - f. Start the operating-system installation. You will need your operating-system CD.

Using the Configuration/Setup Utility program

The Configuration/Setup Utility program is part of the BIOS. You can use it to:

- Change interrupt request (IRQ) settings
- Change the startup drive sequence
- Configure serial-connector assignments
- Enable USB keyboard and mouse support
- Resolve configuration conflicts

- Set the date and time
- Set passwords and security settings

To start the Configuration/Setup Utility program, complete the following steps:

1. Turn on the server.
2. When the message Press F1 for Configuration/Setup is displayed, press F1. If an administrator password has been set, you must type the administrator password to access the full Configuration/Setup Utility menu.
3. Follow the instructions on the screen.

Using the baseboard management controller utility programs

Use the baseboard management controller utility programs to configure the baseboard management controller, update baseboard management controller firmware, and remotely manage a server. For information about these programs, see the *User's Guide* on the IBM System x Documentation CD.

Using the LSI Logic Configuration Utility program

Use the LSI Logic Configuration Utility program to configure hot-swap hard disk drives that are connected to the SAS controller. To start the LSI Logic Configuration Utility program, complete the following steps:

1. Turn on the server.
2. When the prompt Press CTRL-C to start LSI Logic Configuration Utility... is displayed, press Ctrl+C.
3. Use the arrow keys to select the controller for which you want to change settings. Use the Help function to see instructions and available actions for this screen.
4. To change the settings of the selected items, follow the instructions on the screen.
5. When you have finished changing settings, press Esc to exit from the program; select **Save** to save the settings that you have changed.

Using the LSI Logic MegaRAID Storage Manager program

Use the LSI Logic MegaRAID Storage Manager program to monitor and manage the disk-array subsystem that is connected to the integrated SAS controller with RAID capabilities and the ServeRAID-MR10k controller option. The LSI Logic MegaRAID Storage Manager program, device drivers, and information come with the ServeRAID-MR10k controller option.

Using the Scalable Partition Web interface

(Requires scalability enablement) The Scalable Partition Web interface is an extension of the Remote Supervisor Adapter II Web interface and is used to create, delete, control, and view scalable partitions. The Scalable Partition Web interface firmware is in the Remote Supervisor Adapter II service processor.

A multi-node configuration interconnects multiple servers. Each multi-node configuration can have one or more scalable partitions. Each scalable partition supports an independent operating system installation.

The scalable partition uses a single, contiguous memory space and provides access to all associated adapters and hard disk drives. PCI slot numbering starts with the primary node and continues with the secondary nodes, in numeric order of the logical node IDs.

Before you create scalable partitions, read the following information:

- Make sure that all nodes in the multi-node configuration contain the following software and hardware:
 - The current level of BIOS code, SAS BIOS code, service processor firmware, BMC firmware, and FPGA firmware.

Note: To check for the latest firmware levels and to download firmware updates, go to <http://www.ibm.com/systems/support/>.

- Microprocessors that are the same cache size and type, and the same clock speed.
- Make sure that each node contains the following hardware:
 - A minimum of one microprocessor and one memory card with one pair of DIMMs.

Note: The nodes can vary in the number of microprocessors and the amount of memory each contains, above the minimum.

- A ScaleXpander key on the microprocessor board to enable multi-node operation
- Make sure that the primary node contains a minimum of 4 GB of memory.

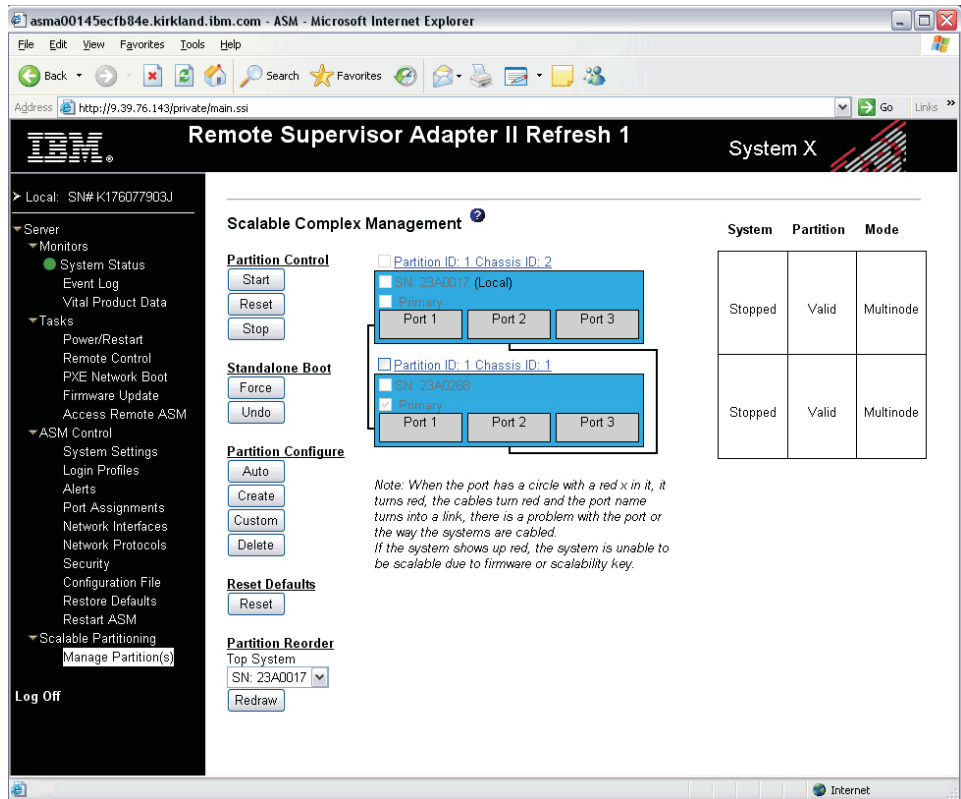
To create a scalable partition, complete the following steps:

1. Connect the ScaleXpander cables. See “SMP Expansion cabling” on page 30 for instructions.
2. Connect all nodes to an ac power source and make sure that they are not running an operating system.

Note: If the nodes are part of an existing partition, all nodes must be in Standby mode, which means that the nodes are part of the partition but operate independently. Click **Force** under **Standalone Boot** on the Scalable Complex Management page to enable the Standby mode.

3. Connect and log in to the Remote Supervisor Adapter II Web interface. See the *Remote Supervisor Adapter II SlimLine and Remote Supervisor Adapter II User's Guide* for more information; then, continue with the procedure to create a scalable partition.
4. In the navigation pane, click **Manage Partition(s)** under **Scalable Partitioning**. Use the Scalable Complex Management page to create, delete, control, and view scalable partitions. A page similar to the one in the following illustration is displayed.

Note: The illustration shows a Scalable Complex Management page with a partition.

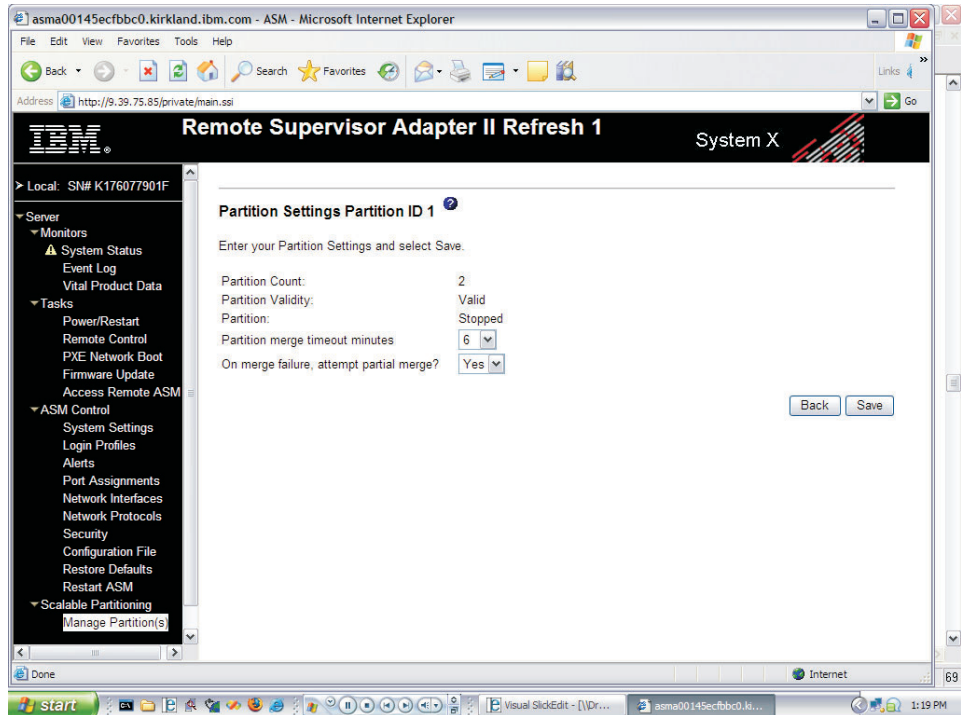


Select the primary node; then, automatically or manually create a scalable partition:

- Click **Auto** under **Partition Configure** to automatically create a single partition that uses all nodes in the multi-node configuration.
- Click **Create** under **Partition Configure** to manually assign nodes to the partition.

Note: Click **Redraw** to reorder the sequence in which the nodes appear in the diagram on the page. You can, for example, reorder the diagram to reflect the order in which the nodes are installed in a rack. The nodes are reordered according to the ScaleXpander cabling, with the node that you select in the top position.

5. (Optional) Click **Partition ID** to define operation of the partition and view information about the partition. A page similar to the one in the following illustration is displayed.



The following nonselectable fields display information about the partition:

- The **Partition Count** field displays the number of nodes in the partition.
- The **Partition Validity** field displays the following status: **Valid** (which indicates the configuration is correct).
- The **Partition** field displays one of the following statuses:
 - **Stopped:** The partition is inactive, and the nodes can be reassigned to a partition.
 - **Started:** The partition is active.
 - **Resetting:** The configuration is resetting.
 - **Unknown:** The partition contains unidentified port or chassis IDs.
- a. In the **Partition merge timeout minutes** field, select the number of minutes POST waits for the scalable nodes to merge resources. The default value is **6 minutes**. Allow at least 8 seconds for each GB of memory in the scalable partition.
- b. In the **On merge failure, attempt partial merge?** field, select whether POST should attempt a partial merge if one error is detected during full merge. **Yes** is the default value.
- c. In the **Memory Mirroring?** field, select whether memory mirroring is enabled in all nodes in the partition. **Yes** is the default value.
- d. Click **Save**.

Chapter 5. Updating IBM Director

If you plan to use IBM Director to manage the server, you must check for the latest applicable IBM Director updates and interim fixes.

To install the IBM Director updates and any other applicable updates and interim fixes, complete the following steps:

1. Check for the latest version of IBM Director:
 - a. Go to <http://www.ibm.com/systems/management/director/downloads.html>.
 - b. If a newer version of IBM Director than what comes with the server is shown in the drop-down list, follow the instructions on the Web page to download the latest version.
2. Install the IBM Director program.
3. Download and install any applicable updates or interim fixes for the server:
 - a. Go to <http://www.ibm.com/systems/support/>.
 - b. Under **Product support**, click **System x**.
 - c. Under **Popular links**, click **Software and device drivers**.
 - d. Click **IBM Director downloads**.
 - e. Select any applicable update or interim fix that you want to download.
 - f. Click the file link for the executable file to download the file, and follow the instructions in the readme file to install the update or interim fix.
 - g. Repeat steps 3e and 3f for any additional updates or interim fixes that you want to install.

Chapter 6. Solving problems

This chapter provides basic troubleshooting information to help you solve some common problems that might occur while you are setting up the server.

If you cannot locate and correct a problem by using the information in this chapter, see “Getting help and technical assistance,” on page 77, the *Problem Determination and Service Guide* on the IBM System x Documentation CD, and the “Server Support” flowchart in the front of this document.

Diagnostic tools overview

The following tools are available to help you diagnose and solve hardware-related problems:

- **POST beep codes**

The power-on self-test beep codes indicate the detection of a problem.

- One beep indicates successful completion of POST, with no errors.
- More than one beep indicates that POST detected a problem. Error messages are displayed also if POST detects a hardware-configuration problem.

See “POST beep codes” on page 54, and the *Problem Determination and Service Guide* on the IBM System x Documentation CD for more information.

- **Troubleshooting tables**

These tables list problem symptoms and steps to correct the problems. See “Troubleshooting tables” on page 57 for more information.

- **Dynamic System Analysis (DSA) Preboot diagnostic programs**

The Preboot DSA diagnostic programs are the primary method of testing the major components of the server. The Preboot DSA diagnostic programs are stored in integrated USB memory and collect and analyze system information to aid in diagnosing server problems. See the *Problem Determination and Service Guide* on the IBM System x Documentation CD for more information.

- **Light path diagnostics**

Use light path diagnostics to diagnose system errors quickly. See “Light path diagnostics” on page 68 for more information.

- **IBM Electronic Service Agent**

IBM Electronic Service Agent is a software tool that monitors the server for hardware error events and automatically submits electronic service requests to the IBM Support Center. Also, it can collect and transmit system configuration information on a scheduled basis so that the information is available to you and your support representative. It uses minimal system resources, is available free of charge, and can be downloaded from the Web. For more information and to download Electronic Service Agent, go to <http://www.ibm.com/support/electronic/>.

- **Remote Supervisor Adapter II**

When the IBM Remote Supervisor Adapter II is used with the systems-management software that comes with the server, you can manage the functions of the server locally and remotely. The Remote Supervisor Adapter II also provides system monitoring, event recording to an event log, and dial-out alert capability. The event logs are time stamped, saved on the Remote Supervisor Adapter II, and can be attached to e-mail alerts.

For information about the Remote Supervisor Adapter II, see the *Remote Supervisor Adapter II SlimLine and Remote Supervisor Adapter II User's Guide* on the IBM System x Documentation CD.

- **Checkpoint codes**

A checkpoint code identifies the check that was occurring when the server stopped; it does not provide error codes or suggest replacement components. Checkpoint codes are shown on the checkpoint display, which is on the light path diagnostics panel. See the *Problem Determination and Service Guide* on the IBM System x Documentation CD for more information.

POST beep codes

POST emits one beep to signal successful completion. If POST detects a problem during startup, other beep codes might occur. Use the following beep code descriptions to help diagnose and solve problems that are detected during startup.

Note: See the *Problem Determination and Service Guide* on the IBM System x Documentation CD for more information about the POST beep codes.

One beep

POST was completed successfully without detecting any errors.

Two short beeps

The server configuration has changed.

Other beep codes

See the *Problem Determination and Service Guide* on the IBM System x Documentation CD for more information about the POST beep codes.

POST error codes

The following table provides an abbreviated list of the error codes that might appear during POST. See the *Problem Determination and Service Guide* on the IBM System x Documentation CD for more information about the POST error codes. To check for updated technical information, complete the following steps.

Note: Changes are made periodically to the IBM Web site. The actual procedure might vary slightly from what is described in this document.

1. Go to <http://www.ibm.com/systems/support/>.
2. Under **Product support**, click **System x**.
3. Under **Popular links**, click **Publications lookup**.
4. From the **Product family** menu, select **System x3850 M2** or **System x3950 M2** and click **Continue**.

- Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.
- See the parts listing in the *Problem Determination and Service Guide* to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).
- If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician.

Error code	Description	Action
162	Device configuration error.	<ol style="list-style-type: none"> 1. Run the Configuration/Setup Utility program, select Load Default Settings, and save the settings. 2. Reseat the following components: <ol style="list-style-type: none"> a. Battery b. Failing device c. I/O board shuttle assembly 3. Remove the battery for 5 minutes; then, reinstall the battery and restart the server. 4. Replace the components listed in step 2 one at a time, in the order shown, restarting the server each time.
163	Real-time clock error.	<ol style="list-style-type: none"> 1. Run the Configuration/Setup Utility program, select Load Default Settings, make sure the date and time are correct, and save the settings. 2. Reseat the following components: <ol style="list-style-type: none"> a. Battery b. I/O board shuttle assembly 3. Replace the components listed in step 2 one at a time, in the order shown, restarting the server each time.
289	A DIMM has been disabled by the user or by the system.	<ol style="list-style-type: none"> 1. If the DIMM was disabled by the user, run the Configuration/Setup Utility program and enable the DIMM. 2. Make sure that the DIMM is installed correctly. 3. Reseat the DIMM. 4. Replace the DIMM.
00019xxx	Microprocessor x is not functioning or failed the built-in self-test; check VRM and processor LEDs.	<ol style="list-style-type: none"> 1. Reseat the following components: <ol style="list-style-type: none"> a. Microprocessor board b. Microprocessor x 2. Replace the following components one at a time, in the order shown, restarting the server each time. <ol style="list-style-type: none"> a. (Trained service technician only) Microprocessor x b. (Trained service technician only) Microprocessor board
00180xxx	A PCI adapter has requested memory resources that are not available.	<ol style="list-style-type: none"> 1. Change the order of the adapters in the PCI Express slots. Make sure that the boot device is positioned early in the scan order. 2. Make sure that the settings for the PCI adapter and all other adapters in the Configuration/Setup Utility program are correct. If the memory resource settings are not correct, change them. 3. If all memory resources are being used, remove an adapter to make memory available to the PCI adapter. Disabling the BIOS on the adapter might correct the error. See the documentation that comes with the adapter.

- Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.
- See the parts listing in the *Problem Determination and Service Guide* to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).
- If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician.

Error code	Description	Action
012980xx 012981xx	No update data for microprocessor x	<ol style="list-style-type: none"> 1. Make sure that all microprocessors have the same cache size. 2. Update the BIOS code again. 3. Reseat microprocessor x. 4. (Trained service technician only) Replace microprocessor x.
I9990305	An operating system was not found.	<ol style="list-style-type: none"> 1. Make sure that a bootable operating system is installed. 2. Run the hard disk drive diagnostic tests. 3. Reseat the following components: <ol style="list-style-type: none"> a. Hard disk drive b. SAS hard disk drive backplane and cables c. DVD drive and cables d. I/O board shuttle assembly 4. Replace the components listed in step 3 one at a time, in the order shown, restarting the server each time.

Troubleshooting tables

Use the troubleshooting tables to find solutions to problems that have identifiable symptoms. See the *Problem Determination and Service Guide* on the IBM System x Documentation CD for more detailed troubleshooting information. If you cannot find a problem in these tables, run the diagnostic programs (see “Running the diagnostic programs” in the *Problem Determination and Service Guide*).

If you have just added new software or a new optional device and the server is not working, complete the following steps before you use the troubleshooting tables:

1. Check the light path diagnostics LEDs on the operator information panel (see “Light path diagnostics” on page 68).
2. Remove the software or device that you just added.
3. Run the diagnostic tests to determine whether the server is running correctly.
4. Reinstall the new software or new device.

CD or DVD drive problems

<ul style="list-style-type: none">• Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.• See the parts listing in the <i>Problem Determination and Service Guide</i> to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).• If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician.	
Symptom	Action
The CD or DVD drive is not recognized.	<ol style="list-style-type: none">1. Make sure that:<ul style="list-style-type: none">• The IDE channel to which the CD or DVD drive is attached (primary or secondary) is enabled in the Configuration/Setup Utility program.• All cables and jumpers are installed correctly.• The correct device driver is installed for the CD or DVD drive.2. Run the CD or DVD drive diagnostic programs.3. Reseat the following components:<ol style="list-style-type: none">a. CD or DVD driveb. CD or DVD drive cablec. I/O board shuttle assembly4. Replace the components listed in step 3 one at a time, in the order shown, restarting the server each time.
A CD or DVD is not working correctly.	<ol style="list-style-type: none">1. Clean the CD or DVD.2. Run the CD or DVD drive diagnostic programs.3. Reseat the CD or DVD drive.4. Replace the CD or DVD drive.
The CD or DVD drive tray is not working.	<ol style="list-style-type: none">1. Make sure that the server is turned on.2. Insert the end of a straightened paper clip into the manual tray-release opening.3. Reseat the CD or DVD drive.4. Replace the CD or DVD drive.

General problems

<ul style="list-style-type: none"> • Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved. • See the parts listing in the <i>Problem Determination and Service Guide</i> to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU). • If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician. 	
Symptom	Action
A cover lock is broken, an LED is not working, or a similar problem has occurred.	If the part is a CRU, replace it. If the part is a FRU, the part must be replaced by a trained service technician.

Hard disk drive problems

<ul style="list-style-type: none"> • Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved. • See the parts listing in the <i>Problem Determination and Service Guide</i> to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU). • If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician. 	
Symptom	Action
Not all drives are recognized by the hard disk drive diagnostic test (the Fixed Disk test).	Remove the drive that is indicated by the diagnostic tests; then, run the hard disk drive diagnostic test again. If the remaining drives are recognized, replace the drive that you removed with a new one.
The server stops responding during the hard disk drive diagnostic test.	Remove the hard disk drive that was being tested when the server stopped responding, and run the diagnostic test again. If the hard disk drive diagnostic test runs successfully, replace the drive that you removed with a new one.
A hard disk drive was not detected while the operating system was being started.	Reseat all hard disk drives and cables; then, run the hard disk drive diagnostic tests again.
A hard disk drive passes the diagnostic Fixed Disk Test but the problem remains.	Run the diagnostic SAS Fixed Disk Test. Note: This test is not available to servers using RAID or servers with IDE or SATA hard disk drives.

Intermittent problems

<ul style="list-style-type: none"> • Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved. • See the parts listing in the <i>Problem Determination and Service Guide</i> to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU). • If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician. 	
Symptom	Action
A problem occurs only occasionally and is difficult to diagnose.	<ol style="list-style-type: none"> 1. Make sure that: <ul style="list-style-type: none"> • All cables and cords are connected securely to the rear of the server and attached devices. • When the server is turned on, air is flowing from the fan grille. If there is no airflow, the fan is not working. This can cause the server to overheat and shut down. 2. Check the system-error log or BMC log.

USB keyboard, mouse, or pointing-device problems

<ul style="list-style-type: none"> • Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved. • See the parts listing in the <i>Problem Determination and Service Guide</i> to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU). • If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician. 	
Symptom	Action
All or some keys on the keyboard do not work.	<ol style="list-style-type: none"> 1. If you have installed a USB keyboard, run the Configuration/Setup Utility program and enable keyboardless operation to prevent the POST error message 301 from being displayed during startup. 2. Make sure that: <ul style="list-style-type: none"> • The keyboard cable is securely connected. • The server and the monitor are turned on. 3. Reseat the following components: <ol style="list-style-type: none"> a. Keyboard b. I/O board 4. Replace the components listed in step 3 one at a time, in the order shown, restarting the server each time.
The USB mouse or USB pointing device does not work.	<ol style="list-style-type: none"> 1. Make sure that: <ul style="list-style-type: none"> • The mouse or pointing-device USB cable is securely connected to the server, and the device drivers are installed correctly. • The server and the monitor are turned on. • Keyboardless operation has been enabled in the Configuration/Setup Utility program. 2. If you are using a USB hub, disconnect the USB device from the hub and connect it directly to the server. 3. Reseat the following components: <ol style="list-style-type: none"> a. Mouse or pointing device b. I/O board 4. Replace the components listed in step 3 one at a time, in the order shown, restarting the server each time.

Memory problems

- Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.
- See the parts listing in the *Problem Determination and Service Guide* to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).
- If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician.

Symptom	Action
The amount of system memory that is displayed is less than the amount of installed physical memory.	<ol style="list-style-type: none"> 1. Make sure that: <ul style="list-style-type: none"> • No error LEDs are lit on the operator information panel or on the memory card. • Memory mirroring does not account for the discrepancy. • Scalability does not account for the discrepancy. Note: Each node in a multi-node configuration uses 256 MB of system memory. • The memory modules are seated correctly. • You have installed the correct type of memory. • If you changed the memory, you updated the memory configuration in the Configuration/Setup Utility program. • All banks of memory are enabled. The server might have automatically disabled a memory bank when it detected a problem, or a memory bank might have been manually disabled. 2. Check the POST error log for error message 289. If a DIMM was disabled, run the Configuration/Setup Utility program and enable the DIMM. 3. Run memory diagnostics. 4. Make sure that there is no memory mismatch when the server is at the minimum memory configuration (two 1 GB DIMMs). 5. Reinstall the removed DIMMs one pair at a time, making sure that the DIMMs in each pair match. 6. Reinstall the removed memory cards one memory card at a time, making sure that the DIMMs on each card match. 7. Reseat the following components: <ol style="list-style-type: none"> a. DIMM b. Memory card 8. Replace the components listed in step 7 one at a time, in the order shown, restarting the server each time.

Microprocessor problems

- Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.
- See the parts listing in the *Problem Determination and Service Guide* to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).
- If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician.

Symptom	Action
The server emits a continuous beep during POST, indicating that the startup (boot) microprocessor is not working correctly.	<ol style="list-style-type: none"> 1. Correct any errors that are indicated by the light path diagnostics LEDs (see “Light path diagnostics” on page 68). 2. Make sure that the server supports all the microprocessors, and that the microprocessors all match in speed and cache size. 3. Make sure that the microprocessor 1 is seated correctly. 4. Reseat the following components: <ol style="list-style-type: none"> a. Microprocessor 1 b. Microprocessor VRMs c. Microprocessor board 5. If there is no indication of which microprocessor has failed, isolate the error by testing with one microprocessor at a time. 6. Replace the following components one at a time, in the order shown, restarting the server each time. <ol style="list-style-type: none"> a. (Trained service technician only) Microprocessor 1 b. Microprocessor VRMs c. (Trained service technician only) Microprocessor board 7. (Trained service technician only) If multiple error codes or light path diagnostics LEDs indicate a microprocessor error, reverse the locations of two microprocessors to determine whether the error is associated with a microprocessor or with a microprocessor socket. Also reverse the locations of the VRMs. <ul style="list-style-type: none"> • If the error is associated with a microprocessor, replace the microprocessor. • If the error is associated with a VRM, replace the VRM. • If the error is associated with a microprocessor socket, replace the microprocessor board.

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 instructions for testing and adjusting the monitor. If you cannot diagnose the problem, call for service.

- Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.
- See the parts listing in the *Problem Determination and Service Guide* to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).
- If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician.

Symptom	Action
Testing the monitor	<ol style="list-style-type: none"> 1. Make sure the monitor cables are firmly connected. 2. Try using a different monitor on the server, or try using the monitor that is being tested on a different server. 3. Run the diagnostic programs. If the monitor passes the diagnostic programs, the problem might be a video device driver. 4. Reseat the following components: <ol style="list-style-type: none"> a. Remote Supervisor Adapter II b. I/O board shuttle assembly 5. Replace the components listed in step 4 one at a time, in the order shown, restarting the server each time.
The screen is blank.	<ol style="list-style-type: none"> 1. If the server is attached to a KVM switch, bypass the KVM switch to eliminate it as a possible cause of the problem: connect the keyboard cable directly to the correct connector on the rear of the server. 2. Make sure that: <ul style="list-style-type: none"> • The server is powered on. • The monitor cables are connected correctly. • The monitor is turned on and the brightness and contrast controls are adjusted correctly. • No beep codes sound when the server is turned on. <p>Important: In some memory configurations, the 3-3-3 beep code might sound during POST, followed by a blank monitor screen. If this occurs, complete the following steps:</p> <ol style="list-style-type: none"> a. Turn off the server. b. Move the memory card to a different slot. c. Turn on the server. <p>Note: BIOS detects a new configuration and automatically re-enables the memory slots that were previously disabled.</p> d. Turn off the server. e. Return the memory card to the slot that you removed it from in step 2b. f. Turn on the server. 3. Make sure that the correct server is controlling the monitor, if applicable. 4. Make sure that damaged BIOS code is not affecting the video. 5. Observe the checkpoint LEDs on the light path diagnostics panel.
The monitor works when you turn on the server, but the screen goes blank when you start some application programs.	<ol style="list-style-type: none"> 1. Make sure that: <ul style="list-style-type: none"> • The application program is not setting a display mode that is higher than the capability of the monitor. • You installed the necessary device drivers for the application. 2. Run video diagnostics. <ul style="list-style-type: none"> • If the server passes the video diagnostics, the video is good. • If the server fails the video diagnostics, reseat the Remote Supervisor Adapter II. • Replace the Remote Supervisor Adapter II.

- Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.
- See the parts listing in the *Problem Determination and Service Guide* to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).
- If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician.

Symptom	Action
The monitor has screen jitter, or the screen image is wavy, unreadable, rolling, or distorted.	<ol style="list-style-type: none"> 1. If the monitor self-tests show the monitor is working correctly, 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. Attention: Moving a color monitor while it is turned on might cause screen discoloration. Move the device and the monitor at least 305 mm (12 in.) apart, and turn on the monitor. Notes: <ol style="list-style-type: none"> a. To prevent diskette drive read/write errors, make sure that the distance between the monitor and any external diskette drive is at least 76 mm (3 in.). b. Non-IBM monitor cables might cause unpredictable problems. 2. Reseat the following components: <ol style="list-style-type: none"> a. Monitor b. Remote Supervisor Adapter II c. I/O board shuttle assembly 3. Replace the components listed in step 2 one at a time, in the order shown, restarting the server each time.
Wrong characters appear on the screen.	<ol style="list-style-type: none"> 1. If the wrong language is displayed, update the BIOS code with the correct language. 2. Reseat the following components: <ol style="list-style-type: none"> a. Monitor b. Remote Supervisor Adapter II 3. Replace the components listed in step 2 one at a time, in the order shown, restarting the server each time.

Optional-device problems

<ul style="list-style-type: none"> • Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved. • See the parts listing in the <i>Problem Determination and Service Guide</i> to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU). • If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician. 	
Symptom	Action
An IBM optional device that was just installed does not work.	<ol style="list-style-type: none"> 1. Make sure that: <ul style="list-style-type: none"> • The device is designed for the server (see the ServerProven® list at http://www.ibm.com/servers/eserver/serverproven/compat/us/). • You followed the installation instructions that came with the device and the device is installed correctly. • You have not loosened any other installed devices or cables. • You updated the configuration information in the Configuration/Setup Utility program. Whenever memory or any other device is changed, you must update the configuration. 2. Reseat the device that you just installed. 3. Replace the device that you just installed.
An IBM optional device that used to work does not work now.	<ol style="list-style-type: none"> 1. Make sure that all of the hardware and cable connections for the device are secure. 2. If the device comes with test instructions, use those instructions to test the device. 3. If the failing device is a SCSI device, make sure that: <ul style="list-style-type: none"> • The cables for all external SCSI devices are connected correctly. • The last device in each SCSI chain, or the end of the SCSI cable, is terminated correctly. • Any external SCSI device is turned on. You must turn on an external SCSI device before turning on the server. 4. Reseat the failing device. 5. Replace the failing device.

Power problems

- Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.
- See the parts listing in the *Problem Determination and Service Guide* to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).
- If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician.

Symptom	Action
<p>The power-control button does not work, and the reset button does work (the server does not start).</p> <p>Note: The power-control button will not function until 20 seconds after the server has been connected to ac power.</p>	<ol style="list-style-type: none"> 1. Make sure that the operator information panel power-control button is working correctly: <ol style="list-style-type: none"> a. Disconnect the ac power cord for 20 seconds; then, reconnect the ac power cord and restart the server. b. Reseat the operator information panel cables, and then repeat step 1a. <ul style="list-style-type: none"> • If the server starts, reseat the operator information panel. If the problem remains, replace the operator information panel. • If the server does not start, bypass the operator information panel power-control button by using the force power-on jumper; if the server starts, reseat the operator information panel. If the problem remains, replace the operator information panel. 2. Make sure that the reset button is working correctly: <ol style="list-style-type: none"> a. Disconnect the server power cords. b. Reconnect the power cords. c. Reseat the light path panel cable, and then repeat step 1a. <ul style="list-style-type: none"> • If the server starts, replace the operator information panel. • If the server does not start, go to step 3. 3. Make sure that: <ul style="list-style-type: none"> • The power cords are correctly connected to the server and to a working electrical outlet. • The type of memory that is installed is correct. • The memory card is fully seated. • The LEDs on the power supply do not indicate a problem. • The microprocessors are installed in the correct sequence. 4. Reseat the following components: <ol style="list-style-type: none"> a. Memory card b. Operator information panel c. Power backplane d. Microprocessor board 5. Replace the following components one at a time, in the order shown, restarting the server each time. <ol style="list-style-type: none"> a. Memory card b. Operator information panel c. Power backplane d. (Trained service technician only) Microprocessor board 6. If you just installed an optional device, remove it, and restart the server. If the server now turns on, you might have installed more devices than the power supply supports.

<ul style="list-style-type: none"> • Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved. • See the parts listing in the <i>Problem Determination and Service Guide</i> to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU). • If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician. 	
Symptom	Action
The server does not turn off.	<ol style="list-style-type: none"> 1. Determine whether you are using an Advanced Configuration and Power Management (ACPI) or a non-ACPI operating system. If you are using a non-ACPI operating system, complete the following steps: <ol style="list-style-type: none"> a. Press Ctrl+Alt+Delete. b. Turn off the server by holding the power-control button for 5 seconds. c. Restart the server. d. If the server fails POST and the power-control button does not work, disconnect the ac power cord for 20 seconds; then, reconnect the ac power cord and restart the server. 2. If the problem remains or if you are using an ACPI-aware operating system, suspect the microprocessor board.
The server unexpectedly shuts down, and the LEDs on the operator information panel are not lit.	See the <i>Problem Determination and Service Guide</i> on the IBM System x Documentation CD for more information.

Serial-device problems

For more information about the serial port, see the *User's Guide* on the IBM System x Documentation CD.

<ul style="list-style-type: none"> • Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved. • See the parts listing in the <i>Problem Determination and Service Guide</i> to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU). • If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician. 	
Symptom	Action
The number of serial ports that are identified by the operating system is less than the number of installed serial ports.	<ol style="list-style-type: none"> 1. Make sure that: <ul style="list-style-type: none"> • Each port is assigned a unique address in the Configuration/Setup Utility program and none of the serial ports is disabled. • The serial-port adapter (if one is present) is seated correctly. 2. Reseat the serial port adapter. 3. Replace the serial port adapter.

<ul style="list-style-type: none"> • Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved. • See the parts listing in the <i>Problem Determination and Service Guide</i> to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU). • If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician. 	
Symptom	Action
A serial device does not work.	<ol style="list-style-type: none"> 1. Make sure that: <ul style="list-style-type: none"> • The device is compatible with the server. • The serial port is enabled and is assigned a unique address. • The device is connected to the correct connector. 2. Reseat the following components: <ol style="list-style-type: none"> a. Failing serial device b. Serial cable c. Remote Supervisor Adapter II d. I/O board shuttle assembly 3. Replace the components listed in step 2 one at a time, in the order shown, restarting the server each time.

ServerGuide problems

<ul style="list-style-type: none"> • Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved. • See the parts listing in the <i>Problem Determination and Service Guide</i> to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU). • If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician. 	
Symptom	Action
The <i>ServerGuide Setup and Installation</i> CD will not start.	<ol style="list-style-type: none"> 1. Make sure that the server supports the ServerGuide program and has a startable (bootable) CD (or DVD) drive. 2. If the startup (boot) sequence settings have been altered, make sure that the CD drive is first in the startup sequence. 3. If more than one CD drive is installed, make sure that only one drive is set as the primary drive. Start the CD from the primary drive.
The SCSI RAID program cannot view all installed drives, or the operating system cannot be installed.	<ol style="list-style-type: none"> 1. Make sure that there are no duplicate SCSI IDs or IRQ assignments. 2. Make sure that the hard disk drive is connected correctly.
The operating-system installation program continuously loops.	Make more space available on the hard disk.
The ServerGuide program will not start the operating-system CD.	Make sure that the operating-system CD is supported by the ServerGuide program. See the <i>ServerGuide Setup and Installation</i> CD label for a list of operating-system versions that support the ServerGuide program.
The operating system cannot be installed; the option is not available.	Make sure that the operating system is supported on the server. If the operating system is supported, either there is no logical drive defined (SCSI RAID systems) or the ServerGuide System Partition is not present. Run the ServerGuide program and make sure that setup is complete.

Software problems

- Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.
- See the parts listing in the *Problem Determination and Service Guide* to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).
- If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician.

Symptom	Action
You suspect a software problem.	<ol style="list-style-type: none">1. To determine whether the problem is caused by the software, make sure that:<ul style="list-style-type: none">• The server has the minimum memory that is needed to use the software. For memory requirements, see the information that comes with the software. If you have just installed an adapter or memory, the server might have a memory-address conflict.• The software is designed to operate on the server.• Other software works on the server.• The software works on another server.2. If you receive any error messages while you use the software, see the information that comes with the software for a description of the messages and suggested solutions to the problem.3. Contact your place of purchase of the software.

Universal Serial Bus (USB) port device problems

- Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.
- See the parts listing in the *Problem Determination and Service Guide* to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).
- If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician.

Symptom	Action
A USB device does not work.	<ol style="list-style-type: none">1. Run USB diagnostics.2. Make sure that:<ul style="list-style-type: none">• The correct USB device driver is installed.• The operating system supports USB devices.3. Make sure that the USB configuration options are set correctly in the Configuration/Setup Utility program menu (see the <i>User's Guide</i> for more information).4. If you are using a USB hub, disconnect the USB device from the hub and connect it directly to the server.

Video problems

See “Monitor problems” on page 61.

Light path diagnostics

Use light path diagnostics to diagnose system errors. By viewing the LEDs in order, you can often identify the source of the error.

LEDs remain lit when the server is connected to an ac power source but is not turned on, provided that the power supply is operating correctly. This feature helps you to isolate a problem that causes the operating system to shut down.

Any memory-card LED can be lit while the memory card is removed from the server so that you can isolate a problem. After ac power has been removed from the server, power remains available to these LEDs for up to 24 hours.

To view the memory-card LEDs, press and hold the light path diagnostics button on the memory card to light the error LEDs. The LEDs that were lit while the server was turned on will be lit again while the button is pressed.

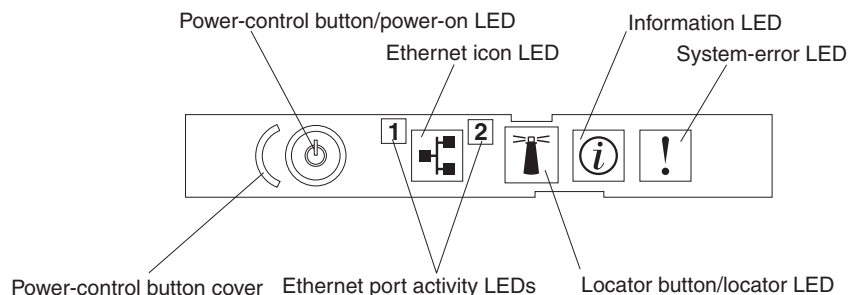
Diagnosing problems using light path diagnostics

Before you work inside the server to view light path diagnostics LEDs, read the safety information that begins on page v, and “Installation guidelines” on page 9.

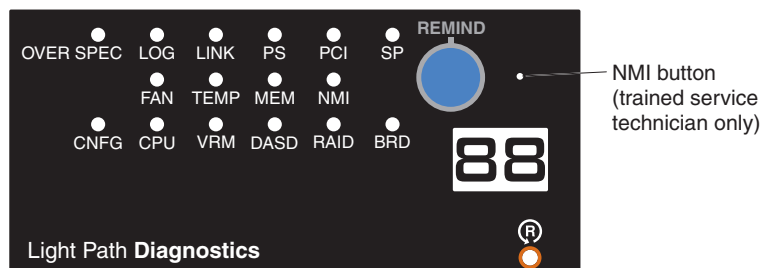
If an error occurs, view the light path diagnostics LEDs in the following order:

1. **Operator information panel:** Look at this panel first and note the lit LEDs.
 - If the information LED is lit, it indicates that a suboptimal condition has occurred and that light path diagnostics might light an additional LED to help diagnose the problem.
 - If the system-error LED is lit, it indicates that a system error has occurred and that light path diagnostics might light an additional LED to help diagnose the problem.

The following illustration shows the operator information panel.



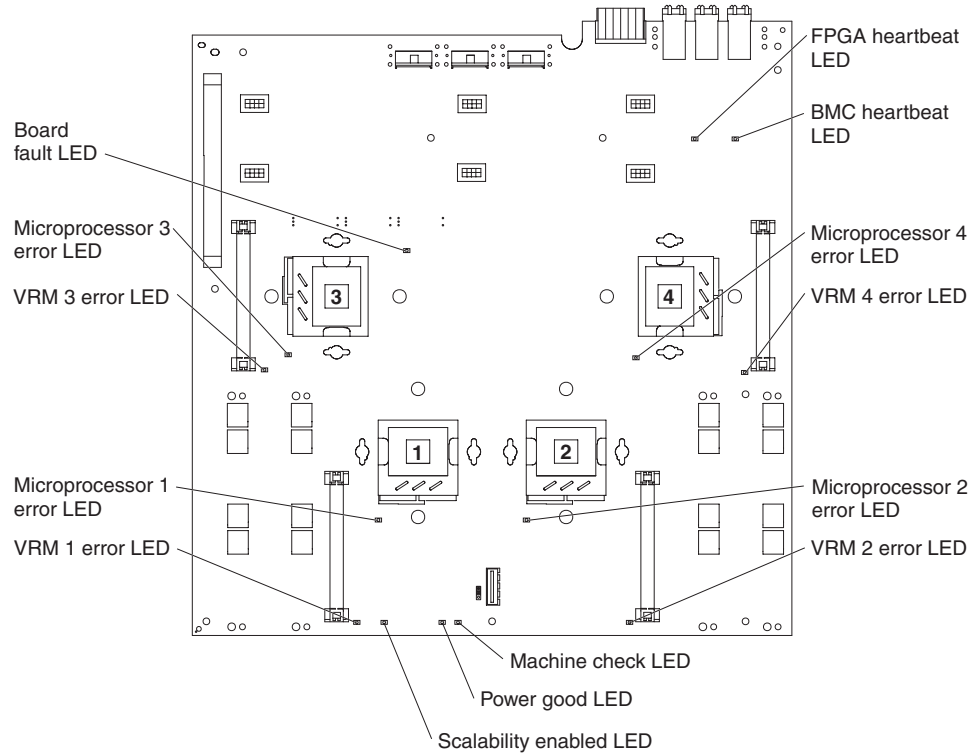
2. **Light path diagnostics panel:** To access the light path diagnostics panel, press the release latch on the front of the operator information panel to the left; then, slide it forward. Note any LEDs that are lit, and then close the drawer.



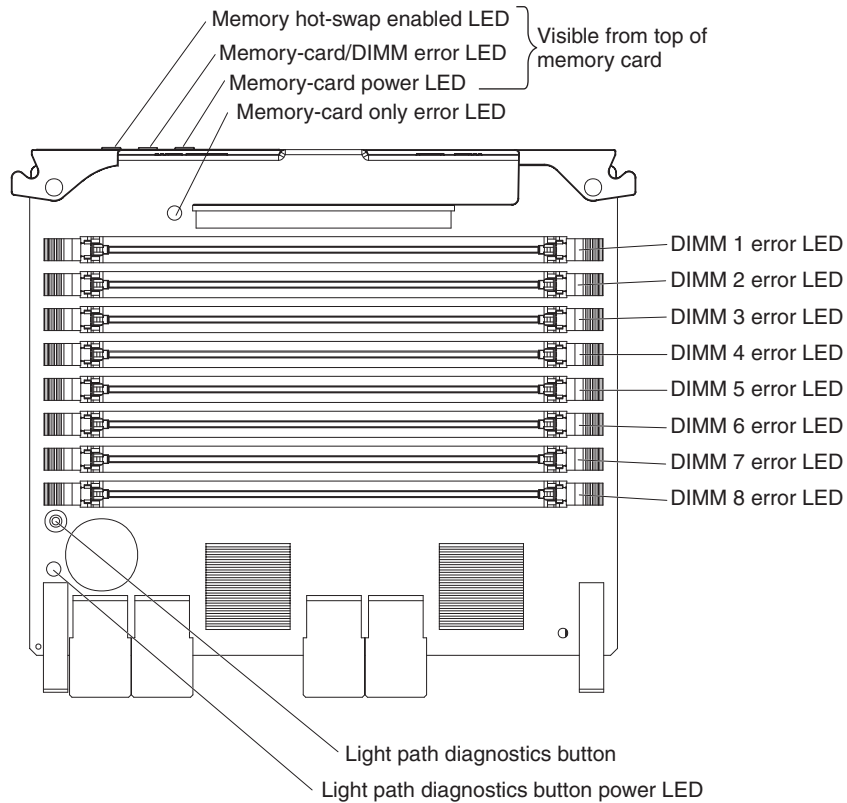
Note: (Trained service technician only) The NMI button is used for operating system debug purposes and will cause the server to reset if pressed.

- LEDs on server components:** Remove the top cover to look inside the server for lit LEDs. To identify the component that is causing the error, note the lit LED on or next to the component. For example, a memory-card error will light the LED on the top of the memory card.

The following illustration shows the LEDs on the microprocessor board.



The following illustration shows the LEDs on the memory card.



Remind button

You can use the remind button on the light path diagnostics panel to put the system-error LED on the operator information panel into Remind mode. When you press the remind button, you acknowledge the error but indicate that you will not take immediate action. The system-error LED flashes while it is in Remind mode and stays in Remind mode until one of the following conditions occurs:

- All known errors or suboptimal conditions are corrected.
- The server is powered back on.
- A new error or suboptimal condition occurs, causing the system-error LED to be lit again.

In multi-node configurations, you can also press this button during startup to start the server as a stand-alone server.

You can also use the remind button to turn off the LOG LED on the light path diagnostics panel and the information LED.

Light path diagnostics panel

The following table lists the LEDs on the light path diagnostics panel, the problems that they indicate, and actions to solve the problems.

- Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.
- See the parts listing in the *Problem Determination and Service Guide* to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).
- If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician.

Lit light path diagnostics LED with the system-error LED also lit	Description	Action
All LEDs are off (only the power LED is lit or flashing).		No action necessary.
All LEDs are off (the power LED is lit or flashing and the system-error LED is lit).	A machine check has occurred. The server is identifying the machine check, the server was interrupted while identifying the machine check, or the server was unable to identify the machine check.	<ol style="list-style-type: none"> 1. Wait several minutes for the server to identify the machine check and the server will restart. 2. (Trained service technician only) Extract the machine check data, which will be used to identify the machine check.
OVERSPEC	There is insufficient power to power the system. The LOG LED might also be lit.	<ol style="list-style-type: none"> 1. Add a power supply if only one power supply is installed. 2. Use 220 V ac instead of 110 V ac. 3. Reseat the following components: <ol style="list-style-type: none"> a. Power supply b. Power backplane 4. Remove optional devices. 5. Replace the components listed in step 3 one at a time, in the order shown, restarting the server each time.
LOG	Information is present in the BMC log and system-error log.	<ol style="list-style-type: none"> 1. Save the log if necessary and clear. 2. Check the log for possible errors.
LINK	<p>There is a fault in an SMP Expansion Port or SMP Expansion cable (requires scalability enablement).</p> <p>Notes:</p> <ol style="list-style-type: none"> 1. This LED remains lit until the problem is resolved and the server is turned off and restarted. 2. If a fault occurs, the SMP Expansion Port link LED on the failed port is off. 	<ol style="list-style-type: none"> 1. Check the SMP Expansion Port link LEDs to find the failing port or cable. 2. Reseat the SMP Expansion cables. 3. Replace the SMP Expansion cables. 4. (Trained service technician only) Replace the microprocessor board.

- Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.
- See the parts listing in the *Problem Determination and Service Guide* to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).
- If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician.

Lit light path diagnostics LED with the system-error LED also lit	Description	Action
PS	<p>A power supply has failed or has been removed.</p> <p>Note: In a redundant power configuration, the dc power LED on one power supply might be off.</p>	<ol style="list-style-type: none"> 1. Reinstall the removed power supply. 2. Check the individual power-supply LEDs to find the failing power supply. 3. Reseat the following components: <ol style="list-style-type: none"> a. Failing power supply b. Power backplane 4. Make sure that the power cord is fully seated in the power-supply inlet and the ac power source. 5. Replace the components listed in step 3 one at a time, in the order shown, restarting the server each time. 6. Disconnect the ac power cord for 20 seconds; then, reconnect the ac power cord and restart the server.
PCI	<p>A PCI adapter has failed.</p> <p>Note: The error LED next to the failing adapter on the I/O board is also lit.</p>	<ol style="list-style-type: none"> 1. See the BMC log or the system-error log. 2. Reseat the following components: <ol style="list-style-type: none"> a. Failing adapter b. I/O board shuttle assembly 3. Replace the components listed in step 2 one at a time, in the order shown, restarting the server each time.
SP	<p>The Remote Supervisor Adapter II has failed or is missing or the planar cable is not connected.</p>	<ol style="list-style-type: none"> 1. Reseat the Remote Supervisor Adapter II and planar cable. 2. Update the firmware for the Remote Supervisor Adapter II. 3. Replace the Remote Supervisor Adapter II.
FAN	<p>A fan has failed or has been removed.</p> <p>Note: A failing fan can also cause the TEMP LED to be lit.</p>	<ol style="list-style-type: none"> 1. Reinstall the removed fan. 2. If an individual fan LED is lit, replace the fan. Note: A failing fan might not cause the fan LED to be lit. 3. Reseat the microprocessor board. 4. (Trained service technician only) Replace the microprocessor board.

- Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.
- See the parts listing in the *Problem Determination and Service Guide* to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).
- If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician.

Lit light path diagnostics LED with the system-error LED also lit	Description	Action
TEMP	<p>A system temperature or component has exceeded specifications. Note: A fan LED might also be lit.</p>	<ol style="list-style-type: none"> 1. See the BMC log or the system-error log for the source of the fault. 2. Make sure that the airflow of the server is not blocked. 3. If a fan LED is lit, reseal the fan. 4. Replace the fan for which the LED is lit. 5. Make sure that the room is neither too hot nor too cold (see “Environment” in “Features and specifications” on page 4). 6. If one of the VRMs indicates “hot,” remove ac power before you restore dc power.
MEM	<p>Memory failure. Note: The error LED on the memory card is also lit.</p>	<ol style="list-style-type: none"> 1. Remove the memory card that has a lit error LED; then, press the light path diagnostics button on the memory card to identify the failed card or DIMM. See “Diagnosing problems using light path diagnostics” on page 69 for the location of the LEDs. 2. Reseat the DIMM. 3. Replace the following components one at a time, in the order shown, restarting the server each time: <ol style="list-style-type: none"> a. DIMM b. Memory card c. (Trained service technician only) Microprocessor board
NMI	<p>A hardware error has been reported to the operating system. Note: The PCI or MEM LED might also be lit.</p>	<ol style="list-style-type: none"> 1. See the BMC log and the system-error log. 2. If the PCI LED is lit, follow the instructions for that LED. 3. If the MEM LED is lit, follow the instructions for that LED. 4. Restart the server.
CNFG	<p>A configuration error has occurred.</p>	<ol style="list-style-type: none"> 1. Find the failing or missing component by checking the other light path diagnostics LEDs. 2. Make sure that the fans, power supplies, microprocessors, VRMs, and memory cards are installed in the correct sequence.

- Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.
- See the parts listing in the *Problem Determination and Service Guide* to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).
- If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician.

Lit light path diagnostics LED with the system-error LED also lit	Description	Action
CPU	A microprocessor has failed, is missing, or has been incorrectly installed.	<ol style="list-style-type: none"> 1. Make sure that the microprocessors are installed in the correct sequence; see “Installing an additional microprocessor” on page 22. 2. Check the BMC log or the system-error log to determine the reason for the lit LED. 3. Find the failing, missing, or mismatched microprocessor by checking the LEDs on the microprocessor board. 4. Reseat the following components: <ol style="list-style-type: none"> a. Failing microprocessor b. Microprocessor board 5. Replace the following components one at a time, in the order shown, restarting the server each time: <ol style="list-style-type: none"> a. (Trained service technician only) Failing microprocessor b. (Trained service technician only) Microprocessor board
VRM	A dc-dc regulator has failed or is missing.	<ol style="list-style-type: none"> 1. Check the BMC log or the system-error log to determine the reason for the lit LED (for a VRM). 2. Find the failing or missing VRM by checking the LEDs on the microprocessor board. 3. Install any missing VRMs. 4. Reseat the following components: <ol style="list-style-type: none"> a. Failing VRM b. Microprocessor associated with the VRM c. Microprocessor board 5. Replace the following components one at a time, in the order shown, restarting the server each time: <ol style="list-style-type: none"> a. Failing VRM b. (Trained service technician only) Microprocessor associated with the VRM c. (Trained service technician only) Microprocessor board

- Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.
- See the parts listing in the *Problem Determination and Service Guide* to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).
- If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician.

Lit light path diagnostics LED with the system-error LED also lit	Description	Action
DASD	A hard disk drive has failed or has been removed. Note: The error LED on the failing hard disk drive is also lit.	<ol style="list-style-type: none"> 1. Reinstall the removed drive. 2. Reseat the following components: <ol style="list-style-type: none"> a. Failing hard disk drive b. SAS hard disk drive backplane c. SAS signal cable d. I/O board shuttle assembly 3. Replace the components listed in step 2 one at a time, in the order shown, restarting the server each time.
RAID	The RAID controller has indicated a fault.	<ol style="list-style-type: none"> 1. Check the BMC log or the system-error log for information. 2. Reseat the following components: <ol style="list-style-type: none"> a. RAID controller, if possible b. Hard disk drives c. I/O board shuttle assembly 3. Replace the components in step 2 one at a time, in the order shown, restarting the server each time.
BOARD	The microprocessor board or I/O board has failed.	<ol style="list-style-type: none"> 1. Find the failing board by checking the LEDs on the microprocessor board and I/O board. 2. Reseat the failing board. 3. Replace the failing board.

Appendix. 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 section contains information about where to go for additional information about IBM and IBM products, what to do if you experience a problem with your 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 and any optional devices are turned on.
- Use the troubleshooting information in your system documentation, and use the diagnostic tools that come with your system. Information about diagnostic tools is in the *Problem Determination and Service Guide* on the *IBM Documentation CD* that comes with your system.
- Go to the IBM support Web site at <http://www.ibm.com/systems/support/> to check for technical information, hints, tips, and new device drivers or to submit a request for information.

You can solve many problems without outside assistance by following the troubleshooting procedures that IBM provides in the online help or in the documentation that is provided with your IBM product. The documentation that comes with IBM systems also describes the diagnostic tests that you can perform. Most systems, operating systems, and programs come with documentation that contains troubleshooting procedures and explanations of error messages and error codes. If you suspect a software problem, see the documentation for the operating system or program.

Using the documentation

Information about your IBM system and preinstalled software, if any, or optional device is available in the documentation that comes with the product. That documentation can include printed documents, online documents, 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/systems/support/> and follow the instructions. Also, some documents are available through the IBM Publications Center at <http://www.ibm.com/shop/publications/order/>.

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 systems, optional devices, services, and support. The address for IBM System x and xSeries® information is <http://www.ibm.com/systems/x/>. The address for IBM BladeCenter® information is <http://www.ibm.com/systems/bladecenter/>. The address for IBM IntelliStation® information is <http://www.ibm.com/intellistation/>.

You can find service information for IBM systems and optional devices at <http://www.ibm.com/systems/support/>.

Software service and support

Through IBM Support Line, you can get telephone assistance, for a fee, with usage, configuration, and software problems with System x and xSeries servers, BladeCenter products, IntelliStation workstations, and appliances. For information about which products are supported by Support Line in your country or region, see <http://www.ibm.com/services/sl/products/>.

For more information about Support Line and other IBM services, see <http://www.ibm.com/services/>, or see <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 your IBM reseller or IBM Services. To locate a reseller authorized by IBM to provide warranty service, go to <http://www.ibm.com/partnerworld/> and click **Find a Business Partner** on the right side of the page. For IBM support telephone numbers, see <http://www.ibm.com/planetwide/>. 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.

IBM Taiwan product service

台灣 IBM 產品服務聯絡方式：
台灣國際商業機器股份有限公司
台北市松仁路7號3樓
電話：0800-016-888

IBM Taiwan product service contact information:

IBM Taiwan Corporation
3F, No 7, Song Ren Rd.
Taipei, Taiwan
Telephone: 0800-016-888

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Important notes

Processor speed indicates the internal clock speed of the microprocessor; other factors also affect application performance.

CD or DVD drive speed is the variable read rate. Actual speeds vary and are often less than the possible maximum.

When referring to processor storage, real and virtual storage, or channel volume, KB stands for 1024 bytes, MB stands for 1 048 576 bytes, and GB stands for 1 073 741 824 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 can 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 that are available from IBM.

Maximum memory might require replacement of the standard memory with an optional memory module.

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Some software might differ from its retail version (if available) and might not include user manuals or all program functionality.

Particulate contamination

Attention: Airborne particulates (including metal flakes or particles) and reactive gases acting alone or in combination with other environmental factors such as humidity or temperature might pose a risk to the server that is described in this document. Risks that are posed by the presence of excessive particulate levels or concentrations of harmful gases include damage that might cause the server to malfunction or cease functioning altogether. This specification sets forth limits for particulates and gases that are intended to avoid such damage. The limits must not be viewed or used as definitive limits, because numerous other factors, such as temperature or moisture content of the air, can influence the impact of particulates or environmental corrosives and gaseous contaminant transfer. In the absence of specific limits that are set forth in this document, you must implement practices that maintain particulate and gas levels that are consistent with the protection of human health and safety. If IBM determines that the levels of particulates or gases in your environment have caused damage to the server, IBM may condition provision of repair or replacement of servers or parts on implementation of appropriate remedial measures to mitigate such environmental contamination. Implementation of such remedial measures is a customer responsibility.

Table 5. Limits for particulates and gases

Contaminant	Limits
Particulate	<ul style="list-style-type: none"> The room air must be continuously filtered with 40% atmospheric dust spot efficiency (MERV 9) according to ASHRAE Standard 52.2¹. Air that enters a data center must be filtered to 99.97% efficiency or greater, using high-efficiency particulate air (HEPA) filters that meet MIL-STD-282. The deliquescent relative humidity of the particulate contamination must be more than 60%². The room must be free of conductive contamination such as zinc whiskers.
Gaseous	<ul style="list-style-type: none"> Copper: Class G1 as per ANSI/ISA 71.04-1985³ Silver: Corrosion rate of less than 300 Å in 30 days

¹ ASHRAE 52.2-2008 - *Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size*. Atlanta: American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc.

² The deliquescent relative humidity of particulate contamination is the relative humidity at which the dust absorbs enough water to become wet and promote ionic conduction.

³ ANSI/ISA-71.04-1985. *Environmental conditions for process measurement and control systems: Airborne contaminants*. Instrument Society of America, Research Triangle Park, North Carolina, U.S.A.

Documentation format

The publications for this product are in Adobe Portable Document Format (PDF) and should be compliant with accessibility standards. If you experience difficulties when you use the PDF files and want to request a Web-based format or accessible PDF document for a publication, direct your mail to the following address:

*Information Development
IBM Corporation
205/A015*

3039 E. Cornwallis Road
P.O. Box 12195
Research Triangle Park, North Carolina 27709-2195
U.S.A.

In the request, be sure to include the publication part number and title.

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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. IBM is not responsible for any radio or television interference caused 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 2004/108/EC 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.

European Community contact:
IBM Technical Regulations
Pascalstr. 100, Stuttgart, Germany 70569
Telephone: 0049 (0)711 785 1176
Fax: 0049 (0)711 785 1283
E-mail: tjahn@de.ibm.com

Taiwanese Class A warning statement

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種情況下，使用者會被要
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Germany Electromagnetic Compatibility Directive

Deutschsprachiger EU Hinweis:

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Dieses Produkt entspricht den Schutzanforderungen der EU-Richtlinie 2004/108/EG zur Angleichung der Rechtsvorschriften über die elektromagnetische Verträglichkeit in den EU-Mitgliedsstaaten und hält die Grenzwerte der EN 55022 Klasse A ein.

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Zulassungsbescheinigung laut dem Deutschen Gesetz über die elektromagnetische Verträglichkeit von Geräten (EMVG) (bzw. der EMC EG Richtlinie 2004/108/EG) für Geräte der Klasse A

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Generelle Informationen:

Das Gerät erfüllt die Schutzanforderungen nach EN 55024 und EN 55022 Klasse A.

People's Republic of China Class A warning statement

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と電波妨害を引き起こすことがあります。この場合には使用者が適切な対策
を講ずるよう要求されることがあります。 VCCI-A

Korean Class A warning statement

이 기기는 업무용으로 전자파 적합등록을 받은 기기
이오니, 판매자 또는 사용자는 이점을 주의하시기
바라며, 만약 잘못 구입하셨을 때에는 구입한 곳에
서 비업무용으로 교환하시기 바랍니다.

Index

A

- accessible documentation 81
- adapter installing 26
- assistance, getting 77
- attention notices 3

B

- baseboard management controller (BMC) 46
- bays 5
- beep codes 54

C

- cable routing 29
- cable routing, internal 28
- cables, connecting 29
- cabling
 - external 29
 - the server 29
- cache 5
- caution statements 3
- CD drive problems 57
- Class A electronic emission notice 82
- components 6
- configuration
 - four-node 33
 - three-node 31
 - two-node 30
 - updating 29
- Configuration/Setup Utility program 45
- configuring hardware 45
- connector
 - electrostatic-discharge 38
 - external SAS 41
 - Gigabit Ethernet 39
 - power-supply 40, 41
 - system serial 41
 - USB, front 37
 - USB, rear 41
- connectors
 - cable 29
 - external 29
 - front 29
 - rear 29
- contamination, particulate and gaseous 5, 81

D

- danger statements 3
- diagnostic tools 53
- diagnostics, light path 68
- dimensions 5
- DIMM
 - connectors 16
 - installation sequence 17
- documentation CD 2

- documentation format 81
- drive, installing hot-swap 14
- drives 5
- DVD drive
 - install 15
- DVD drive problems 57
- DVD-eject button 37
- DVD-ROM
 - activity LED 37
 - eject button 37

E

- electrical input 5
- electronic emission Class A notice 82
- electrostatic-discharge connector 38
- environment 5
- error codes, POST 54
- error LED
 - memory 19
 - memory card 19
 - system 38, 39
- error symptoms
 - CD-ROM drive, DVD-ROM drive 57
 - general 58
 - hard disk drive 58
 - intermittent 59
 - keyboard, USB 59
 - memory 60
 - microprocessor 61
 - mouse, USB 59
 - optional devices 64
 - pointing device, USB 59
 - power 65
 - serial port 66
 - software 68
 - USB port 68
- Ethernet
 - activity LED 38, 40
 - Gigabit activity LED 38, 40
 - Gigabit connector 39
 - Gigabit link LED 39
- expansion bays 5
- expansion slots 5
- external cabling 29

F

- FCC Class A notice 82
- features 4
- filler panel, hard disk drive bay 14
- firmware updates 1
- four-node configuration 33
- front connectors 29
- front USB connector 37
- front view, LEDs 37

G

- gaseous contamination 5, 81
- getting help 77
- Gigabit Ethernet
 - activity LED 39
 - connector 39
 - link LED 39
- guidelines
 - installation 9
 - system reliability 10

H

- hard disk drive
 - activity LED 37
 - problems 58
 - status LED 37
- hardware service and support 78
- heat output 5
- heat sink, installing 24
- help, getting 77
- hot-swap drive, installing 14
- humidity 5

I

- IBM Director, updating 51
- IBM Support Line 78
- important notices 3
- information LED 38
- install
 - DVD drive 15
 - hot-swap power supply 12
- installation
 - guidelines 9
- installation, completing 28
- installing
 - adapter 26
 - DIMMs 16
 - heat sink 24
 - memory 19
 - memory card 21
 - microprocessor 22
 - options 9
 - RAID controller 25
- integrated
 - functions 5
- intermittent problems 59

L

- LED
 - DVD-ROM activity 37
 - error
 - memory 19
 - memory card 19
 - Gigabit Ethernet 2 activity 39
 - Gigabit Ethernet 2 link 39
 - Gigabit Ethernet activity 38, 40
 - hard disk drive activity 37

LED (continued)

- hard disk drive status 37
 - locator 38, 39
 - memory card power 19
 - memory hot-swap enabled 19
 - power-on 38, 39
 - scalability 38
 - system-error 38, 39
- ## LEDs
- light path, viewing without power 69
 - microprocessor/memory card assembly 70
- ## LEDs, light path
- PCI BRD 76
- ## light path diagnostic LEDs
- actions 71
- ## light path diagnostic panel 69
- ## light path diagnostics 68, 69
- remind button 71
- ## light path diagnostics LEDs
- problems 71
- ## LSI Logic Configuration Utility program 46
- ## LSI Logic MegaRAID Storage Manager program 46

M

- memory
 - card power LED 19
 - card, installing 21
 - hot-swap enabled LED 19
 - installing 19
 - problems 60
 - specifications 5
- microprocessor 5
 - installing 22
 - problems 61
- microprocessor/memory cards
 - problems 70
- monitor problems 61
- mouse problems 59

N

- node description 30
- noise emissions 5
- notes 3
- notes, important 80
- notices 79
 - electronic emission 82
 - FCC, Class A 82
- notices and statements 3

O

- online documentation 1
- operator information panel 37, 69
- optional device problems 64

P

- particulate contamination 5, 81
- PCI BRD LED 76
- pointing device problems 59
- POST
 - beep codes 53, 54
 - error codes 54
- power
 - features 41
 - problems 65
 - requirement 5
- power supply
 - connector 40, 41
 - specification 5
- power-control
 - button 38
 - button cover 38
- power-on
 - LED 38, 39
- problems
 - CD-ROM, DVD-ROM drive 57
 - hard disk drive 58
 - intermittent 59
 - keyboard 59
 - memory 60
 - microprocessor 61
 - monitor 61
 - optional devices 64
 - power 65
 - serial port 66
 - ServerGuide 67
 - software 68
 - solving 53
 - USB port 68
 - video 61

R

- rack installation 2
- RAID controller installation 25
- rear
 - connectors 29
 - view 39
- rear USB
 - USB connectors 41
- remind button 71
- Remote Supervisor Adapter II connectors 40

S

- SAS connector 41
- scalability LED 38
- scalable partition web interface 46
- serial connector 41
- serial port problems 66
- ServerGuide
 - error symptoms 67
 - using 45
- ServerGuide CD 1
- size 5

- slots 5
- SMP expansion
 - cabling 30
 - port connectors 41
 - port link LEDs 41
- software problems 68
- software service and support 78
- solving problems 53
- specifications 4
- standby mode 41
- statements and notices 3
- static-sensitive devices, handling 11
- support, web site 77
- system-error LED 38, 39

T

- table
 - memory
 - cost-sensitive configuration 17
 - memory-mirroring configuration 18
 - performance configuration 17
- telephone numbers 78
- temperature 5
- three-node configuration 31
- trademarks 79
- troubleshooting chart 57
- turning off server 42
- turning on server 41
- two-node configuration 30

U

- United States electronic emission Class A notice 82
- United States FCC Class A notice 82
- Universal Serial Bus (USB) problems 68
- USB connectors 37, 41

V

- video problems 61

W

- web site
 - publication ordering 77
 - support 77
 - support line, telephone numbers 78
- weight 5
- working inside server with power on 11



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