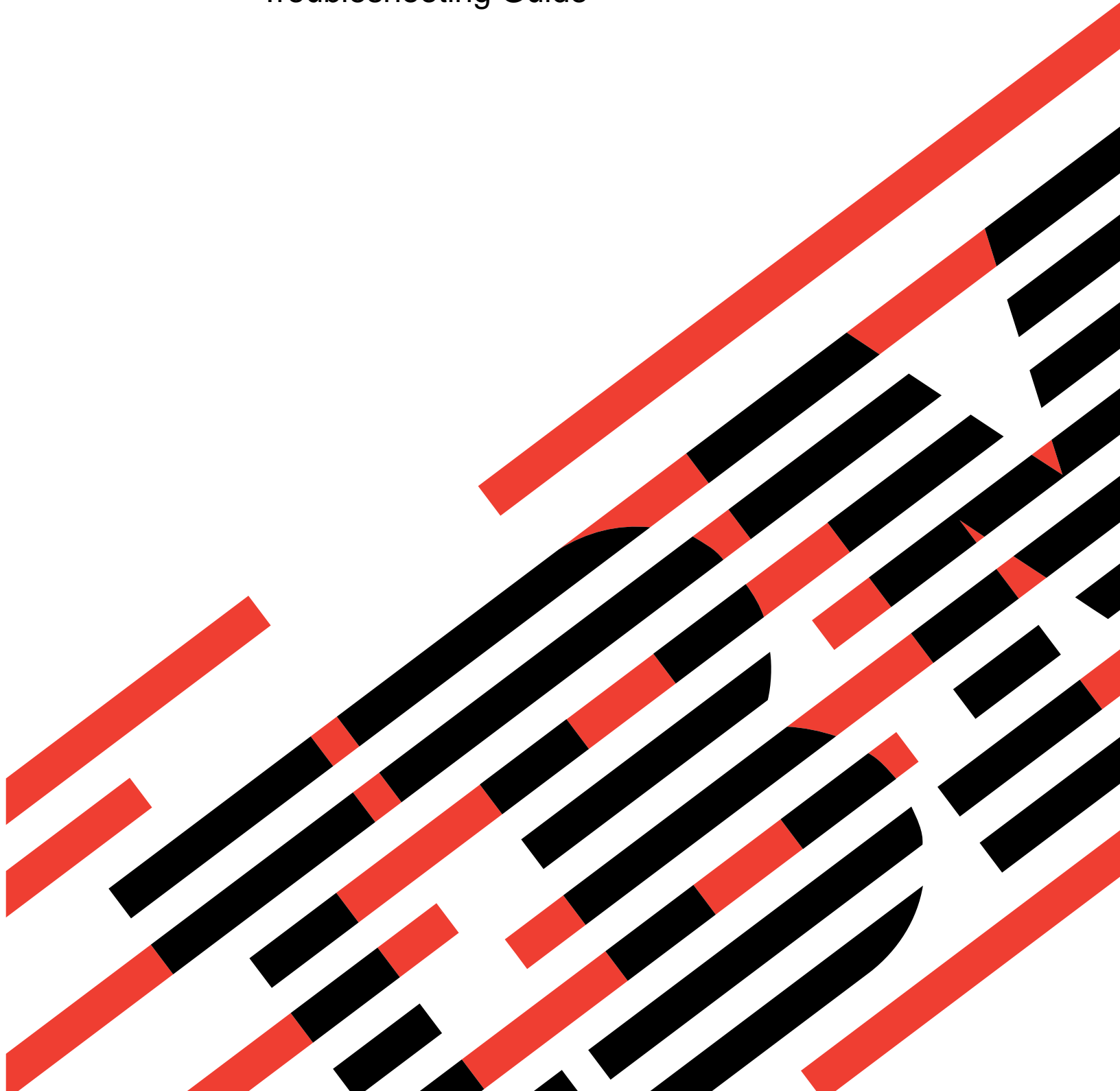


IBM

@server

xSeries 440

Troubleshooting Guide





xSeries 440

Troubleshooting Guide

SC59-P678-80

Note: Before using this information and the product it supports, be sure to read the general information in Appendix A, "Notices" on page 51.

Third Edition (November 2002)

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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.

Statement 1:



DANGER

Electrical current from power, telephone, and communication cables is hazardous.

To avoid a shock hazard:

- **Do not connect or disconnect any cables or perform installation, maintenance, or reconfiguration of this product during an electrical storm.**
- **Connect all power cords to a properly wired and grounded electrical outlet.**
- **Connect to properly wired outlets any equipment that will be attached to this product.**
- **When possible, use one hand only to connect or disconnect signal cables.**
- **Never turn on any equipment when there is evidence of fire, water, or structural damage.**
- **Disconnect the attached power cords, telecommunications systems, networks, and modems before you open the device covers, unless instructed otherwise in the installation and configuration procedures.**
- **Connect and disconnect cables as described in the following table when installing, moving, or opening covers on this product or attached devices.**

To Connect:

1. Turn everything OFF.
2. First, attach all cables to devices.
3. Attach signal cables to connectors.
4. Attach power cords to outlet.
5. Turn device ON.

To Disconnect:

1. Turn everything OFF.
2. First, remove power cords from outlet.
3. Remove signal cables from connectors.
4. Remove all cables from devices.

Statement 2:



CAUTION:

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

Do not:

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

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

Statement 3:



CAUTION:

When laser products (such as CD-ROMs, DVD drives, fiber optic devices, or transmitters) are installed, note the following:

- Do not remove the covers. Removing the covers of the laser product could result in exposure to hazardous laser radiation. There are no serviceable parts inside the device.
- Use of controls or adjustments or performance of procedures other than those specified herein might result in hazardous radiation exposure.

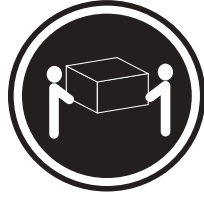


DANGER

Some laser products contain an embedded Class 3A or Class 3B laser diode. Note the following.

Laser radiation when open. Do not stare into the beam, do not view directly with optical instruments, and avoid direct exposure to the beam.

Statement 4:



≥ 18 kg (39.7 lb)



≥ 32 kg (70.5 lb)



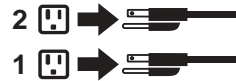
≥ 55 kg (121.2 lb)

CAUTION:
Use safe practices when lifting.

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.

Chapter 1. Introduction

Problems can be caused by hardware, software, or some other error. This *Troubleshooting Guide* provides the information needed to help you solve the problem yourself, or provide helpful information to a service technician.

In addition to this *Troubleshooting Guide*, the following xSeries 440 documentation is provided with your server:

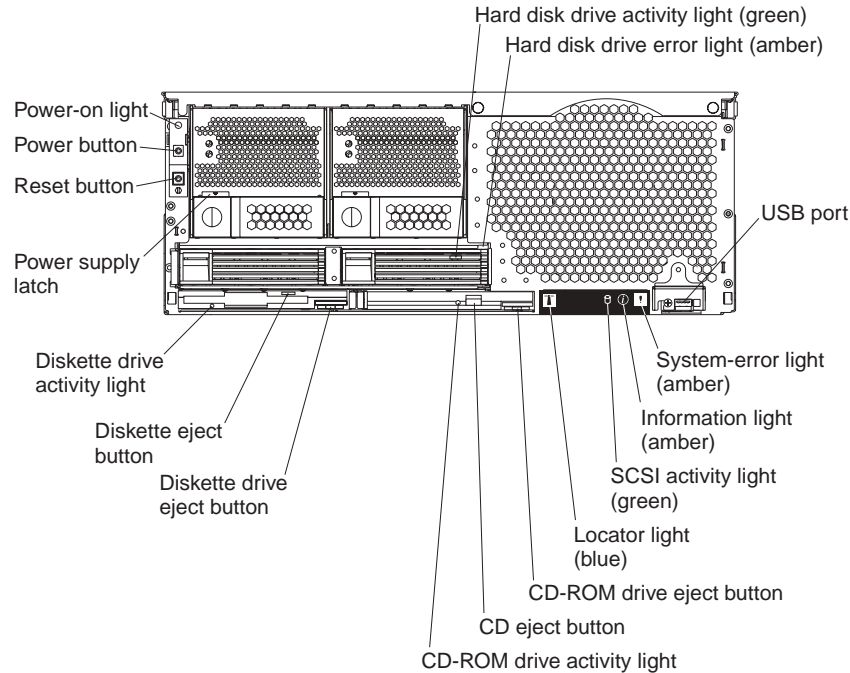
- *Installation Guide*
This printed publication contains setup and installation instructions. This publication is also provided in Portable Document Format (PDF) format on the *IBM® xSeries™ Documentation CD*.
- *Rack Installation Instructions*
This printed publication contains the instructions needed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

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

Server controls and indicators

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

Front view



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

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

Hard disk drive error light: When this amber light is on, it indicates that there is a problem with the hard disk drive.

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

System-error light: When this amber light is on, it indicates a system error has occurred.

Information light: When this amber light is on, it indicates information about a system error has been placed in the System Error log.

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

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

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

CD eject button: Push this button to release a CD from the drive.

CD-ROM drive activity light: When this light is on, it indicates that the CD-ROM drive is in use.

Diskette drive eject button: Push this button to release a diskette drive from the server.

Diskette eject button: Push this button to release a diskette from the drive.

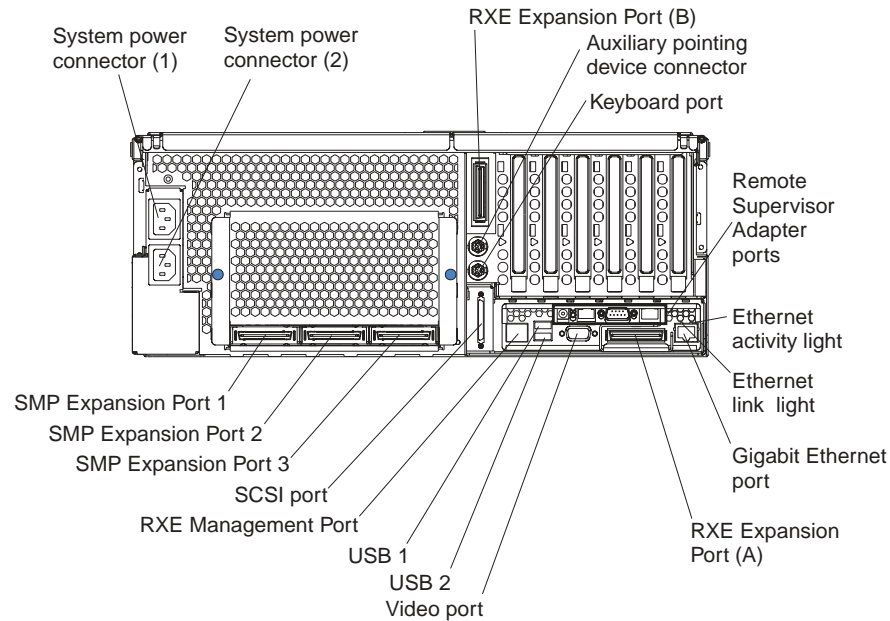
Diskette drive activity light: When this light is on, it indicates that the diskette drive is in use.

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

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

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

Rear view



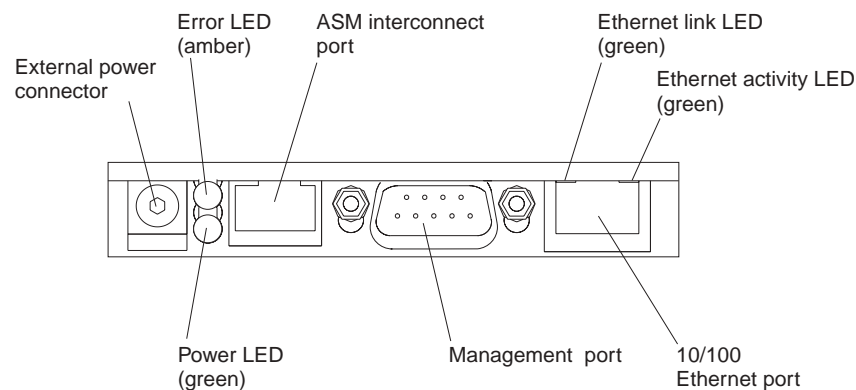
System power connectors (1 and 2): The system power cords are connected to these two connectors to provide power to the system.

RXE Expansion Port (B): Use this port to connect the server to a remote I/O enclosure when two SMP Expansion Modules are installed.

Auxiliary pointing device connector: Signal cables for a mouse, trackball, or other pointing device are connected to the auxiliary pointing device connector.

Keyboard port: Signal cables for a keyboard are connected to the keyboard port.

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



- **External power connector** - This connector is not supported on this server.
- **Error LED** - This amber light goes on when a system management error has occurred.
- **ASM interconnect port** - Signal cables for managing expansion module resources are connected to this port.

- **Ethernet link light:** This green light, located on the right of the Ethernet port, goes on when there is an active link connection on the Ethernet controller for the Ethernet port.
- **Ethernet activity light:** This green light, located on the left of the Ethernet port, goes on when there is activity on the Ethernet LAN connected to the Ethernet port.
- **10/100 Ethernet port** - Ethernet Signal cables are connected to the Ethernet port.
- **Management port** - Signal cables for modems or other serial devices are connected to this port.
- **Power LED** - This green light goes on and stays on when you plug in your server.

Ethernet activity light: This green light, located on the left of the Gigabit Ethernet port, blinks when there is activity on the Ethernet LAN.

Ethernet link light: This green light, located on the right of the Gigabit Ethernet port, goes on when there is an active link connection on the Gigabit Ethernet controller for Ethernet port 1.

Gigabit Ethernet port: Gigabit Ethernet Signal cables are connected to the Gigabit Ethernet port. This port supports 10/100/1000 speed connections.

RXE Expansion Port (A): Use this port to connect the server to a remote I/O enclosure, when only one SMP Expansion Module is installed.

Video port: The signal cable for a monitor connects to the video port.

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

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

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

SCSI port: This port is used to connect external SCSI devices to the server.

SMP Expansion port 3: This port is intended for future use.

SMP Expansion port 2: This port is used to interconnect two SMP Expansion Modules together.

SMP Expansion port 1: This port is used to interconnect two SMP Expansion Modules together.

Server power features

This section contains information on how to properly turn your server on and off.

Turning on the server

You can turn on the server in any of the following ways:

- If the power cords are connected to a power source, you can press the power-control button on the front of the server.

Notes:

1. You can install a circular disk over the power-control button to prevent accidental manual power-off. This disk, known as the power-control button shield, comes with your server.
 2. After you plug the power cords of your server into the electrical outlets, wait approximately 20 seconds before pressing the power-control button. During this time, the system-management adapter is initializing; therefore, the power-control button does not respond.
- If the server is turned on and a power failure occurs, the server will restart automatically when power is restored.
 - If ac power is present and the server is in Standby mode, the server can be turned on from the Remote Supervisor Adapter user interface.
 - When you plug in your server for the first time, Wake on LAN[®] can turn on the server.
 - If your server was previously turned on, it must be properly placed in Standby mode for the Wake on LAN feature to turn on the server.

Complete the following steps to manually turn on the server:

1. Review the information in “Safety” on page v.
2. Turn on all external devices, such as the monitor.
3. Plug the server power cords into the power source.
4. Press the power-control button on the front of the server.

Note: While the server is powering up, the power-on LED on the front of the server is lit.

Turning off the server

Complete the following steps to manually turn off the server:

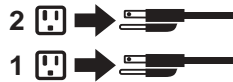
1. Review the information in “Safety” on page v.
2. See your operating system documentation for the proper procedure to shut down the operating system.

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.



3. Press the power-control button on the front of the server. This will put the server in Standby mode.
Note: You might need to press and hold the power-control button for more than 4 seconds to cause an immediate shutdown of the server and to force it into Standby mode. You can use this feature if the operating system stops functioning.
4. Disconnect the server from the power source.
Note: After disconnecting all the power cords, wait approximately 15 seconds for your system to stop running. Watch for the power-on LED on the front of the server to stop flashing.

Standby mode

Standby mode refers to the condition in which the server is connected to an ac power source but the server operating system is not running and all core logic is shut down except for the service processor. In Standby mode, the server can respond to service processor requests, such as a remote request to turn on the server. When the server is in Standby mode, the power-on LED on the front of the server flashes (when the server is running, the power-on LED stays on and does not flash).

You can put the server in Standby mode in any of the following ways:

- You can press the power-control button on the server. This starts an orderly shutdown of the operating system, if this feature is supported by your operating system.
- The server can be placed in Standby mode from the Remote Supervisor Adapter user interface.

Complete the following steps to put the server into Standby mode:

1. See the operating system documentation for the proper procedure to shut down the operating system.

Note: Each operating system is different. Read all the documentation about shutting down the operating system before continuing.

2. Press the power-control button on the front of the server.

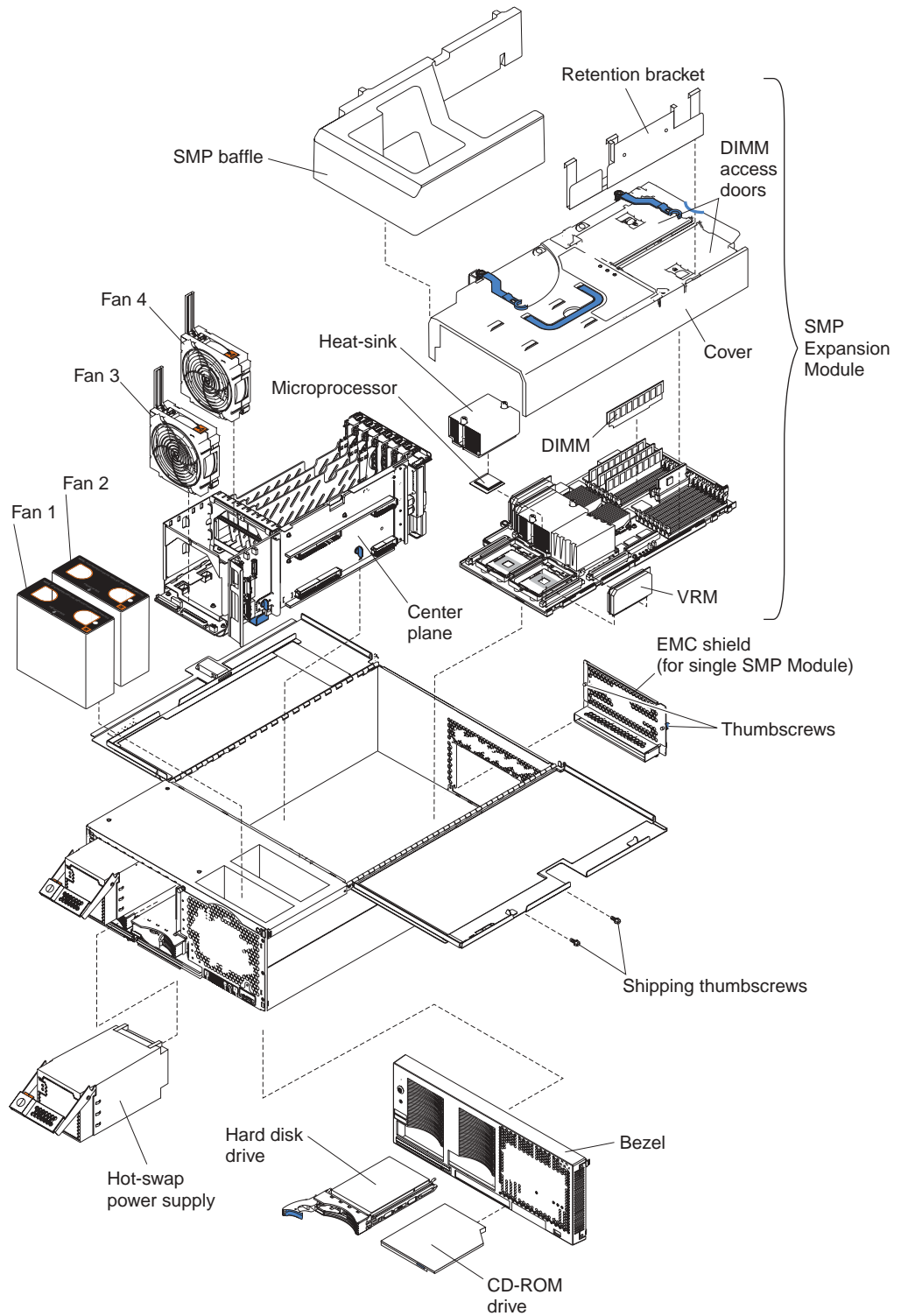
Notes:

- a. After you place the server in Standby mode, wait at least 5 seconds before you turn on the server again.
- b. You might need to press and hold the power-control button for more than 4 seconds to cause an immediate shutdown of the operating system and to force it into Standby mode. You can use this feature if the operating system stops functioning.

Major components of the xSeries 440

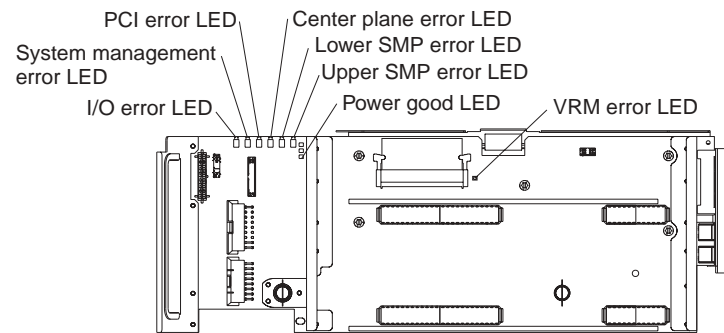
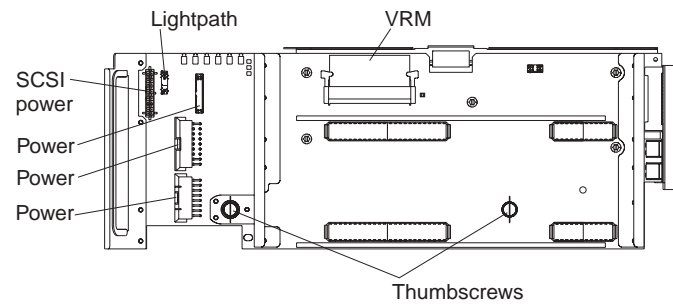
The following illustration shows the locations of major components in your server.

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



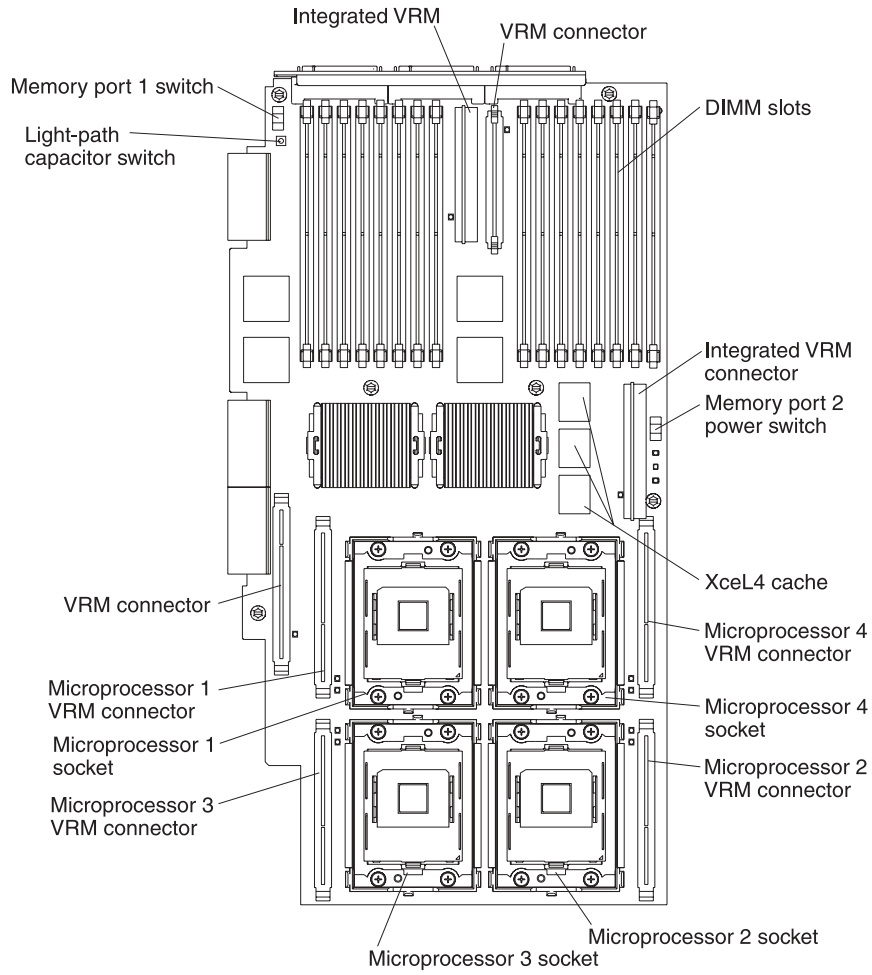
Center plane connectors and LEDs

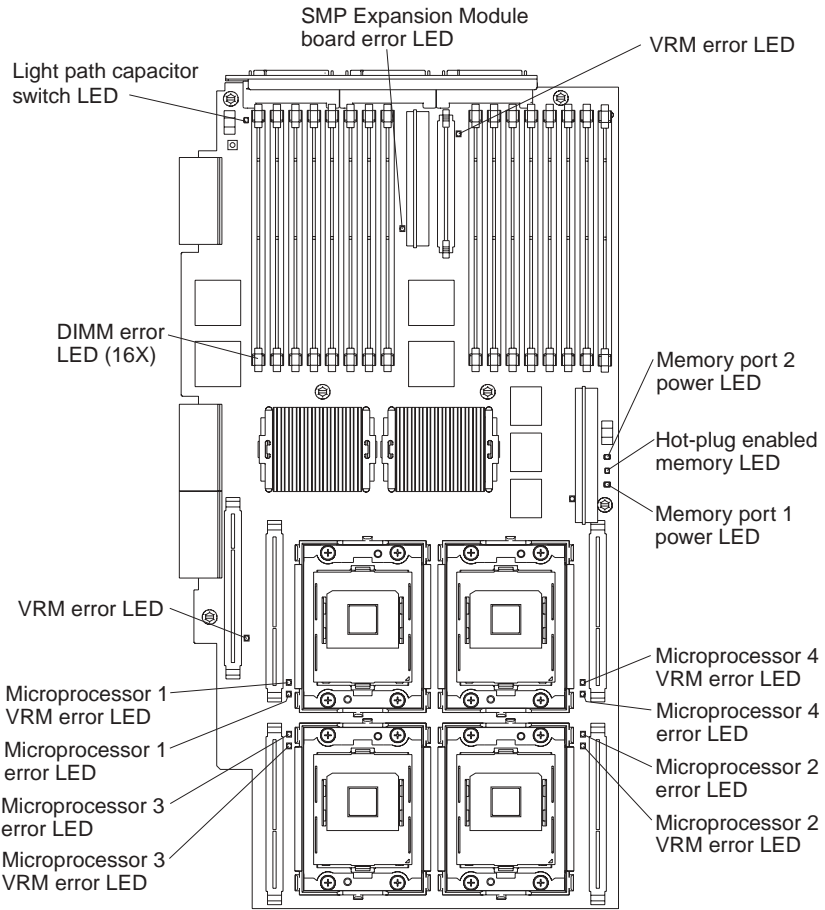
The following illustrations identify the connectors and LEDs on the center plane. This center plane is used to connect the power and signal paths for the SMP Expansion Module, I/O board, and the Remote Supervisor Adapter.



SMP Expansion Module connectors and lights

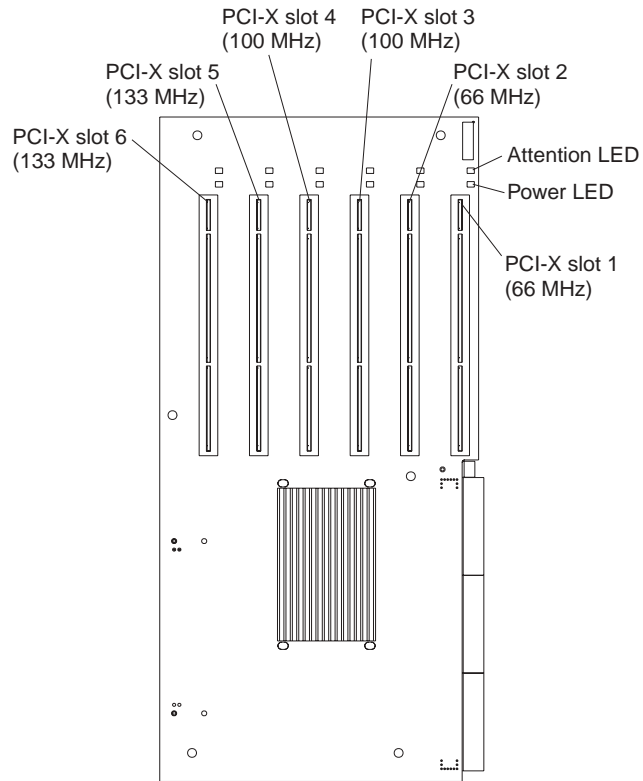
The following illustrations identify the connectors, switches, and lights on the SMP Expansion Module.





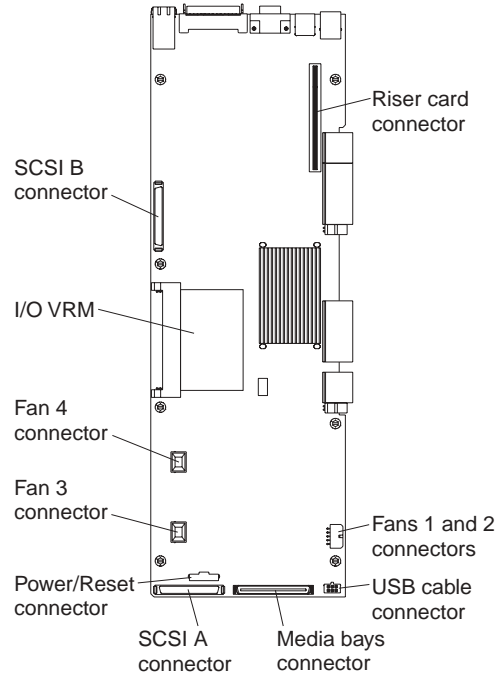
PCI-X planar internal connectors and LEDs

The following illustration identifies the internal connectors and LEDs on the PCI-X planar. This planar enables you to install adapters into the server.



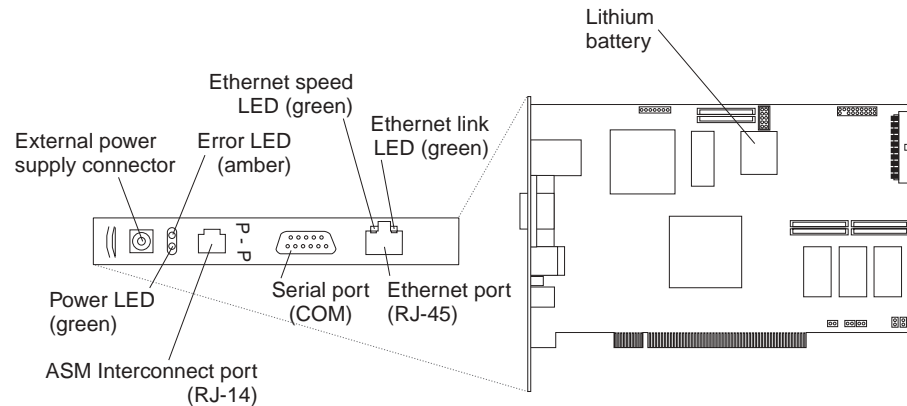
I/O board internal connectors

The following illustration identifies the internal connectors on the I/O board. This board supports the input and output ports located on the server.



Remote Supervisor Adapter component locations

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



Chapter 2. Solving Problems

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

If you cannot locate and correct the problem using the information in this section, see “Getting help and technical assistance” on page 48 for more information.

Diagnostic tools overview

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

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

The power-on self-test (POST) generates beep codes and messages to indicate successful test completion or the detection of a problem. See “POST” on page 17 for more information.

- **Diagnostic programs and error messages**

The server diagnostic programs are stored in upgradable read-only memory (ROM) on the system board. These programs are the primary method of testing the major components of your server. See “Diagnostic programs and error messages” on page 31 for more information.

- **Light Path Diagnostics™ feature**

Use the Light Path Diagnostics feature to identify system errors quickly.

- **Troubleshooting charts**

These charts list problem symptoms, along with suggested steps to correct the problems. See the “Troubleshooting charts” on page 43 for more information.

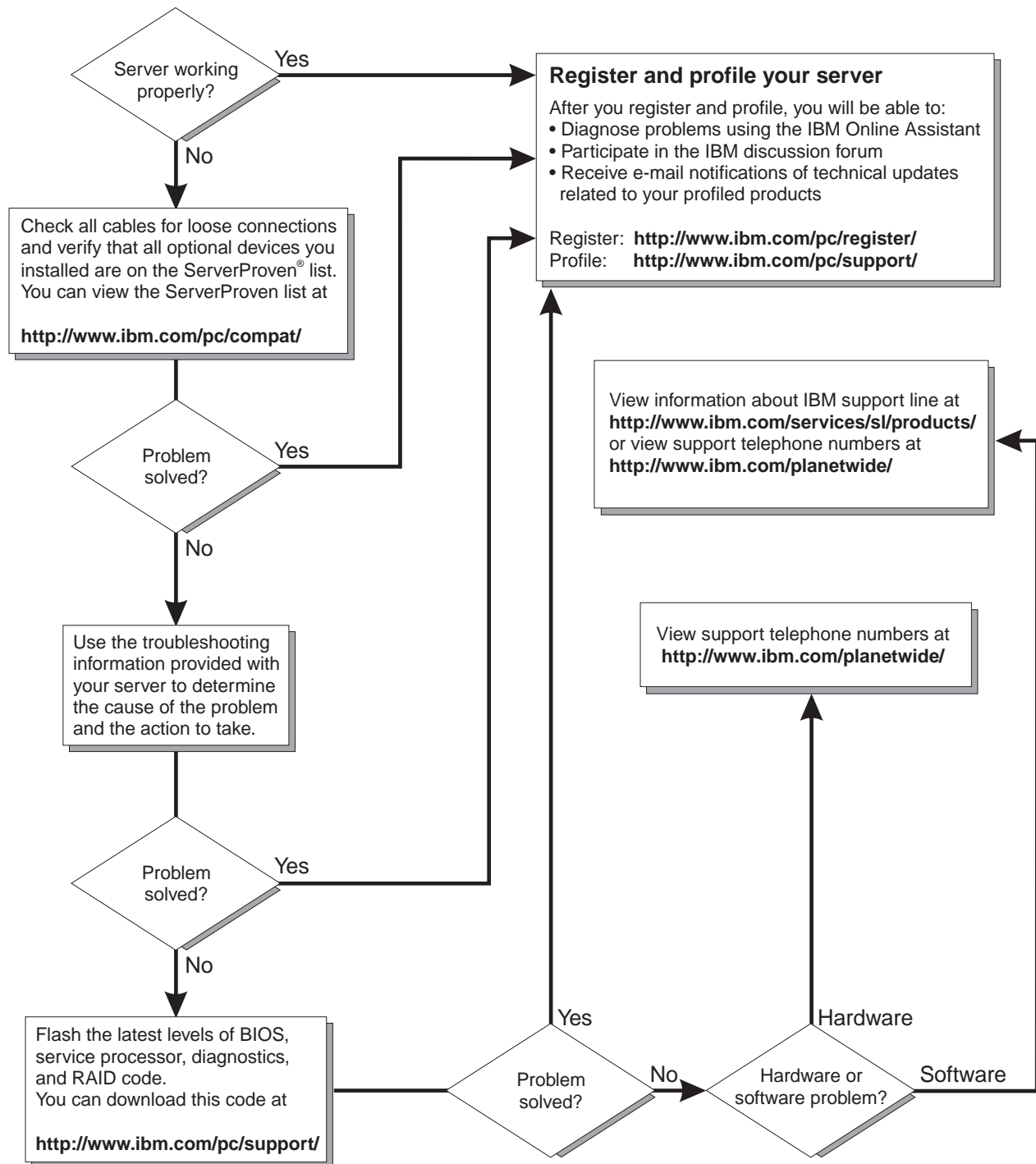
- **Customized support page**

You can create a customized support page that is specific to your hardware, complete with Frequently Asked Questions, Parts Information, Technical Hints and Tips, and Downloadable Files. In addition, you can choose to receive electronic mail (e-mail) notifications whenever new information becomes available about your registered products.

After you register and profile your xSeries products, you can diagnose problems using the IBM Online Assistant and you can participate in the IBM discussion forum. For more detailed information about registering and creating a customized profile for your IBM products, visit the following addresses on the Web:

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

Server Support



POST

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

If POST finishes without detecting any problems, a single beep sounds, and the first screen of your operating system or application program appears.

If POST detects a problem, more than one beep sounds, and an error message appears on your screen. See “POST beep code descriptions” and “POST error messages” on page 20 for more information.

Notes:

1. If you have a power-on password set, you must type the password and press Enter, when prompted, before POST will continue.
2. A single problem might cause several error messages. When this occurs, work to correct the cause of the first error message. After you correct the cause of the first error message, the other error messages usually will not occur the next time you run the test.

POST beep code descriptions

Beep codes are sounded in a series of long and short beeps.

The possible types of beep codes that your server might emit include the following:

No beeps

If no beep occurs after your server completes POST, call for service.

Continuous beep

Your startup (boot) microprocessor has failed, or your system board or speaker subsystem might contain a failing component. If the system continues through POST with no errors, call for service. If no video appears, the startup processor has failed; replace the startup processor.

One short beep

One beep indicates that your server successfully completed POST. POST detected no configuration or functional errors. One beep also occurs after your server completes POST if you type an incorrect power-on password.

Two short beeps

POST encountered an error. The Configuration/Setup Utility program will display additional information; follow the instructions that appear on the screen. See “POST error messages” on page 20 for descriptions of the text messages that might appear.

Three short beeps

A system memory error has occurred. This combination occurs only if the video basic input/output system (BIOS) cannot display the error message. Replace the failing memory module.

Repeating short beeps

The system board might contain a failing component, your keyboard might be defective, or a key on the keyboard might be stuck. Ensure that:

- Nothing is resting on the keyboard and pressing a key.
- No key is stuck.
- The keyboard cable is connected correctly to the keyboard and to the correct connector on the server.

Running the diagnostic tests can isolate the server component that failed, but you must have your system serviced. If the error message remains, call for service.

Note: If you just connected a new mouse or other pointing device, turn off the server and disconnect that device. Wait at least 5 seconds; then, turn on the server. If the error message goes away, replace the device.

One long and one short beep

POST encountered an error on a video adapter. If you are using the integrated video controller, call for service. If you are using an optional video adapter, replace the failing video adapter.

One long and two short beeps

A video I/O adapter ROM is not readable, or the video subsystem is defective. If you hear this beep combination twice, both the system board and an optional video adapter have failed the test. This beep combination might also indicate that the system board contains a failing component.

One long and three short beeps

The system-board video subsystem has not detected a monitor connection to the server. Ensure that the monitor is connected to the server. If the problem persists, replace the monitor.

Two long and two short beeps

POST does not support the optional video adapter. This beep combination occurs when you install a video adapter that is incompatible with your server. Replace the optional video adapter with one that the server supports, or use the integrated video controller.

POST beep codes

In addition to the beep codes that are described in “POST beep code descriptions” on page 17, your server might emit beep codes that are described in the following table. For example, a 1-2-4 beep code sounds like one beep, a pause, two consecutive beeps, another pause, and four more consecutive beeps.

Beep code	Description	Action
1-1-2	Microprocessor register test has failed.	Call for service.
1-1-3	CMOS write/read test has failed.	
1-1-4	BIOS ROM checksum has failed.	
1-2-1	Programmable Interval Timer test has failed.	
1-2-2	DMA initialization has failed.	
1-2-3	DMA page register write/read test has failed.	
1-2-4	RAM refresh verification has failed.	Reseat the memory modules or install a memory module. If the problem persists, call for service.
1-3-1	First 64 Kb RAM test has failed.	
1-3-2	First 64 Kb RAM parity test has failed.	

Beep code	Description	Action
1-4-3	Interrupt vector loading test has failed.	Call for service.
2-1-1	Secondary DMA register test has failed.	
2-1-2	Primary DMA register test has failed.	
2-1-3	Primary interrupt mask register test has failed.	
2-1-4	Secondary interrupt mask register test has failed.	
2-2-1	Interrupt vector loading has failed.	
2-2-2	Keyboard controller test has failed.	
2-2-3	CMOS power failure and checksum checks have failed.	
2-2-4	CMOS configuration information validation has failed.	
2-3-1	Screen initialization has failed.	Turn off the computer and then restart the computer. If the problem persists, call for service.
2-3-2	Screen memory test has failed.	Call for service.
2-3-3	Screen retrace tests have failed.	
2-3-4	Search for video ROM has failed.	
2-4-1	Screen test indicates the screen is operable.	
3-1-1	Timer tick interrupt test has failed.	
3-1-2	Interval timer channel 2 test has failed.	
3-1-3	RAM test has failed above address hex 0FFFF.	
3-1-4	Time-of-Day clock test has failed.	
3-2-1	Serial port test has failed.	
3-2-2	Parallel port test has failed.	
3-2-4	Comparison of CMOS memory size against actual has failed.	
3-3-1	A memory size mismatch has occurred.	Reseat the memory modules or install a memory module. If the problem persists, call for service.
3-3-2	I2C bus has failed.	Call for service.
3-3-3	Important: In some memory configurations, the 3-3-3 beep code might sound during POST, followed by a blank display screen. If this occurs and the Boot Fail Count feature in the Start Options of the Configuration/Setup Utility program is set to Enabled (its default setting), you must restart the computer three times to force the system BIOS to reset the memory connector or bank of connectors from Disabled to Enabled .	Reseat the memory modules or install a memory module. If the problem persists, call for service.

POST error messages

The following tables provide information about the POST error messages that can appear during startup.

POST message	Description
062	<p>The server failed to start on three consecutive attempts.</p> <p>All processor caches are disabled. Repeatedly turning the server on and then off or resetting the server might cause this problem.</p> <p>Note: Start the Configuration/Setup Utility program and verify that all settings are correct. Use the Cache Control selection in the Advanced Setup menu of the Configuration/Setup Utility program to enable the processor caches.</p> <p>If the problem persists, call for service. When the problem is corrected, be sure to enable the processor caches.</p>
101 102 106	<p>An error occurred during the system board and microprocessor test.</p> <p>Note: Call for service.</p>
114	<p>An adapter read-only memory (ROM) error occurred.</p> <p>Note: Remove the options. If you can start the server without the options installed, reinstall each option one at a time and retest after each is reinstalled. When an option fails, replace it.</p> <p>If you cannot isolate and correct the problem, call for service.</p>
151	<p>A real-time clock (RTC) error occurred.</p> <p>Note: Call for service.</p>
161	<p>The real-time clock battery has failed.</p> <p>Note: Replace the battery yourself or call for service.</p> <p>You can use the server until you replace the battery. However, you must run the Configuration/Setup Utility program and set the time and date and other custom settings each time you turn on the server.</p>
162	<p>A change in device configuration occurred. This error occurs under one or more of the following conditions:</p> <ul style="list-style-type: none"> • A new device has been installed. • A device has been moved to a different location or cable connection. • A device has been removed or disconnected from a cable. • A device is failing and is no longer recognized by the server as being installed. • An external device is not turned on. • An invalid checksum is detected in the battery-backed memory. <p>Note: Verify that all external devices are turned on. You must turn on external devices before turning on the server.</p> <p>If you did not add, remove, or change the location of a device, a device is probably failing. Running the diagnostic program might isolate the failing device.</p> <p>If you cannot isolate and correct the problem, call for service.</p>
163	<p>The time of day has not been set.</p> <p>Note: Set the correct date and time. If the date and time are set correctly and saved, but the 163 error message reappears, call for service.</p> <p>You can use the server until the system is serviced, but any application programs that use the date and time will be affected.</p>

POST message	Description
164	<p>A change in the memory configuration occurred. This message might appear after you add or remove memory.</p> <p>Notes:</p> <ol style="list-style-type: none"> The server can be used with decreased memory capacity. If POST error message 289 also occurred, follow the instructions for that error message first. If you just installed or removed memory, run the Configuration/Setup Utility program; then, exit, saving the new configuration settings. <p>If the message appears again, shut down the server, reseal the memory modules, and restart the server.</p> <p>If the problem persists, call for service.</p>
175	<p>A vital product data (VPD) error occurred.</p> <p>Note: Call for service.</p>
176 177 178	<p>A security hardware error occurred.</p> <p>Note: Check for indications that someone has tampered with the server. If no one has tampered with the server, call for service.</p>
184	<p>The power-on password information stored in your server has been removed.</p> <p>Note: From the Configuration/Setup Utility program main menu, select System Security. Then, follow the instructions on the screen.</p> <p>If this information cannot be restored, call for service.</p>
185	<p>A power failure damaged the stored information about the drive-startup sequence.</p> <p>Note: From the Configuration/Setup Utility program main menu, select Start Options; then, follow the instructions on the screen.</p> <p>If this information cannot be restored, call for service.</p>
186	<p>A system board or hardware error occurred.</p> <p>Note: Call for service.</p>
187	<p>The VPD serial number is not set.</p> <p>Note: The system serial number is set in the VPD EEPROM at the time of manufacturing. If the system board has been replaced, the system serial number will be invalid and should be set. From the main menu of the Configuration/Setup Utility program, select System Information, and then select Product Data. If the problem persists, call for service.</p>
188	<p>A vital product data (VPD) error occurred.</p> <p>Note: Call for service.</p>
189	<p>An attempt has been made to access the server with invalid passwords. After three incorrect attempts, the server locks up; that is, the logon data fields are no longer available to the user.</p>
201	<p>An error occurred during the memory controller test. This error can be caused by:</p> <ul style="list-style-type: none"> Incorrectly installed memory A failing memory module A system board problem <p>Note:</p> <ol style="list-style-type: none"> If you just installed memory, verify that the new memory is correct for your server. Also verify that the memory is installed and seated correctly. If the problem persists, call for service.

POST message	Description
289	<p>An error occurred during POST memory tests and a failing DIMM was disabled.</p> <p>Notes:</p> <ol style="list-style-type: none"> You can use the server with decreased memory. If you just installed memory, verify that the new memory is correct for your server. Also verify that the memory is installed and seated correctly. Start the Configuration/Setup Utility program and select Memory Settings from the Advanced Setup menu to enable the DIMM. If the problem remains, replace the failing DIMM. <p>If the problem persists, call for service.</p>
301 303	<p>An error occurred during the keyboard and keyboard controller test. These error messages also might be accompanied by continuous beeping.</p> <p>Notes:</p> <ol style="list-style-type: none"> Ensure that: <ul style="list-style-type: none"> Nothing is resting on the keyboard and pressing a key. No key is stuck. The keyboard cable is connected correctly to the keyboard and to the correct connector on the server. After installing a USB keyboard, you might need to use the Configuration/Setup utility to Enable keyboardless operation and prevent the POST error message 301 from being displayed during startup. <p>Running the diagnostic tests can isolate the server component that failed, but you must have your system serviced. If the error message remains, call for service.</p> <p>Note: If you just connected a new mouse or other pointing device, turn off the server and disconnect that device. Wait at least 5 seconds; then, turn on the server. If the error message goes away, replace the device.</p>
602	<p>Invalid diskette boot record</p> <p>Note:</p> <ol style="list-style-type: none"> Replace the diskette. If the problem persists, make sure that the diskette drive cables are correctly and securely connected. If the problem remains, replace the diskette drive. <p>If the problem persists, call for service.</p>
604	<p>An error occurred during a diskette drive test.</p> <p>Note:</p> <ol style="list-style-type: none"> Verify that the Configuration/Setup Utility program correctly reflects the type of diskette drive that you have installed. Run the diagnostic tests. If the diagnostic tests fail, call for service.
662	<p>A diskette drive configuration error occurred.</p> <p>Note: If you removed a diskette drive, make sure that the diskette drive setting is correct in the Configuration/Setup Utility program. If the setting is not correct, change it.</p> <p>If the problem persists, call for service.</p>

POST message	Description
11xx	<p>An error occurred during the system-board serial port test.</p> <p>Note: If you have a modem, serial printer, or other serial device attached to your server, verify that the serial cable is connected correctly. If it is, use the following procedure:</p> <ol style="list-style-type: none"> 1. Turn off the server. 2. Disconnect the serial cable from the serial port. 3. Wait 5 seconds; then, turn on the server. <p>If the POST error message does not reappear, either the serial cable or the device is probably failing. See the documentation that comes with the serial device for additional testing information.</p> <p>If the POST error message reappears, call for service.</p>
1162	<p>The serial port configuration conflicts with another device in the system.</p> <p>Note:</p> <ol style="list-style-type: none"> 1. Make sure the IRQ and I/O port assignments needed by the serial port are available. 2. If all interrupts are being used by adapters, you might need to remove an adapter to make an interrupt available to the serial port, or force other adapters to share an interrupt.
1800	<p>A PCI adapter has requested a hardware interrupt that is not available.</p> <p>Note:</p> <ol style="list-style-type: none"> 1. Make sure that the PCI adapter and all other adapters are set correctly in the Configuration/Setup Utility program. If the interrupt resource settings are not correct, change the settings. 2. If all interrupts are being used by other adapters, you might need to remove an adapter to make an interrupt available to the PCI adapter, or force other adapters to share an interrupt.
1962	<p>No valid startup devices were found. The system cannot find the startup drive or operating system.</p> <p>Note: Be sure that the drive you want to start from is in the startup sequence.</p> <ol style="list-style-type: none"> 1. Select Start Options from the Configuration/Setup Utility program main menu. If you are unable to set the startup sequence, call for service. 2. Check the list of startup devices in the Startup device data fields. Is the drive you want to start from in the startup sequence? <ul style="list-style-type: none"> Yes Exit from this screen; then, select Exit Setup to exit the Configuration/Setup menu. Go to step 3. No Follow the instructions on the screen to add the drive; then, save the changes and exit the Configuration/Setup menu. Restart the server. 3. Is an operating system installed? <ul style="list-style-type: none"> Yes Turn off the server. Go to step 4. No Install the operating system in your server; then, follow your operating system instructions to shut down and restart the server. 4. During server startup, watch for messages indicating a hardware problem. <p>If the same error message appears, call for service.</p>
2400	<p>An error occurred during the testing of the video controller on the system board. This error can be caused by a failing monitor, a failing system board, or a failing video adapter (if one is installed).</p> <p>Note: Verify that the monitor is connected correctly to the video connector. If the monitor is connected correctly, call for service.</p>
2462	<p>A video memory configuration error occurred.</p> <p>Note: Make sure that the monitor cables are correctly and securely connected to the server.</p> <p>If the problem persists, call for service.</p>

POST message	Description
5962	<p>An IDE CD-ROM configuration error occurred.</p> <p>Note: Check the signal and power cable connections to the CD-ROM drive.</p> <p>If the problem persists, call for service.</p>
8603	<p>An error occurred during the mouse (pointing device) controller test. The addition or removal of a mouse, or a failing system board can cause this error.</p> <p>Note: This error also can occur if electrical power was lost for a very brief period and then restored. In this case, turn off the server for at least 5 seconds; then, turn it back on.</p> <p>Note: Ensure that the keyboard and mouse (pointing device) are attached to the correct connectors. If they are connected correctly, use the following procedure:</p> <ol style="list-style-type: none"> 1. Turn off the server. 2. Disconnect the mouse from the server. 3. Turn on the server. <p>If the POST error message does not reappear, the mouse is probably failing. See the documentation that comes with the mouse for additional testing information. If the problem remains, replace the mouse or pointing device.</p> <p>If the POST error message reappears, run the diagnostic tests to isolate the problem. If the diagnostic tests do not find a problem and the POST error message remains, call for service.</p>
00012000	<p>Processor machine check.</p> <p>Note:</p> <ol style="list-style-type: none"> 1. Update the system BIOS code. 2. If the problem persists, replace the microprocessor.
0001950n	<p>Processor n is not functioning.</p> <p>Note: Replace microprocessor n.</p> <p>If the problem persists, call for service.</p>
0001970n	<p>Processor n failed the built-in self test.</p> <p>Note: Replace microprocessor n.</p> <p>If the problem persists, call for service.</p>
00180100	<p>A PCI adapter has requested memory resources that are not available.</p> <p>Note:</p> <ol style="list-style-type: none"> 1. Make sure that the PCI adapter and all other adapters are set correctly in the Configuration/Setup Utility program. If the memory resource settings are not correct, change the settings. 2. If all memory resources are being used, you might need to remove an adapter to make memory available to the PCI adapter. Disabling the adapter BIOS on the adapter might correct the error. See the documentation provided with the adapter.
00180200	<p>A PCI adapter has requested an I/O address that is not available, or the PCI adapter might be defective.</p> <p>Note:</p> <ol style="list-style-type: none"> 1. Make sure that the I/O address for the PCI adapter and all other adapters are set correctly in the Configuration/Setup Utility program. 2. If the I/O port resource settings are correct, the PCI adapter might be defective. Call for service.

POST message	Description
00180300	<p>A PCI adapter has requested a memory address that is not available, or the PCI adapter might be defective.</p> <p>Note:</p> <ol style="list-style-type: none"> 1. Make sure that the memory address for all other adapters are set correctly in the Configuration/Setup Utility program. If the memory resource settings are not correct, change the settings. 2. If the memory resource settings are correct, the PCI adapter might be defective. Call for service.
00180400	<p>A PCI adapter has requested a memory address that is not available.</p> <p>Note: If all memory addresses are being used, you might need to remove an adapter to make memory address space available to the PCI adapter. Disabling the adapter BIOS on the adapter might correct the error. Refer to the documentation provided with the adapter.</p>
00180500	<p>A PCI adapter ROM error occurred.</p> <p>Note: Remove the PCI adapters. If you can start the server without the adapters, reinstall each adapter one at a time and retest after each is reinstalled. When an adapter fails, replace it.</p> <p>If you cannot isolate and correct the problem, call for service.</p>
00180600	<p>A PCI-to-PCI bridge error occurred. More than one PCI bus tried to access memory below 1 MB.</p> <p>Note: Remove the PCI adapter that has the PCI bridge. If you can start the server without the adapter, reinstall and retest the adapter. If the adapter fails, replace it.</p> <p>If you cannot isolate and correct the problem, call for service.</p>
00180700	<p>xxxxyyyy planar PCI device does not respond or disabled by user (where xxxx is the PCI vendor ID and yyyy is the PCI device ID).</p> <p>Note: Start the Configuration/Setup Utility program, select Devices and I/O Ports, and make sure that the device is enabled. If the problem persists, call for service.</p>
00180800	<p>An unsupported PCI device is installed.</p> <p>Note: Remove the PCI adapters. If you can start the server without the adapters, reinstall each adapter one at a time and retest after each is reinstalled. When an adapter fails, replace it.</p> <p>If the problem persists, call for service.</p>
00181000	<p>PCI error.</p> <p>Note: Remove the PCI adapters. If you can start the server without the adapters, reinstall each adapter one at a time and retest after each is reinstalled. When an adapter fails, replace it.</p> <p>If the problem persists, call for service.</p>
01295085	<p>The ECC checking hardware test failed.</p> <p>Note: Call for service.</p>
0129800n	<p>No update data is available for processor n.</p> <p>Note: Update the system BIOS code to a level that supports the microprocessors installed in the server.</p>
0129810n	<p>The update data for processor n is incorrect.</p> <p>Note: Update the system BIOS code to a level that supports the microprocessors installed in the server.</p>
I9990301	<p>A hard disk drive error occurred.</p> <p>Note: Call for service.</p>

POST message	Description
I9990305	<p>POST could not find an operating system.</p> <p>Note: Install an operating system. If you have already installed the operating system, check the drive startup sequence. If the drive sequence is correct, run the diagnostic tests to verify that the hard disk drive is functioning correctly. If there is a problem with the hard disk drive (such as a bad sector), you might need to reinstall the operating system.</p> <p>If you cannot reinstall the operating system, call for service.</p>
I9990650	<p>AC power has been restored.</p> <p>Note: No action is required. This message appears each time ac power is restored to the server after an ac power loss.</p>
Other Numbers	<p>POST found an error.</p> <p>Note: Follow the instructions on the screen.</p>

Error logs

The POST error log contains the three most recent error codes and messages that the system generated during POST. The System Error log contains all messages issued during POST and all system status messages from the service processor.

You can view the contents of the System Error log from the Configuration/Setup Utility program or from the diagnostic programs:

- Start the Configuration/Setup Utility program; then, select **Error Logs** from the main menu. See "Using the Configuration/Setup Utility program" in the *User's Guide* on the *IBM Documentation CD*.
- Start the diagnostic programs; select **Hardware Info** from the top of the diagnostic programs screen; select **System Error Log** from the list that appears; then, follow the instructions on the screen. See "Starting the diagnostic programs" on page 32 for more information.

Identifying problems using the Light Path Diagnostics feature

If the system-error light in the operator information panel on the front of the server is on, one or more lights inside the server might be on. Use the Light Path Diagnostics panel to identify the type of error that occurred.

You can use the Light Path Diagnostics feature in your server to quickly identify the type of system error that occurred. The Light Path Diagnostics panel is located inside the Light Path Diagnostics drawer, located on the front right of the server. To access the Light Path Diagnostic panel, press on the front of the Light Path Diagnostics drawer, the Light Path Diagnostic panel will be exposed. For light locations, see "Light Path Diagnostics panel" on page 27.

Your server is designed so that lights that are illuminated when the server is on, can be illuminated again without ac power after you remove the cover. This feature helps you isolate the problem if an error causes the server to shut down. See "Light Path Diagnostics table" on page 27.

Important: You have up to 12 hours to use the Light Path Diagnostics lights after ac power has been removed from the server. After 12 hours, you must power on the server again to be able to use the Light Path Diagnostics lights to help locate system errors.

To view the lights on the various system boards:

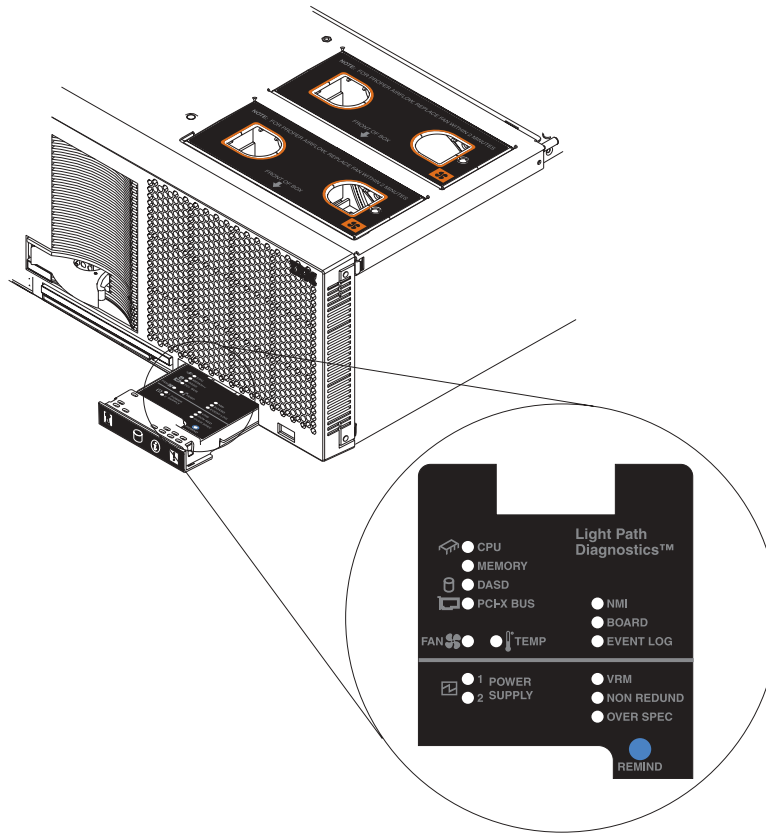
1. Turn off the server and peripheral devices.
2. Press and hold the Light Path Diagnostics (blue) button on the diagnostics panel. The lights will be illuminated while the switch is pressed.

Note: You can illuminate the lights for a maximum of 2 minutes. After that time, the circuit that powers the lights is exhausted.

3. Close the server cover; then, reinstall the server in the rack and connect all external cables.

Light Path Diagnostics panel

The following illustration shows the lights on the diagnostics panel on the system board. See “Light Path Diagnostics table” for information on identifying problems using these lights.



Light Path Diagnostics table

The system-error light on the operator information panel is lit when certain system errors occur. If the system-error light on your server is lit, use the following table to help determine the cause of the error and the action you should take.

Lit light on diagnostics panel	Cause	Action
None	An error has occurred and can not be isolated, or the ASM processor has failed.	An error has occurred that is not represented by a Light Path Diagnostics light. Check the System Error log for more information about the error.

Lit light on diagnostics panel	Cause	Action
PS	Power supply has failed.	Have the system serviced.
TEMP	The system temperature has exceeded a threshold level.	<ol style="list-style-type: none"> 1. Check to see if a fan has failed. If it has, replace the fan. 2. Make sure the room temperature is not too hot. (See "Features and specifications" in the <i>User's Guide</i> on the <i>IBM Documentation CD</i>.) <p>If the problem persists, have the system serviced.</p>
FAN	A fan has failed or is operating too slowly. Note: A failing fan can also cause the TEMP light to be on.	Check the lights on the fans and replace the indicated fan.
SP	The service processor has failed.	<p>Remove ac power from the server and then restart the server.</p> <p>Note: Wait 30 seconds before turning on the server.</p> <p>If the problem persists, have the system serviced.</p>
MEM	A memory error occurred.	<ol style="list-style-type: none"> 1. Check the DIMM failure lights on the system board. 2. Replace the DIMM indicated by the lit DIMM failure light.
CPU	One of the microprocessors has failed.	<ol style="list-style-type: none"> 1. Check the microprocessor failure lights on the system board. 2. If a microprocessor failure light is on, make sure the microprocessor is installed correctly. 3. If the problem persists, replace the microprocessor. <p>If the problem persists, have the system serviced.</p>
VRM	One of the VRMs on the system board has failed.	<p>Remove ac power from the server and then restart the server.</p> <p>Note: Wait 30 seconds before turning on the server.</p> <p>If the problem persists have the system serviced.</p>
PCI	An error occurred on a PCI bus. The system board caused the error.	<ol style="list-style-type: none"> 1. Check the error log for additional information. 2. If you cannot isolate the failing adapter from the information in the error log, try to determine the failing adapter by removing one adapter at a time from the failing PCI-X bus and restarting the server after each adapter is removed. <p>If the problem persists, have the system serviced.</p>

ServerGuide problems

If you are experiencing problems with your ServerGuide™ CD use the following chart to troubleshoot the problem. Look for the symptom in the left column of the chart. Probable solutions to the problem are in the right column.

Symptom	Suggested action
Server will not start.	<ul style="list-style-type: none">• Ensure that the system is a supported server with a startable (bootable) CD-ROM drive.• If the startup (boot) sequence settings have been altered, ensure that the CD-ROM drive is first in the startup sequence.• If more than one CD-ROM drive is installed, ensure that only one drive is set as the primary drive. Start the CD from the primary drive.
ServeRAID™ program cannot view all installed drives - or - cannot install NOS.	<ul style="list-style-type: none">• Ensure that there are no duplicate SCSI IDs or IRQ assignments.• Ensure that the hard disk drive is connected properly.
The Operating System Installation program continuously loops.	Make more space available on the hard disk.
ServerGuide will not start <i>your</i> NOS CD.	Ensure that the NOS CD you have is supported by the ServerGuide program. See the CD label for a list of supported NOS versions.
Cannot install NOS - option is unavailable.	Ensure that the NOS is supported on your server. If the NOS is supported, either there is no logical drive defined (ServeRAID systems) or the ServerGuide System Partition is not present. Run the ServerGuide setup and configuration program, and ensure that setup is complete.

Small computer system interface (SCSI) messages

If you receive a SCSI error message when running the SCSISelect Utility program, one or more of the following might be causing the problem:

- A failing SCSI device (adapter, drive, controller)
- An improper SCSI configuration
- Duplicate SCSI IDs in the same SCSI chain
- An improperly installed SCSI terminator
- A defective SCSI terminator
- An improperly installed cable
- A defective cable

To solve the problem, verify that:

- The external SCSI devices are turned on. External SCSI devices must be turned on *before* the server.
- The cables for all external SCSI devices are connected correctly.
- The last device in each SCSI chain is terminated properly.
- The SCSI devices are configured correctly.

If you have verified these items and the problem persists, run the diagnostic programs to obtain additional information about the failing device. If the error remains or recurs, call for service.

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

Diagnostic programs and error messages

The server diagnostic programs are stored in upgradable read-only memory (ROM) on the system board. These programs are the primary method of testing the major components of your server.

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

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

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

The error code format is as follows:

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

where:

fff	is the three-digit function code that indicates the function being tested when the error occurred. For example, function code 089 is for the microprocessor.
ttt	is the three-digit failure code that indicates the exact test failure that was encountered. (These codes are for trained service personnel and are described in the <i>Hardware Maintenance Manual</i>).
iii	is the three-digit device ID. (These codes are for trained service personnel and are described in the <i>Hardware Maintenance Manual</i>).
date	is the date that the diagnostic test was run and the error recorded.
cc	is the check value that is used to verify the validity of the information.
text message	is the diagnostic message that indicates the reason for the problem.

Text messages

The diagnostic text message format is as follows:

Function Name: Result (test specific string)

where:

Function Name

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

Result

can be one of the following:

Passed

This result occurs when the diagnostic test is completed without any errors.

Failed	This result occurs when the diagnostic test discovers an error.
User Aborted	This result occurs when you stop the diagnostic test before it is complete.
Not Applicable	This result occurs when you specify a diagnostic test for a device that is not present.
Aborted	This result occurs when the test could not proceed; for example, because of the system configuration.
Warning	This result occurs when a possible problem is reported during the diagnostic test, such as when a device driver is not found.

test specific string

This is additional information that you can use to analyze the problem.

Starting the diagnostic programs

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

To start the diagnostic programs:

1. Turn on the server and watch the screen.
2. When the message F2 for Diagnostics appears, press F2.
If a power-on password is set, the server prompts you for it. Type the power-on password, and press Enter.
3. When the Diagnostic Programs screen appears, select either **Extended** or **Basic** from the top of the screen.
4. Select the test you want to run from the list that appears; then, follow the instructions on the screen.

Notes:

- a. If the server stops during testing and you cannot continue, restart the server and try running the diagnostic programs again. If the problem persists, call for service.
- b. The keyboard and mouse (pointing device) tests assume that a keyboard and mouse are attached to the server.
- c. If you run the diagnostic programs with no mouse attached to your server, you will not be able to navigate between test categories using the **Next Cat** and **Prev Cat** buttons. All other functions provided by mouse-selectable buttons are also available using the function keys.
- d. You can test the USB keyboard by using the regular keyboard test. The regular mouse test can test a USB mouse. Also, you can run the USB interface test only if there are no USB devices attached.
- e. You can view server configuration information (such as system configuration, memory contents, interrupt request (IRQ) use, direct memory access (DMA) use, device drivers, and so on) by selecting **Hardware Info** from the top of the screen.

If the diagnostic programs do not detect any hardware error but the problem persists during normal server operations, a software error might be the cause. If you suspect a software problem, see the information that comes with the software package.

Viewing the test log: When the tests are completed, you can view the test log by selecting **Utility** from the top of the screen and then selecting **View Test Log**.

Notes:

1. You can view the test log only while you are in the diagnostic programs. When you exit the diagnostic programs, the test log is cleared (saved test logs are not affected). To save the test log so that you can view it later, click **Save Log** on the diagnostic programs screen and specify a location and name for the saved log file.
2. To save the test log to a diskette, you must use a diskette that you have formatted yourself; this function does not work with preformatted diskettes. If the diskette has sufficient space for the test log, the diskette may contain other data.

Viewing the System Error log: You can also view the System Error log from the diagnostic programs. See the instructions in “Error logs” on page 26.

Diagnostic error message tables

The following tables provide descriptions of the error messages that might appear when you run the diagnostic programs.

Note: Not all messages in this table apply to your server.

Important: If diagnostic error messages appear that are not listed in the following tables, call for service.

Code	Function	Result	Description	Action
001	Core system	Failed	Processor board, ECC Logic	Call for service.
			System board	
005	Video port		Processor and system boards	
011	Serial port		Integrated serial port	
015	USB interface	Aborted	Can NOT test USB interface while it is in use. Note: If you have a USB keyboard, mouse, or other USB device attached, you cannot run the diagnostic program for the USB interface.	<ol style="list-style-type: none"> 1. Turn off the server. 2. Disconnect all USB devices from the server. Replace any USB keyboard and mouse with a standard keyboard and mouse. 3. Turn on the server. 4. Run the diagnostic test again. <p>If the problem persists, call for service.</p>
		Failed	USB interface failed	Call for service.
020	PCI interface	Failed	PCI slot latch mechanism is defective	Call for service.

Code	Function	Result	Description	Action
030	SCSI interface	Failed	SCSI adapter in slot <i>n</i> failed register/counter/ power test (where <i>n</i> is the slot number of the failing adapter)	Refer to the information provided with the adapter for instructions. If the problem persists, call for service.
			SCSI controller on system board failed register/counter/power test	Call for service.
035	ServeRAID	Aborted	Test setup error: No ServeRAID adapter found on system board or PCI bus	Make sure that the ServeRAID adapter is properly installed. If the problem remains, replace the ServeRAID adapter. If the problem persists, call for service.
		Failed	Adapter in slot <i>n</i> ; adapter/drive configuration error (where <i>n</i> is the slot number of the failing adapter)	1. Run the ServeRAID Configuration Utility. 2. If the problem remains, replace the ServeRAID adapter in slot <i>n</i> .
			Adapter in slot <i>n</i> ; internal error (where <i>n</i> is the slot number of the failing adapter)	
			Logical drive <i>m</i> on adapter in slot <i>n</i> (where <i>m</i> is the number of the failing logical drive and <i>n</i> is the slot number of the adapter)	If the problem persists, call for service.
			On system board; internal error	Run the ServeRAID Configuration Utility.
			On system board; adapter/drive configuration error	
			Logical drive on system board adapter	If the problem persists, call for service.
			Adapter in slot <i>n</i> ; memory allocation error (where <i>n</i> is the slot number of the failing adapter)	Call for service.
			On system board; memory allocation error	
			On system board; PCI configuration error	
			On system board; POST error	
			Adapter in slot <i>n</i> ; POST error (where <i>n</i> is the slot number of the failing adapter)	Replace the ServeRAID adapter in slot <i>n</i> . If the problem persists, call for service.
			Adapter in slot <i>n</i> ; PCI configuration error (where <i>n</i> is the slot number of the failing adapter)	
SCSI drive on adapter in slot <i>n</i> , SCSI ID <i>m</i> (where <i>n</i> is the slot number of the adapter and <i>m</i> is the SCSI ID of the drive)	Check the cable and power connections on the drive. If the problem persists, call for service.			
075	Power supply	Failed	Voltage sensed by the system is out of range	Call for service.

Code	Function	Result	Description	Action
089	Microprocessor	Failed	Invalid microprocessor in slot xyz or BIOS setup problem (where xyz identifies the microprocessor that is causing the error message)	<ol style="list-style-type: none"> 1. Check the System Error log for the related error messages. 2. If your server does not have the latest level BIOS code installed, update the BIOS code. 3. If the problem remains, replace the xyz microprocessor and run the test again. <p>If the problem persists, call for service.</p>
			Processor in socket id xyz is installed but not functioning (where xyz identifies the microprocessor that is causing the error message)	
			Microprocessor in socket id xyz (where xyz identifies the microprocessor that is causing the error message)	<ol style="list-style-type: none"> 1. Reseat the microprocessor. 2. If the problem remains, replace the microprocessor. <p>If the problem persists, call for service.</p>
			Processor in socket id xyz is defective (where xyz identifies the microprocessor that is causing the error message)	<p>Replace the microprocessor.</p> <p>If the problem persists, call for service.</p>
			Test setup error: Application microprocessor not installed or BIOS setup problem	<ol style="list-style-type: none"> 1. Verify that the application microprocessor is installed and seated correctly. 2. If your server does not have the latest level BIOS code installed, update the BIOS code. 3. If the problem remains, replace the application microprocessor and run the test again. <p>If the problem persists, call for service.</p>
089 (continued)	Microprocessor	Failed	VRM corresponding to microprocessor in socket xyz is defective (where xyz identifies the microprocessor whose VRM is causing the error message)	<p>Replace the VRM.</p> <p>If the problem remains, call for service.</p>
			VRM corresponding to microprocessor in socket id xyz is not installed (where xyz identifies the microprocessor whose VRM is causing the error message)	<p>Install a VRM.</p> <p>If the problem persists, call for service.</p>

Code	Function	Result	Description	Action
091	RIOG port (also called: RXE Expansion port)	Failed	Ping rate failure	Verify that cables are connected correctly and securely, and try again. If the problem persists, call for service.
			Receive threshold exceeded	
			Transmit threshold exceeded	
			Connection error	
092	Scalability port (also called: SMP Expansion port)	Failed	Ping rate failure	Verify that cables are connected correctly and securely, and try again. If the problem persists, call for service.
			Receive threshold exceeded	
			Transmit threshold exceeded	
			Connection error	
155	Active™ Memory latch	Failed	Active Memory latch mechanism is defective	Call for service.
165	Service processor	Failed	Service processor BIST indicate failed tests.	Disconnect all server and option power cords from the server, wait 30 seconds, reconnect, and try again. If problem persists, call for service.
			Unable to restart service processor.	
			I2C Bus Error(s). See System Error Log for details from both SERVPROC and DIAGS messages.	
			I2C Busses xyz bad or devices on these busses are functioning incorrectly (where xyz identifies the busses that are causing the error message)	
			Failed I2C Bus xyz bad or devices on this bus are functioning incorrectly (where xyz identifies the busses that are causing the error message)	
			Service processor is temporarily unreachable or not installed.	
166	System management	Failed	ASM adapter may be busy	1. Make sure you have downloaded and installed the latest level of service processor code, and then try again. 2. Make sure the cable is firmly connected to the ASM adapter and the system board, and then try again. 3. Reseat the Remote Supervisor Adapter, and then try again. 4. Disconnect all server and option power cords from the server, wait 30 seconds, reconnect, and try again. If problem persists, call for service.
			ASM communication failed	
			I2C bus failure	
			I2C cable disconnected	
			Restart ASM error	
			System management failure	
			ASM BIST failed	
			System management hardware on system board failed.	

Code	Function	Result	Description	Action
175	System thermal	Failed	Fan # <i>n</i> (where <i>n</i> is the number of the failing fan)	Replace the indicated fan.
			Temperature sensed on processor board is out of range	Call for service.
180	Status display (light diagnostics test)	Failed	Any failure message	Call for service.
			Fan light error	Replace the fan.
201	System memory	Aborted	Test setup error: Corrupt BIOS code in ROM	If your server does not have the latest level BIOS code installed, update the BIOS code to the latest level. If the problem persists, call for service.
			Test setup error: Corrupt DMI BIOS, information in BIOS is not as expected	
		Failed	DIMMs in location DIMM <i>n</i> (where <i>n</i> is the number of the socket that contains the failing DIMM)	<ol style="list-style-type: none"> 1. Reseat the failing DIMM. 2. If the problem remains, replace the DIMM. <p>If the problem persists, call for service.</p>

Code	Function	Result	Description	Action
202	Processor cache	Aborted	Test setup error: BIOS cannot access VPD information	If your server does not have the latest level BIOS code installed, update the BIOS code to the latest level and run the diagnostic program again. If the problem persists, call for service.
			Test setup error: Corrupt DMI BIOS. Information in BIOS is not as expected	
			Test setup error: No L2 cache detected on microprocessor socket id xyz or BIOS setup problem (where xyz identifies the microprocessor that is causing the error message)	
		Test setup error: Unknown hardware problem associated with microprocessor in socket id xyz. (where xyz identifies the microprocessor that is causing the error message)		
		Failed	Microprocessor in socket ID xyz (where xyz identifies the microprocessor that is causing the error message)	1. Reseat the identified microprocessor. 2. If the problem remains, replace the microprocessor. If the problem persists, call for service.
Warning	Test setup error: Processor cache is disabled. Use system setup to enable before retrying the test	Use the Cache Control choice from the Advanced Setup menu to enable the processor cache. If the problem persists, call for service.		
203	External cache	Aborted	Test setup error: Hardware problem associated with microprocessor/system board	Call for service.
		Failed	Data pattern test failure	
			Directory test failure	
			Set associativity test failure	
			Memory controller: Internal register test failure	
Warning	External cache is disabled	Run the Configuration/Setup Utility and enable the external cache, then rerun the test. If the problem persists, call for service.		
206	Diskette drive	Failed	Internal diskette drive bay	Call for service.

Code	Function	Result	Description	Action
215	CD-ROM	Failed	On system board.	Call for service.
		Aborted	The CD-ROM drive is not present.	Verify that the cables are properly connected to the CD-ROM drive. If the problem persists, call for service.
217	Hard disk drive	Failed	BIOS drive # <i>n</i> (where <i>n</i> is the drive bay number)	Call for service.
264	Magnetic tape drive	Aborted	Test setup error: No tape drive found.	Check the cable and power connections to the drive. See the information that is provided with the tape drive. If the problem persists, call for service.
		Failed	The load/mount test failed for device <i>n</i> on adapter <i>m</i> (where <i>n</i> is the number of the device and <i>m</i> is the adapter number)	Refer to the information provided with the tape drive. If the problem persists, call for service. Note: The push button test is applicable only to SCSI tape drives that have a push button.
			The Self-diagnostic failed for device <i>n</i> on adapter <i>m</i> . (where <i>n</i> is the number of the device and <i>m</i> is the adapter number)	
			The unload/eject test failed for device <i>n</i> on adapter <i>m</i> (where <i>n</i> is the number of the device and <i>m</i> is the adapter number)	
			The unload/eject push button test failed for device <i>n</i> on adapter <i>m</i> (where <i>n</i> is the number of the device and <i>m</i> is the adapter number)	
			The Read/Write Self-diagnostic failed for device <i>n</i> on adapter <i>m</i> (where <i>n</i> is the number of the device and <i>m</i> is the adapter number)	
	Insert a new tape cartridge; then, run the diagnostic test again. See the information that is provided with the tape drive. If the problem persists, call for service.			

Code	Function	Result	Description	Action
301	Keyboard	Failed	On system board keyboard test failed.	<ol style="list-style-type: none"> 1. Verify that the keyboard cable is connected. 2. If the problem remains, replace the keyboard. <p>Note: After installing a USB keyboard, you might need to use the Configuration/Setup utility to Enable keyboardless operation and prevent the POST error message 301 from being displayed during startup.</p> <p>If the problem persists, call for service.</p>
302	Mouse	Failed	On system board pointing device test failed.	Replace the pointing device. If the problem persists, call for service.
305	Video monitor		Any message	See the information that came with the monitor.
405	Ethernet	Failed	In PCI slot <i>n</i> (where <i>n</i> is the PCI slot number in which the failing Ethernet adapter is installed)	Replace the Ethernet adapter in slot <i>n</i> . If the problem persists, call for service.
			On system board	Call for service.

Code	Function	Result	Description	Action
415	Analog/digital modem	Not applicable	No modem was detected	<ol style="list-style-type: none"> 1. Verify that the modem is properly attached to the server. 2. If the problem remains, replace the modem. <p>If the problem persists, call for service.</p>
			PCI modem detected but not enabled	<ol style="list-style-type: none"> 1. Change the configuration to enable the modem. 2. If the problem remains, replace the modem. <p>If the problem persists, call for service.</p>
		Failed	Modem reset failed	<p>Replace the modem.</p> <p>If the problem persists, call for service.</p>
			No dialtone detected	<ol style="list-style-type: none"> 1. Make sure that the phone line attached to the modem has a dial tone. (Connect a phone to the line and listen, if necessary.) If there is no tone, have the phone line serviced. 2. If the problem remains, replace the modem. <p>If the problem persists, call for service.</p>

Recovering BIOS code

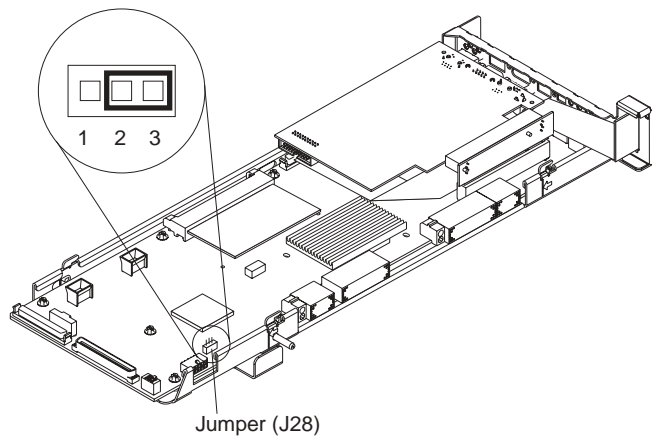
If the BIOS code has become damaged, such as from a power failure during a flash update, you can recover the BIOS code using the BIOS code page jumper and a BIOS flash diskette.

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

- Use the ServerGuide program to make a BIOS flash diskette.
- Download a BIOS flash diskette from the World Wide Web. Go to <http://www.ibm.com/pc/support/>, click **IBM Server Support**, and make the selections for your server.
- Contact your IBM service representative.

To recover the BIOS code:

1. Turn off the server and peripheral devices and disconnect all external cables and power cords; then, remove the cover.
2. Locate the BIOS code page jumper (J28) on the I/O board.



3. Move the jumper from pins 1 and 2 to pins 2 and 3 to enable the BIOS back-up image.
4. Reconnect all external cables and power cords and turn on the peripheral devices.
5. Insert the BIOS flash diskette into the diskette drive.
6. Restart the server. The system begins the power-on self-test (POST) and BIOS flash.
7. Select **1 - Update POST/BIOS** from the menu that contains various flash (update) options.
8. When prompted as to whether you want to save the current code to a diskette, press N.
9. When prompted to choose a language, select a language (from 0 to 7) and press Enter to accept your choice.
10. Do not restart your system at this time.
11. Remove the BIOS flash diskette from the diskette drive.
12. Turn off the server.
13. Move the jumper on J28 to pins 1 and 2 to return to normal startup mode.
14. Restart the server.
15. Replace the cover.

Troubleshooting charts

You can use the troubleshooting charts in this section to find solutions to problems that have definite symptoms.

Look for the symptom in the left column of the chart. Instructions and probable solutions to the problem are in the right column.

Note: If you have just added new software or a new option and your server is not working, do the following before using the troubleshooting charts:

1. Remove the software or device that you just added.
2. Run the diagnostic tests to determine if your server is running correctly.
See “Starting the diagnostic programs” on page 32 to test the server. If the server still does not work and running the diagnostic test programs does not reveal the problem, call for service.
3. If your server is running correctly, reinstall the new software or new device.

Symptom	Suggested action
CD-ROM drive problems	Verify that:
CD-ROM drive is not recognized.	<ol style="list-style-type: none"> 1. The IDE channels are enabled in the Configuration/Setup Utility program. 2. All cables and jumpers are installed correctly. 3. The correct device driver is installed for the CD-ROM drive.
Diskette drive problems	If there is a diskette in the drive, verify that:
Diskette drive in-use light stays on, or the system bypasses the diskette drive.	<ol style="list-style-type: none"> 1. The diskette drive is enabled in the Configuration/Setup Utility program. 2. The diskette is good and not damaged. (Try another diskette if you have one.) 3. The diskette contains the necessary files to start the server. 4. Your software program is working properly. <p>If the diskette drive in-use light stays on, or the system continues to bypass the diskette drive, call for service.</p>
Expansion enclosure problems	Verify that:
The SCSI expansion enclosure used to work but does not work now.	<ol style="list-style-type: none"> 1. The cables for all external SCSI options are connected correctly. 2. The last option in each SCSI chain, or the end of the SCSI cable, is terminated correctly. 3. Any external SCSI option is turned on. You must turn on an external SCSI option before turning on the server. <p>For more information, see your SCSI and expansion enclosure documentation.</p>
Hard disk drive problems	<ol style="list-style-type: none"> 1. Remove the first drive not recognized and try the hard disk diagnostic test again. 2. If the remaining drives are recognized, replace the drive you removed with a new one.
Not all drives are recognized by the hard disk diagnostic test (Fixed Disk test).	
System stops responding during hard disk diagnostic.	<ol style="list-style-type: none"> 1. Remove the hard disk drive being tested when the server stopped responding and try the diagnostic again. 2. If the hard disk diagnostic runs successfully, replace the drive you removed with a new one.
General problems	Call for service.
Problems such as broken cover locks or indicator lights not working.	

Symptom	Suggested action
Intermittent problems	Verify that:
A problem occurs only occasionally and is difficult to detect.	<ol style="list-style-type: none"> 1. All cables and cords are connected securely to the rear of the server and attached options. 2. When the server is turned on, air is flowing from the rear of the server at the fan grill. If there is no air flow, the fan is not working. This causes the server to overheat and shut down. 3. Ensure that the SCSI bus and devices are configured correctly and that the last external device in each SCSI chain is terminated correctly. <p>If the items above are correct, call for service.</p>
Keyboard, mouse, or pointing-device problems.	<ol style="list-style-type: none"> 1. Make sure that the keyboard cable is properly connected to the server. 2. Make sure that the server and the monitor are turned on. 3. Try using another keyboard.
All or some keys on the keyboard do not work.	If the items above are correct, call for service.
The mouse or pointing device does not work.	<ol style="list-style-type: none"> 1. Verify that the mouse or pointing-device cable is securely connected and the device drivers are installed correctly. 2. Try using another mouse or pointing device. <p>If the problem remains, call for service.</p>
Memory problems	Verify that:
The amount of system memory displayed is less than the amount of physical memory installed.	<ol style="list-style-type: none"> 1. The memory modules are seated properly. 2. You have installed the correct type of memory. 3. If you changed the memory, you updated the memory configuration with the Configuration/Setup Utility program. 4. All banks of memory on the DIMMs are enabled. The server might have automatically disabled a DIMM bank when it detected a problem, or a DIMM bank could have been manually disabled. <p>Look in the POST error log for error message 289:</p> <ul style="list-style-type: none"> • If the DIMM was disabled by a system-management interrupt (SMI), replace the DIMM. • If the DIMM was disabled by the user or by POST: <ol style="list-style-type: none"> 1. Start the Configuration/Setup Utility program. 2. Enable the DIMM. 3. Save the configuration and restart the server. • If you continue to get this error, replace the DIMM. <p>If the problem persists, call for service.</p>
Microprocessor problems	The startup (boot) microprocessor is not working properly.
The server emits a continuous tone during POST.	<p>Verify that the startup microprocessor is seated properly. If it is, replace the startup microprocessor.</p> <p>If the problem remains, call for service.</p>
Monitor problems	Some IBM monitors have their own self-tests. If you suspect a problem with your monitor, see the information that comes with the monitor for adjusting and testing instructions.
Testing the monitor.	If you still cannot find the problem, call for service.

Symptom	Suggested action
The screen is blank.	Verify that: <ol style="list-style-type: none"> 1. The server power cord is plugged into the server and a working electrical outlet. 2. The monitor cables are connected properly. 3. The monitor is turned on and the Brightness and Contrast controls are adjusted correctly. <p>Important: In some memory configurations, the 3-3-3 beep code might sound during POST followed by a blank display screen. If this occurs and the Boot Fail Count feature in the Start Options of the Configuration/Setup Utility program is set to Enabled (its default setting), you must restart the server three times to force the system BIOS to reset the CMOS values to the default configuration (memory connector or bank of connectors Enabled).</p> <p>If the items above are correct and the screen remains blank, call for service.</p>
Only the cursor appears.	Call for service.
The monitor works when you turn on the server but goes blank when you start some application programs.	Verify that: <ol style="list-style-type: none"> 1. The primary monitor cable is connected to the server. 2. You installed the necessary device drivers for the applications. <p>If the items above are correct and the screen remains blank, call for service.</p>
The screen is wavy, unreadable, rolling, distorted, or has screen jitter.	If the monitor self-tests show the monitor is working properly, consider the location of the monitor. Magnetic fields around other devices (such as transformers, appliances, fluorescent lights, and other monitors) can cause screen jitter or wavy, unreadable, rolling, or distorted screen images. If this happens, turn off the monitor. (Moving a color monitor while it is turned on might cause screen discoloration.) Then move the device and the monitor at least 305 mm (12 in.) apart. Turn on the monitor. <p>Notes:</p> <ol style="list-style-type: none"> 1. To prevent diskette drive read/write errors, be sure the distance between monitors and diskette drives is at least 76 mm (3 in.). 2. Non-IBM monitor cables might cause unpredictable problems. 3. An enhanced monitor cable with additional shielding is available for the 9521 and 9527 monitors. For information about the enhanced monitor cable, contact your IBM reseller or IBM marketing representative. <p>If the problem remains, call for service.</p>
Wrong characters appear on the screen.	If the wrong language is displayed, update the BIOS code with the correct language. <p>If the problem remains, call for service.</p>
Option problems	Verify that:
An IBM option that was just installed does not work.	<ol style="list-style-type: none"> 1. The option is designed for the server. See the "Server Support" flowchart for information about obtaining ServerProven[®] compatibility information from the World Wide Web. 2. You followed the installation instructions that came with the option. 3. The option is installed correctly. 4. You have not loosened any other installed options or cables. 5. You updated the configuration information in the Configuration/Setup Utility program. Whenever memory or an option is changed, you must update the configuration. <p>Note: If you just installed a microprocessor, ensure that you installed the VRM that came in the microprocessor option.</p> <p>If the problem remains, call for service.</p>

Symptom	Suggested action
An IBM option that used to work does not work now.	<p>Verify that all of the option hardware and cable connections are secure.</p> <p>If the option comes with its own test instructions, use those instructions to test the option.</p> <p>If the failing option is a SCSI option, verify that:</p> <ol style="list-style-type: none"> 1. The cables for all external SCSI options are connected correctly. 2. The last option in each SCSI chain, or the end of the SCSI cable, is terminated correctly. 3. Any external SCSI option is turned on. You must turn on an external SCSI option before turning on the server. <p>If the problem remains, call for service.</p>
Power problems	Verify that:
The server does not power on.	<ol style="list-style-type: none"> 1. The power cables are properly connected to the server. 2. The electrical outlet functions properly. 3. The type of memory installed is correct. 4. If you just installed an option, remove it, and restart the server. If the server now turns on, you might have installed more options than the power supply supports. <p>Note: The xSeries 440 server requires a 220 V power connection for full power-supply redundancy. Whenever possible, use a 220 V connection for all configurations. However, you can use a 110 V connection, but without power-supply redundancy.</p> <p>If the problem remains, call for service.</p>
The server does not power off.	<p>Verify whether you are using an ACPI or non-ACPI operating system.</p> <p>If you are using a non-ACPI operating system:</p> <ol style="list-style-type: none"> 1. Press Ctrl+Alt+Delete. 2. Turn off the system by using the power-control button. <p>If the problem remains or if you are using an ACPI-aware operating system, call for service.</p>
Software problem	To determine if problems are caused by the software, verify that:
Suspected software problem.	<ol style="list-style-type: none"> 1. Your server has the minimum memory requirements needed to use the software. For memory requirements, refer to the information that comes with the software. <p>Note: If you have just installed an adapter or memory, you might have a memory address conflict.</p> <ol style="list-style-type: none"> 2. The software is designed to operate on your server. 3. Other software works on your server. 4. The software that you are using works on another system. <p>If you received any error messages when using the software program, refer to the information that comes with the software for a description of the messages and solutions to the problem.</p> <p>If the items above are correct and the problem remains, contact your place of purchase.</p>
Universal Serial Bus (USB) port problems	Verify that:
A USB device does not work.	<ol style="list-style-type: none"> 1. You are not trying to use a USB device during POST if you have a standard (non-USB) keyboard attached to the keyboard port. <p>Note: If a standard (non-USB) keyboard is attached to the keyboard port, the USB is disabled and no USB device will work during POST.</p> <ol style="list-style-type: none"> 2. The correct USB device driver is installed. 3. Your operating system supports USB devices. <p>If the problem still exists, call for service.</p>

Troubleshooting an Ethernet controller

This section provides troubleshooting information for problems that might occur with a 10/100/1000-Mbps Ethernet controller.

Network connection problems: If an Ethernet controller cannot connect to the network, check the following:

- Make sure that the cable is installed correctly.
The network cable must be securely attached at all connections. If the cable is attached but the problem persists, try a different cable.
If you set the Ethernet controller to operate at 100 or 1000 Mbps, you must use Category 5 cabling.
If you directly connect two workstations (without a hub), or if you are not using a hub with X ports, use a crossover cable.
Note: To determine whether a hub has an X port, check the port label. If the label contains an X, the hub has an X port.
- Determine if the hub supports auto-negotiation. If not, try configuring the integrated Ethernet controller manually to match the speed and duplex mode of the hub.
- Make sure that you are using the correct device drivers, supplied with your server.
- Check for operating-system-specific causes for the problem.
- Make sure that the device drivers on the client and server are using the same protocol.
- Test the Ethernet controller.
How you test the Ethernet controller depends on which operating system you are using (see the Ethernet controller device driver README file).

Ethernet controller troubleshooting chart: You can use the following troubleshooting chart to find solutions to 10/100/1000-Mbps Ethernet controller problems that have definite symptoms.

Ethernet controller problem	Suggested action
The server stops running when loading device drivers.	<p>The PCI BIOS interrupt settings are incorrect.</p> <p>Check the following:</p> <ul style="list-style-type: none"> • Determine if the interrupt (IRQ) setting assigned to the Ethernet controller is also assigned to another device in the Configuration/Setup Utility program. Although interrupt sharing is allowed for PCI devices, some devices do not function well when they share an interrupt with a dissimilar PCI device. Try changing the IRQ assigned to the Ethernet controller or the other device. For example, for NetWare Versions 3 and 4, it is recommended that disk controllers not share interrupts with LAN controllers. • Make sure that you are using the most recent device driver available from the World Wide Web. • Run the network diagnostic program. <p>If the problem remains, call for service.</p>
Data is incorrect or sporadic.	<p>Check the following:</p> <ul style="list-style-type: none"> • Make sure that you are using Category 5 cabling when operating the server at 100 Mbps. • Make sure that the cables do not run close to noise-inducing sources like fluorescent lights.

Ethernet controller problem	Suggested action
<p>The Ethernet controller stopped working when another adapter was added to the server.</p>	<p>Check the following:</p> <ul style="list-style-type: none"> • Make sure that the cable is connected to the Ethernet controller. • Make sure that your PCI system BIOS is current. • Reseat the adapter. • Determine if the interrupt (IRQ) setting assigned to the Ethernet adapter is also assigned to another device in the Configuration/Setup Utility program. Although interrupt sharing is allowed for PCI devices, some devices do not function well when they share an interrupt with a dissimilar PCI device. Try changing the IRQ assigned to the Ethernet adapter or the other device. <p>If the problem remains, call for service.</p>
<p>The Ethernet controller stopped working without apparent cause.</p>	<p>Check the following:</p> <ul style="list-style-type: none"> • Run diagnostics for the Ethernet controller. • Try a different connector on the hub. • Reinstall the device drivers. Refer to your operating-system documentation and to the ServerGuide information. <p>If the problem remains, call for service.</p>

Getting help and technical assistance

If you need help, service, or technical assistance or just want more information about IBM products, you will find a wide variety of sources available from IBM to assist you. This appendix contains information about where to go for additional information about IBM and IBM products, what to do if you experience a problem with your xSeries or IntelliStation® system, and whom to call for service, if it is necessary.

Before you call

Before you call, make sure that you have taken these steps to try to solve the problem yourself:

- Check all cables to make sure that they are connected.
- Check the power switches to make sure that the system is turned on.
- Use the troubleshooting information in your system documentation, and use the diagnostic tools that come with your system.
- Go to the IBM Support Web site at <http://www.ibm.com/pc/support/> to check for technical information, hints, tips, and new device drivers.
- Use an IBM discussion forum on the IBM Web site to ask questions.

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

Using the documentation

Information about your IBM xSeries or IntelliStation system and preinstalled software, if any, is available in the documentation that comes with your system. That documentation includes printed books, online books, README files, and help files.

See the troubleshooting information in your system documentation for instructions for using the diagnostic programs. The troubleshooting information or the diagnostic programs might tell you that you need additional or updated device drivers or other software. IBM maintains pages on the World Wide Web where you can get the latest technical information and download device drivers and updates. To access these pages, go to <http://www.ibm.com/pc/support/> and follow the instructions. Also, you can order publications through the IBM Publications Ordering System at <http://www.elink.ibm.com/public/applications/publications/cgibin/pbi.cgi>.

Getting help and information from the World Wide Web

On the World Wide Web, the IBM Web site has up-to-date information about IBM xSeries and IntelliStation products, services, and support. The address for IBM xSeries information is <http://www.ibm.com/eserver/xseries/>. The address for IBM IntelliStation information is <http://www.ibm.com/pc/intellistation/>.

You can find service information for your IBM products, including supported options, at <http://www.ibm.com/pc/support/>. If you click **Profile** from the support page, you can create a customized support page. The support page has many sources of information and ways for you to solve problems, including:

- Diagnosing problems, using the IBM Online Assistant
- Downloading the latest device drivers and updates for your products
- Viewing Frequently Asked Questions (FAQ)
- Viewing hints and tips to help you solve problems
- Participating in IBM discussion forums
- Setting up e-mail notification of technical updates about your products

Software service and support

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

For more information about Support Line and other IBM services, go to <http://www.ibm.com/services/>, or go to <http://www.ibm.com/planetwide/> for support telephone numbers.

Hardware service and support

You can receive hardware service through IBM Integrated Technology Services or through your IBM reseller, if your reseller is authorized by IBM to provide warranty service. Go to <http://www.ibm.com/planetwide/> for support telephone numbers.

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.

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Important notes

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

CD-ROM drive speeds list the variable read rate. Actual speeds vary and are often less than the maximum possible.

When referring to processor storage, real and virtual storage, or channel volume, KB stands for approximately 1000 bytes, MB stands for approximately 1 000 000 bytes, and GB stands for approximately 1 000 000 000 bytes.

When referring to hard disk drive capacity or communications volume, MB stands for 1000000 bytes, and GB stands for 1000 000 000 bytes. Total user-accessible capacity may vary depending on operating environments.

Maximum internal hard disk drive capacities assume the replacement of any standard hard disk drives and population of all hard disk drive bays with the largest currently supported drives available from IBM.

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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 89/336/EEC on the approximation of the laws of the Member States relating to electromagnetic compatibility. IBM cannot accept responsibility for any failure to satisfy the protection requirements resulting from a nonrecommended modification of the product, including the fitting of non-IBM option cards.

This product has been tested and found to comply with the limits for Class A Information Technology Equipment according to CISPR 22/European Standard EN 55022. The limits for Class A equipment were derived for commercial and industrial environments to provide reasonable protection against interference with licensed communication equipment.

Attention: This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

Taiwanese Class A warning statement

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Power cords

For your safety, IBM provides a power cord with a grounded attachment plug to use with this IBM product. To avoid electrical shock, always use the power cord and plug with a properly grounded outlet.

IBM power cords used in the United States and Canada are listed by Underwriter's Laboratories (UL) and certified by the Canadian Standards Association (CSA).

For units intended to be operated at 115 volts: Use a UL-listed and CSA-certified cord set consisting of a minimum 18 AWG, Type SVT or SJT, three-conductor cord, a maximum of 15 feet in length and a parallel blade, grounding-type attachment plug rated 15 amperes, 125 volts.

For units intended to be operated at 230 volts (U.S. use): Use a UL-listed and CSA-certified cord set consisting of a minimum 18 AWG, Type SVT or SJT, three-conductor cord, a maximum of 15 feet in length and a tandem blade, grounding-type attachment plug rated 15 amperes, 250 volts.

For units intended to be operated at 230 volts (outside the U.S.): Use a cord set with a grounding-type attachment plug. The cord set should have the appropriate safety approvals for the country in which the equipment will be installed.

IBM power cords for a specific country or region are usually available only in that country or region.

IBM power cord part number	Used in these countries and regions
13F9940	Argentina, Australia, China (PRC), New Zealand, Papua New Guinea, Paraguay, Uruguay, Western Samoa
13F9979	Afghanistan, Algeria, Andorra, Angola, Austria, Belgium, Benin, Bulgaria, Burkina Faso, Burundi, Cameroon, Central African Rep., Chad, China (Macau S.A.R.), Czech Republic, Egypt, Finland, France, French Guiana, Germany, Greece, Guinea, Hungary, Iceland, Indonesia, Iran, Ivory Coast, Jordan, Lebanon, Luxembourg, Malagasy, Mali, Martinique, Mauritania, Mauritius, Monaco, Morocco, Mozambique, Netherlands, New Caledonia, Niger, Norway, Poland, Portugal, Romania, Senegal, Slovakia, Spain, Sudan, Sweden, Syria, Togo, Tunisia, Turkey, former USSR, Vietnam, former Yugoslavia, Zaire, Zimbabwe
13F9997	Denmark
14F0015	Bangladesh, Burma, Pakistan, South Africa, Sri Lanka
14F0033	Antigua, Bahrain, Brunei, Channel Islands, China (Hong Kong S.A.R.), Cyprus, Dubai, Fiji, Ghana, India, Iraq, Ireland, Kenya, Kuwait, Malawi, Malaysia, Malta, Nepal, Nigeria, Polynesia, Qatar, Sierra Leone, Singapore, Tanzania, Uganda, United Kingdom, Yemen, Zambia

IBM power cord part number	Used in these countries and regions
14F0051	Liechtenstein, Switzerland
14F0069	Chile, Ethiopia, Italy, Libya, Somalia
14F0087	Israel
1838574	Thailand
6952301	Bahamas, Barbados, Bermuda, Bolivia, Brazil, Canada, Cayman Islands, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Guatemala, Guyana, Haiti, Honduras, Jamaica, Japan, Korea (South), Liberia, Mexico, Netherlands Antilles, Nicaragua, Panama, Peru, Philippines, Saudi Arabia, Suriname, Taiwan, Trinidad (West Indies), United States of America, Venezuela

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