



**@server**<sup>™</sup>

xSeries 360

Type 8686

# User's Reference





IBM® xSeries 360



# User's Reference

**Note:**

Before using this information and the product it supports, read the general information in Appendix A, "Warranty information," on page 149 and Appendix B, "Notices," on page 159.

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# Safety

Before installing this product, read the Safety Information.

مح، يجب قراءة دات السلامة

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 přečtete 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**

#### 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.



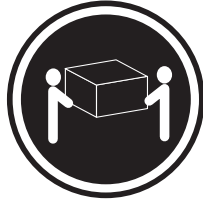
### DANGER

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.

Class 1 Laser Product  
Laser Klasse 1  
Laser Klass 1  
Luokan 1 Laserlaite  
Appareil À Laser de Classe 1

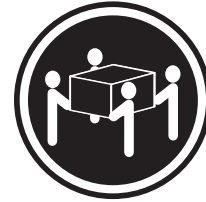
**Statement 4**



≥ 18 kg (39.7 lb)



≥ 32 kg (70.5 lb)



≥ 55 kg (121.2 lb)

**CAUTION:**  
Use safe practices when lifting.

**Statement 5**



**CAUTION:**  
The power control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.



**Statement 8**



**CAUTION:**

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



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

**Statement 10**



**CAUTION:**

Do not place any object weighing more than 82 kg (180 lb) on top of rack-mounted devices.



>82 kg (180 lb)



# Chapter 1. Introducing the xSeries 360 server

The IBM® eServer xSeries 360, which features IBM X-Architecture™ technology<sup>1</sup>, is a high-performance rack model server that can be upgraded to a symmetric multiprocessing (SMP) server. It is ideally suited for networking environments that require superior microprocessor performance, efficient memory management, flexibility, and large amounts of reliable data storage.

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

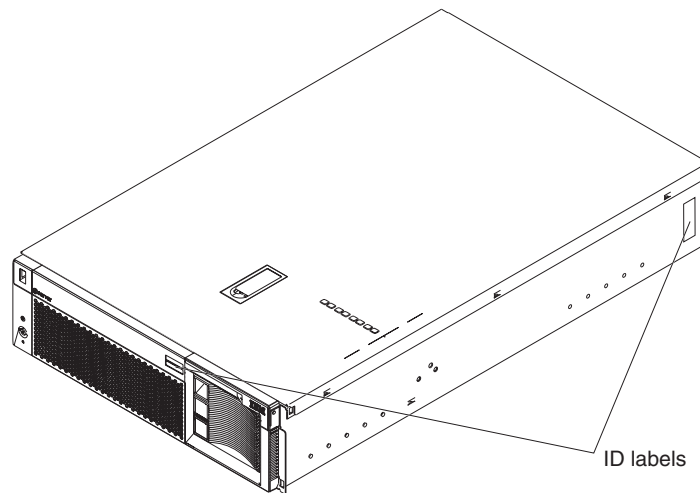
If you have access to the World Wide Web, you can obtain up-to-date information about your xSeries 360 server and other IBM server products at <http://www.ibm.com/eserver/xseries/>.

**Note:** If you need help, information, technical assistance, or just want more information about IBM products, see "Getting information, help, and service" on page 144.

To register your IBM products and to create a profile, or to create a customized support page that is specific to your hardware, see "Customized support page" at "Diagnostic tools overview" on page 95.

The machine type, model number, and serial number are on the ID labels, one located on the bezel to the left of the CD-ROM drive and the other at the rear of the right side, as shown in the following illustration. You will need these numbers when you register your server with IBM.

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



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1. X-Architecture technology is an IBM design blueprint that takes full advantage of existing IBM technologies to build powerful, scalable, and reliable Intel processor-based servers. For more information about X-Architecture technology, go to the World Wide Web at: <http://www.pc.ibm.com/us/eserver/xseries/xarchitecture/index.html>.

## Features and specifications

The following table provides a summary of the specifications and features for the xSeries 360 server.

<p><b>Microprocessor:</b></p> <ul style="list-style-type: none"> <li>Intel® Xeon™ Processor MP (frequency varies with server model, each MP processor functions as two logical processors)           <ul style="list-style-type: none"> <li>Minimum: One</li> <li>Maximum: Four</li> </ul> </li> <li>Level-3 cache size varies with model</li> <li>100 MHz front-side bus (FSB)</li> </ul> <p><b>Chipset:</b></p> <p>IBM XA-32™ Chipset with integrated memory, I/O controller, and remote I/O controller.</p> <p><b>Memory:</b></p> <ul style="list-style-type: none"> <li>DDR registered SDRAM DIMMs with ECC and Chipkill™ memory           <ul style="list-style-type: none"> <li>Minimum: 512 MB</li> <li>Maximum: 8 GB</li> </ul> </li> <li>Slots: Interleaved, 8 slots</li> </ul> <p><b>Drives standard:</b></p> <ul style="list-style-type: none"> <li>Slim diskette: 1.44 MB</li> <li>Slim CD-ROM: 24X-10X IDE</li> </ul> <p><b>Hard disk drives:</b></p> <ul style="list-style-type: none"> <li>Slim-high hot-swap drives. (number of drives and drive capacity vary with model)</li> <li>Maximum: Three</li> </ul> <p><b>Active™ PCI-X expansion slots:</b></p> <ul style="list-style-type: none"> <li>Two 100 MHz/64-bit PCI-X</li> <li>Four 66 MHz/64-bit PCI-X</li> </ul> <p><b>Hot-swap power supplies:</b></p> <p>370 W (115-230 V ac)</p> <ul style="list-style-type: none"> <li>Minimum: One</li> <li>Maximum: Three</li> </ul>	<p><b>Hot-swap cooling:</b></p> <p>Six hot-swap fans</p> <p><b>Video:</b></p> <ul style="list-style-type: none"> <li>S3 video controller</li> <li>Compatible with SVGA 4</li> <li>8 MB SDRAM video memory</li> </ul> <p><b>Size (3 U)</b></p> <ul style="list-style-type: none"> <li>Height: 134 mm (5.28 in.)</li> <li>Depth: 720 mm (28.35 in.)</li> <li>Width: 440 mm (17.32 in.)</li> <li>Weight: 25 kg (55 lb) to 31.7 kg (70 lb) depending upon configuration</li> </ul> <p><b>Integrated functions:</b></p> <ul style="list-style-type: none"> <li>Light Path Diagnostics™</li> <li>Ultra160 SCSI controller</li> <li>One 10BASE-T/100BASE-TX Intel Ethernet controller</li> <li>Remote Supervisor Adapter (service processor)           <ul style="list-style-type: none"> <li>ASM interconnect (peer-to-peer) port</li> <li>RXE expansion port</li> <li>RXE management port</li> <li>Ethernet port</li> <li>Serial port</li> </ul> </li> <li>Three universal serial bus ports</li> <li>Keyboard port</li> <li>Mouse port</li> <li>Video port</li> </ul> <p><b>Acoustical noise emissions:</b></p> <ul style="list-style-type: none"> <li>Sound power, idling: 6.3 bel maximum</li> <li>Sound power, operating: 6.3 bel maximum</li> <li>Sound pressure, operating: 47 dBa maximum</li> </ul>	<p><b>Environment:</b></p> <ul style="list-style-type: none"> <li>Air temperature:           <ul style="list-style-type: none"> <li>Server on: 10° to 35°C (50° to 95°F). Altitude: 0 to 914 m (3000 ft)</li> <li>Server on: 10° to 32°C (50° to 89.6°F). Altitude: 914 m (3000 ft) to 2133 m (7000 ft)</li> <li>Server off: 10° to 43°C (50° to 110°F). Maximum altitude: 2133 m (7000 ft)</li> </ul> </li> <li>Humidity:           <ul style="list-style-type: none"> <li>Server on: 8% to 80%</li> <li>Server off: 8% to 80%</li> </ul> </li> </ul> <p><b>Heat output:</b></p> <p>Approximate heat output in British thermal units (Btu) per hour</p> <ul style="list-style-type: none"> <li>Minimum configuration: 1232 Btu (0.36 kilowatts)</li> <li>Maximum configuration: 3566 Btu (1.045 kilowatts)</li> </ul> <p><b>Electrical input:</b></p> <ul style="list-style-type: none"> <li>Sine-wave input (50-60 Hz) required</li> <li>Input voltage low range:           <ul style="list-style-type: none"> <li>Minimum: 100 V ac</li> <li>Maximum: 127 V ac</li> </ul> </li> <li>Input voltage high range:           <ul style="list-style-type: none"> <li>Minimum: 200 V ac</li> <li>Maximum: 240 V ac</li> </ul> </li> <li>Input kilovolt-amperes (kVA) approximately:           <ul style="list-style-type: none"> <li>Minimum: 0.08 kVA (ac power connected, server off)</li> <li>Minimum: 0.38 kVA (dc power on, server idle)</li> <li>Maximum: 1.1 kVA</li> </ul> </li> </ul>
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## Notices and statements used in this book

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

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

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

---

## What the xSeries 360 offers

The design of the server takes advantage of advancements in symmetric multiprocessing (SMP), data storage, disk-array technologies, and memory management. The server combines:

- X-Architecture technology  
X-Architecture technology is an IBM design blueprint that takes full advantage of existing IBM technologies to build powerful, scalable, and reliable Intel processor-based servers.  
For more information about X-Architecture technology, go to the Web at <http://www.pc.ibm.com/us/eserver/xseries/xarchitecture/index.html>.
- Impressive performance using an innovative approach to SMP  
The server supports up to four Intel Xeon Processor MP microprocessors. The server comes with at least one microprocessor installed; you can install additional processors to enhance performance and provide SMP capability.
- Large data-storage and hot-swap capabilities  
The xSeries 360 server supports up to three 26 mm (1-inch) slim-high 3.5-inch hot-swap hard disk drives in the hot-swap bays. This hot-swap feature enables you to remove and replace hard disk drives without turning off the server.
- Active PCI-X (hot-plug) adapter capabilities  
The server has six *hot-plug* PCI-X slots for PCI or PCI-X adapters. With operating-system support, you can replace failing hot-plug PCI/PCI-X adapters without turning off the server. If the *hot-add* feature is supported by both the operating system and a PCI/PCI-X adapter, you can also add such PCI/PCI-X adapters in these slots without turning off the server.
- Redundant hot-swap cooling and redundant hot-swap power capabilities

The fans in the server can operate at variable speeds so that if one fan fails, the remaining fans increase in speed to enable continued operation until the failing fan is replaced. You can replace a failing fan without turning off the server.

The server supports up to three 370-watt power supplies. Multiple hot-swap 370-watt power supplies ensure redundancy and hot-swap capability for a typical configuration.

- Large system memory

The memory bus in the server supports up to 8 GB of system memory. The memory controller provides error correcting code (ECC) support for up to eight industry-standard, 2.5 V, 168-pin, 16-byte, PC1600 registered DDR SDRAM dual inline memory modules (DIMMs). The memory controller also provides Chipkill Memory protection. Chipkill Memory protection is a technology that protects the server from a single chip failure on a DIMM.

- Light Path Diagnostics

Light Path Diagnostics provide LEDs to assist in isolating problems with the server. An LED on the operator information panel is lit if an unusual condition or a problem occurs. If this happens, you can look at the LEDs visible through a special cutout in the cover and isolate the cause. Under some circumstances, you may need to remove the cover and view LEDs on the system board to pinpoint the source of a problem.

- Systems-management capabilities

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

- Integrated network environment support

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

- Remote expansion enclosure

The addition of an optional, IBM RXE-100 Remote Expansion Enclosure provides up to twelve additional hot-plug PCI/PCI-X slots for PCI or PCI-X adapters. The enclosure can be managed through the Remote Supervisor Adapter, enabling remote operation over a network or a modem.

- Redundant network adapter

The addition of an optional, redundant network adapter provides a failover capability to a secondary Ethernet connection. If a problem occurs with the primary Ethernet connection, all Ethernet traffic associated with this primary connection is automatically switched to the redundant network adapter. If the appropriate device drivers are installed, this switching occurs without data loss and without user intervention.

- IBM ServerGuide™ CDs

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

**Note:** The latest level of basic input/output system (BIOS) code for the server is available through the World Wide Web. See “Getting information” on page 144 for the appropriate World Wide Web addresses.

For more information about the ServerGuide CDs, see Chapter 4, “Using the ServerGuide™ CDs,” on page 45.

The server is designed to be cost-effective, powerful, and flexible. It uses peripheral component interconnect-extended (PCI-X) bus architecture to provide compatibility with a wide range of existing hardware devices and software applications.

The server meets stringent worldwide certifications for power, electromagnetic compatibility (EMC), and safety.

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## Reliability, availability, and serviceability

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

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

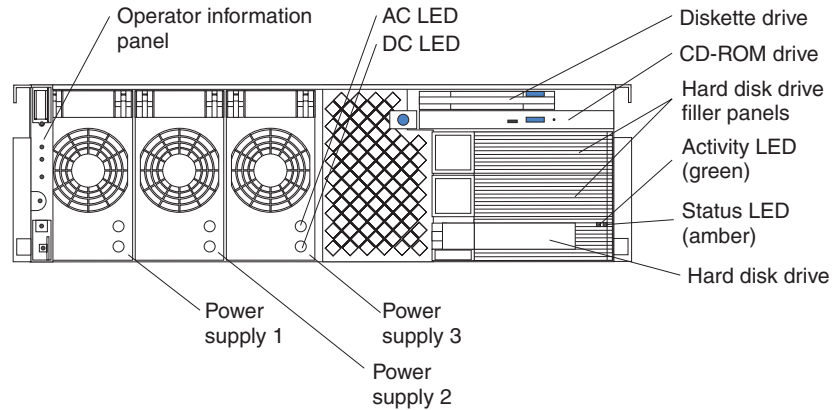
- ECC memory, L3 cache, and front side buses (FSBs)
- Parity checking on the small computer system interface (SCSI) bus
- Advanced Configuration and Power Interface (ACPI) power management
- Power-on self-test (POST)
- Systems-management monitoring through Intra-Integrated Circuit (I<sup>2</sup>C) bus
- Light Path Diagnostics
- Automatic error retry and recovery
- Automatic restart after a power failure
- Built-in temperature, fan, and voltage monitoring
- Chipkill Memory protection
- Hot-swap cooling with fan speed-sensing capability
- Hot-swap and redundant power supplies
- Hot-swap hard disk drives
- Hot-plug (Active) PCI-X adapter slots
- Menu-driven setup, system configuration, SCSISelect configuration, and diagnostic programs
- Memory scrubbing and Predictive Failure Analysis™ (PFA) (background and real time)
- Microcode and diagnostic program levels available
- System-management software and LANDesk® enabled
- Network adapter failover support
- Remote Supervisor Adapter to enable remote server management
- Remote Connect™
- Remote system problem-determination support
- Upgradable POST/BIOS, diagnostics, and Remote Supervisor Adapter microcode
- Wake on LAN® and Alert on LAN™ capability
- Backup BIOS switching by means of a flash ROM page swap jumper
- Error codes and messages
- Microprocessor serial number access
- Cable presence detection for standard internal cables
- Vital product data (VPD) for microprocessors, system and memory boards, memory DIMMs, power supplies, hot-swap-drive backplane, and power supply backplane

- Customer support center 24 hours a day, 7 days a week<sup>2</sup>

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## Server controls and indicators

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



**Operator information panel:** This panel, also known as the front LED panel, contains controls, indicators, and one of the three USB ports. See “Operator information panel” on page 7 for details.

**AC LED:** Each hot-swap power supply has an ac power LED to indicate that ac power is available to the power supply.

**DC LED:** Each hot-swap power supply has a dc power LED to indicate that the power supply is active.

**Diskette drive:** The server contains one standard 3.5 diskette drive with an LED to indicate when it is active.

**CD-ROM drive:** The server contains one standard IDE CD-ROM drive with an LED to indicate when it is active.

**Hard disk drive filler panels:** A filler panel is used to cover empty hard disk drive bays. A filler panel must be installed in each empty bay to ensure proper system cooling.

**Activity LED:** Each hot-swap hard disk drive has an activity LED, which flashes if the drive is being accessed.

**Status LED:** Each hot-swap hard-disk drive has a status LED. If this amber LED is on continuously, the drive has failed. If an optional IBM ServeRAID™ adapter is installed in the server and the LED flashes slowly (one flash per second), the drive is being rebuilt. If the LED flashes rapidly (three flashes per second), the controller is identifying the drive.

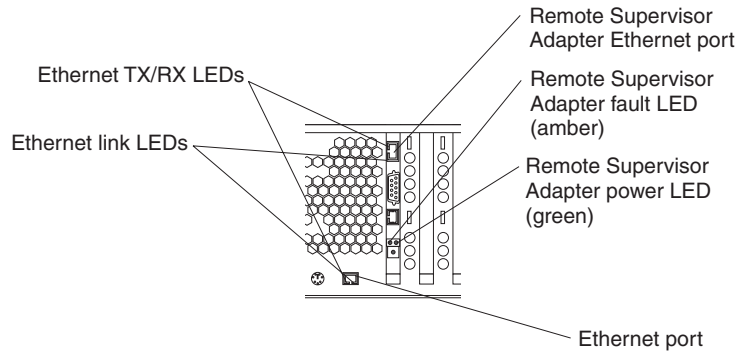
**Hard disk drive:** The server supports a maximum of three hot-swap hard disk drives.

**Power supplies 1, 2, and 3:** The server comes with a minimum of one hot-swap power supply and supports a maximum of three hot-swap power supplies.

---

<sup>2</sup>Service availability will vary by country. Response time will vary depending on the number and nature of incoming calls.

The following illustration shows the indicators on the rear of the server.



**Ethernet Link LEDs:** These LEDs (one for the Remote Supervisor Adapter, one for the network) indicate that the related Ethernet link is operational.

**Ethernet TX/RX LEDs:** These LEDs (one for the Remote Supervisor Adapter, one for the network) indicate that activity is taking place on the related network.

**Remote Supervisor Adapter Ethernet port:** This port enables you to manage the server from a remote location.

**Remote Supervisor Adapter fault LED:** This LED indicates that the Remote Supervisor Adapter has failed.

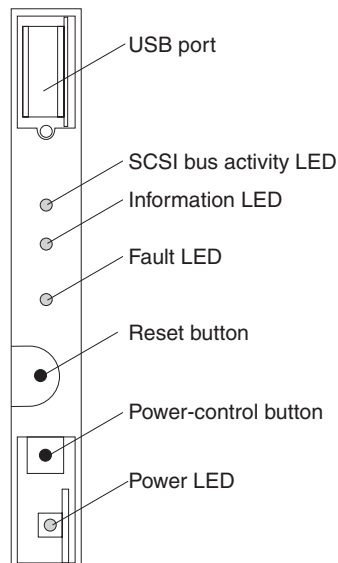
**Remote Supervisor Adapter power LED:** This LED indicates that power is being supplied to the Remote Supervisor Adapter.

**Ethernet port:** This port enables you to connect the server to a network.

---

## Operator information panel

The following illustration shows the controls, indicators, and USB port on the operator information panel (also known as the front LED panel).



**USB port:** This port enables you to attach a USB device to the front of the server.

**SCSI bus activity LED:** This green LED is on when there is activity on the SCSI bus.

**Information LED:** This amber light is on if the server power supplies are nonredundant or some other noncritical event has occurred. See the LEDs on the Level 2 diagnostic LED panel or on the system board for specific error information. For details, see “Level 2 diagnostic LED panel and system board LED locations” on page 63.

**Fault LED:** This amber LED is on if a system error has occurred. See the LEDs on the Level 2 diagnostic LED panel or on the system board for specific error information. For details, see “Level 2 diagnostic LED panel and system board LED locations” on page 63.

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

**Power-control button:** If the server is in operational mode, press this button to put it into standby mode. If the server is in standby mode, press this button to restore it to operational mode. See “Turning on the server” and “Turning off the server” on page 9 for more information about applying and removing external power to the server.

**Power LED:** This green LED is on if ac and dc power are present in the server. If this LED is flashing, the server is in standby mode (ac power is present, but the power supplies are turned off). If this LED is off, either ac power, all power supplies, or the light has failed.

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

## Turning on the server

Turning on the server refers to the act of plugging the server power cords into the power source and pressing the power-control button. After you install the network operating system in the server, this typically causes the operating system to start.

Complete the following steps to turn on the server.

1. Turn on all external devices, such as the monitor.

**Note:** After you plug the power cords into the power source, wait 30 seconds before pressing the power-control button on the operator information panel. During this time, the Remote Supervisor Adapter is initializing and the power-control button does not respond. The power LED on the information panel blinks, indicating that ac power is present in the server.

2. Plug the server power cords into the power source.

**Note:** Plugging the power cords into the power source might cause the server to start automatically. This is an acceptable action.

3. Wait 30 seconds; then, press the power-control button on the operator information panel. The power LED comes on and the power-on self-test (POST) begins.

If the server is turned on and a power failure occurs, it restarts automatically when power is restored. You can turn on the server remotely by means of the Remote Supervisor Adapter.

When you start the server for the first time after you add or remove an internal option or an external SCSI device, you might see a message telling you that the configuration has changed. The Configuration/Setup Utility program automatically starts so that you can save the new configuration information. See Chapter 3, “Configuring the server,” on page 13 for details.

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

The server comes with at least one microprocessor installed on the system board. If you have installed one or more additional microprocessors, the server can now operate as an SMP server. Therefore, you might need to upgrade the operating system to support SMP. See Chapter 4, “Using the ServerGuide™ CDs,” on page 45 and the operating-system documentation for additional information.

If the server has a ServeRAID adapter installed and you have installed or removed a hard disk drive, see the documentation that comes with the ServeRAID adapter for information about reconfiguring the disk arrays.

## Turning off the server

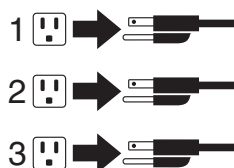
Turning off the server refers to the act of stopping the operating system, pressing the power-control button, and disconnecting the server power cords from the power source.

### 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.**



See the operating system documentation for the proper procedure to shut down the operating system before turning off the server. Each operating system is different. Some allow an immediate shutdown; others require an orderly shutdown procedure.

Complete the following steps to turn off the server:

1. Press the power-control button on the operator information panel. This places the server in standby mode. The power LED on the operator information panel blinks. This does not remove all power from the server.

**Note:** After doing this, wait at least 30 seconds before pressing the power-control button to turn on the server again.

2. Disconnect the server power cords from the power source.

**Note:** Wait approximately 15 seconds after disconnecting the power cords for the server to stop running. The power LED on the operator information panel will stop blinking.

## Standby mode

Standby mode refers to the condition in which the server operating system is not running and all core logic is shut down except for the Remote Supervisor Adapter.

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.

You can put the server into standby mode remotely by means of the Remote Supervisor Adapter.



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## Chapter 2. Arranging your workspace

To get the most from the server, arrange both the equipment you use and your work area to suit your needs and the kind of work you do. Your comfort is of foremost importance, but light sources, air circulation, and the location of electrical outlets also can affect the way you arrange your workspace.

---

### Comfort

Although no single working position is ideal for everyone, here are a few guidelines to help you find a position that suits you best.

Sitting in the same position for a long time can cause fatigue. A good chair can make a big difference. The backrest and seat should adjust independently and provide good support. The seat should have a curved front to relieve pressure on the thighs. Adjust the seat so that your thighs are parallel to the floor and your feet are either flat on the floor or on a footrest.

When using the keyboard, keep your forearms parallel to the floor and your wrists in a neutral, comfortable position. Try to keep a light touch on the keyboard and your hands and fingers relaxed. You can change the angle of the keyboard for maximum comfort by adjusting the position of the keyboard feet.

Adjust the monitor so the top of the screen is at, or slightly below, eye level. Place the monitor at a comfortable viewing distance, usually 51 to 61 cm (20 to 24 in.), and position it so you can view it without having to twist your body. Also position other equipment you use regularly, such as the telephone or a mouse, within easy reach.

---

### Glare and lighting

Position the monitor to minimize glare and reflections from overhead lights, windows, and other light sources. Even reflected light from shiny surfaces can cause annoying reflections on the monitor screen. Place the monitor at right angles to windows and other light sources, when possible. Reduce overhead lighting, if necessary, by turning off lights or using lower wattage bulbs. If you install the monitor near a window, use curtains or blinds to block the sunlight. You might have to adjust the Brightness and Contrast controls on the monitor as the room lighting changes throughout the day.

Where it is impossible to avoid reflections or to adjust the lighting, an antiglare filter placed over the screen might be helpful. However, these filters might affect the clarity of the image on the screen; try them only after you have tried all other methods of reducing glare.

Dust buildup compounds problems that are associated with glare. Remember to clean the monitor screen periodically using a soft cloth that is moistened with a nonabrasive liquid glass cleaner.

---

### Air circulation

The server and monitor produce heat. The server has one or more fans that pull in fresh air and force out hot air. The monitor lets hot air escape through vents. Blocking the air vents can cause overheating, which might result in a malfunction or damage. Place the server and monitor so that nothing blocks the air vents; usually, 15 cm (6

inches) of air space is sufficient. Also, make sure that the vented air is not blowing on someone else.

---

## Electrical outlets and cable lengths

The location of electrical outlets and the length of power cords and cables that connect to the monitor, printer, and other devices might determine the final placement of the server.

When arranging your workspace:

- Avoid the use of extension cords. When possible, plug the server power cords directly into electrical outlets.
- Keep power cords and cables neatly routed away from walkways and other areas where they might get kicked accidentally.

For more information about power cords, see “Power cords” on page 163.

---

## Chapter 3. Configuring the server

You can use the following configuration programs to customize the settings for the server hardware:

- **Configuration/Setup Utility program**

This program is part of the basic input/output system (BIOS) code that comes with the server. You can use this program to change interrupt request (IRQ) settings, change the drive startup sequence, set the date and time, and set passwords. For information about using this utility, see “Using the Configuration/Setup Utility program” on page 14.

- **SCSISelect utility program**

This program is part of the basic input/output system (BIOS) code that comes with the server. You can use this program to configure the devices that are attached to the integrated SCSI controller. Use this program to change default values and to resolve configuration conflicts. For information about using this utility, see “Using the SCSISelect utility program” on page 20.

- **PXE Boot Agent Utility program**

The Preboot eXecution Environment (PXE) Boot Agent Utility program is part of the BIOS code that comes with the server. You can use this program to select the boot protocol and other boot options, to display the PXE setup prompt or to disable it, to set the prompt display duration, and to select a power management option. For information about using this utility, see “Using the PXE Boot Agent Utility program” on page 21

**Note:** The RPL selection for the Boot Protocol option is not supported for this server.

- **ServerGuide CDs**

The ServerGuide CDs provide software setup and installation tools that are specifically designed for your IBM server. Use these CDs during the initial installation of your server to configure basic hardware features and to simplify your network operating system (NOS) installation. (See Chapter 4, “Using the ServerGuide™ CDs,” on page 45 for more information.) The ServerGuide CDs also contain a collection of application programs, which you can install after the server is up and running.

- **ServeRAID configuration program**

This program comes with the optional ServeRAID adapters and with server models that have a ServeRAID adapter preinstalled. If the server has a ServeRAID adapter installed, you must use the ServeRAID configuration program to define and configure the disk-array subsystem *before* you install the operating system. For more information about using the ServeRAID configuration program, see “Using the ServeRAID™ configuration programs” on page 23 and also the ServeRAID documentation that comes on the *xSeries 360 Documentation CD*.

- **Remote Supervisor Adapter configuration process**

Configuration activities are also required for the Remote Supervisor Adapter. See “Setting up the Remote Supervisor Adapter” on page 26 for information about setting up and cabling the Remote Supervisor Adapter for use with an Advanced System Management (ASM) network. For complete information about cabling, configuring, and using the Remote Supervisor Adapter to manage the server remotely, see the *xSeries 360 User's Reference* and the *Remote Supervisor Adapter User's Guide* on the *xSeries 360 Documentation CD*.

**Note:** These configuration programs are not designed to help you configure the integrated Ethernet controller.

To configure the integrated Ethernet controller, see “Configuring the Ethernet controller” on page 23.

---

## Using the Configuration/Setup Utility program

Configuration/Setup is a menu-driven utility that is part of the BIOS code that comes with the server. You can use it to:

- Change the drive startup sequence
- Enable USB keyboard and mouse support
- Resolve configuration conflicts
- Set the date and time
- Set passwords

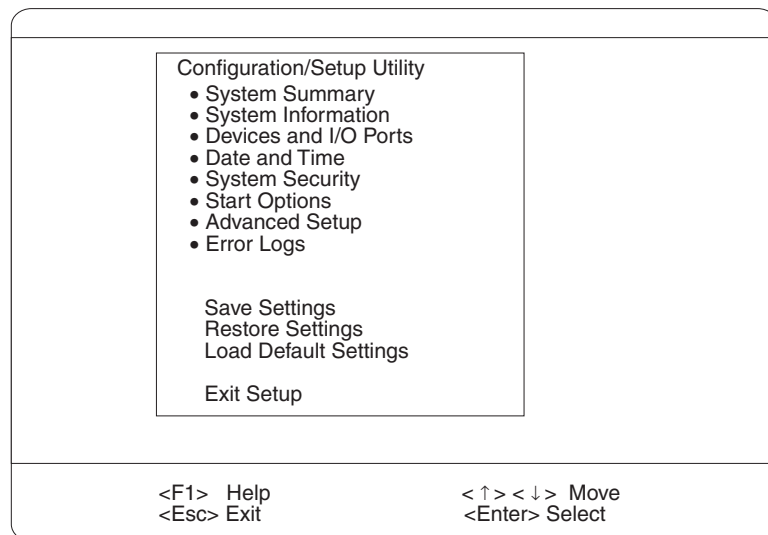
## Starting the Configuration/Setup Utility program

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

1. Turn on the server and watch the monitor screen.
2. When the message Press F1 for Configuration/Setup appears, press F1.
3. Follow the instructions that appear on the screen.

## Choices available from the Configuration/Setup Utility main menu

From the Configuration/Setup Utility main menu, you can select settings that you want to change.



### Notes:

1. You can press F1 to display help information for a selected menu item.
2. The choices on some menus might differ slightly, depending on the BIOS code version in the server.

The following choices are available from the main menu:

- **System Summary**

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

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

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

- **System Information**

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

- **Product Data**

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

- **System Card Data**

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

- **Devices and I/O Ports**

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

You can use this choice to enable or disable the integrated SCSI, video, and Ethernet controllers.

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

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

- If the video controller is disabled and no video adapter is installed, the server will have no video capability.

- **Date and Time**

Select this choice to set the system date and time and to change the system time that is sent to the Remote Supervisor Adapter when the server is started. This choice appears only on the full Configuration/Setup Utility main menu.

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

You can set a time delta to be added or subtracted from the system time that is sent to the Remote Supervisor Adapter each time the server is started. Use the number keys to type the hours and minutes and + or – to add or subtract from the system time. If you want the system clock time to be the same as the Remote Supervisor Adapter clock time, leave the value set at its default of 0.

- **System Security**

Select this choice to set passwords or the remote control security settings. You can implement three levels of password protection. This choice appears only on the full Configuration/Setup Utility main menu.

You can implement the following levels of password protection:

- **Power-on Password**

Select this choice to set or change a power-on password. See “Power-on password” on page 18 for more information.

— **Administrator Password**

Select this choice to set or change an administrator password.

**Attention:** If an administrator password is set and then forgotten, it cannot be overridden or removed. You must have an IBM service technician replace the operator information panel card.

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

See “Administrator password” on page 19 for more information.

— **Remote Control Security Settings**

Select this choice to set the password for remote access to the server. You can set the number of failed logins before the server cuts off access. See “Remote-control security settings” on page 20 for more information.

• **Start Options**

Select this choice to view or change the start options. This choice appears only on the full Configuration/Setup Utility main menu. Start options take effect when you start the server.

You can select keyboard operating characteristics, such as whether the keyboard number lock starts on or off, and the keyboard speed. You also can enable the server to run without a diskette drive, display, or keyboard.

The server uses a startup sequence to determine the device from which the operating system starts. For example, you can define a startup sequence that checks for a startable diskette in the diskette drive, then checks the hard disk drive in bay 1, and then checks a network adapter.

— **USB Legacy**

If you enable this option, you can use a USB keyboard on a non USB-aware operating system. The supported environments are DOS and System Setup. Note that if a PS/2 keyboard is detected, the USB Legacy operation will be disabled regardless of the value of this setting.

— **Boot Fail Count**

If you enable this option, you can restore the BIOS system defaults after three consecutive boot failures. If this option is disabled, the BIOS system defaults can be loaded only from the Configuration/Setup Utility main menu.

— **Virus Detection**

If you enable this option, a virus-detection test checks for changes in the master boot record at startup.

• **Advanced Setup**

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

A warning message appears above the choices on this menu to alert you that the system might malfunction if these options are configured incorrectly. Follow the instructions on the screen carefully.

— **System Partition Visibility**

Select this choice to specify whether the System Partition is visible. To make the System Partition visible, set this value to **Visible**. To make the System Partition invisible, set this value to **Hidden**. See Chapter 4, “Using the

ServerGuide™ CDs,” on page 45 for additional information on the System Partition.

— **Boot Device Location**

Select this choice to determine whether the server boots from the system board SCSI device or from an adapter in an expansion slot.

— **PCI Slot/Device Information**

Select this choice to view system resources used by installed PCI/PCI-X devices. PCI/PCI-X devices are usually configured automatically. This information is saved when you exit. The **Save Settings**, **Restore Settings**, and **Load Default Settings** choices on the Configuration/Setup Utility main menu do not save the PCI Slot/Device Information settings.

**Attention:** You must use the menu selections to save custom settings for the **PCI Slot/Device Information** choice. The **Save Settings**, **Restore Settings**, and **Load Default Settings** choices on the Configuration/Setup Utility main menu do not save the PCI Slot/Device Information settings.

After making changes, select:

- **Save and exit the PCI utility** to save the changes and return to the **Advanced Setup** screen.
- **Exit the PCI utility without saving changes** to ignore the changes, restore the previous settings, and return to the **Advanced Setup** screen.

— **Cache Control**

Select this choice to enable or disable the microprocessor cache. In addition, you can set the microprocessor cache mode as write-back (WB) or write-through (WT). Selecting write-back mode provides better system performance.

— **Memory Settings**

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

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

— **Integrated System Management Processor Settings**

Select this choice to specify the **Reboot System on NMI** option. You can use this option to enable or disable automatic reboot after a Non Maskable Interrupt (NMI) occurs.

• **Error Logs**

Select this choice to view or clear error logs.

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

Select **Clear Event/Error Logs** from the POST Error Log menu to clear the error log.

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

Select **Clear Event/Error Logs** from the System Event/Error Log menu to clear the error or event log.

• **Save Settings**

Select this choice to save your customized settings.

- **Restore Settings**

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

- **Load Default Settings**

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

- **Exit Setup**

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

---

## Using passwords

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

### Power-on password

When a power-on password is set, POST is not completed until you type the password. After you set a power-on password, you can enable the unattended-start mode. This locks the keyboard and mouse but allows the system to start the operating system. The keyboard and mouse remain locked until you type the correct password.

You can use any combination of up to seven characters (A–Z, a–z, and 0–9) for your power-on password. Keep a record of your password in a secure place. If you forget the power-on password, you can regain access to the server through one of the following methods:

- If an administrator password is set, type the administrator password at the power-on prompt. (See “Administrator password” on page 19 for details.) Start the Configuration/Setup Utility program and change the power-on password.
- Change the position of the power-on password override jumper as described at “Using the password-override jumper”.
- Remove the battery and then install the battery.

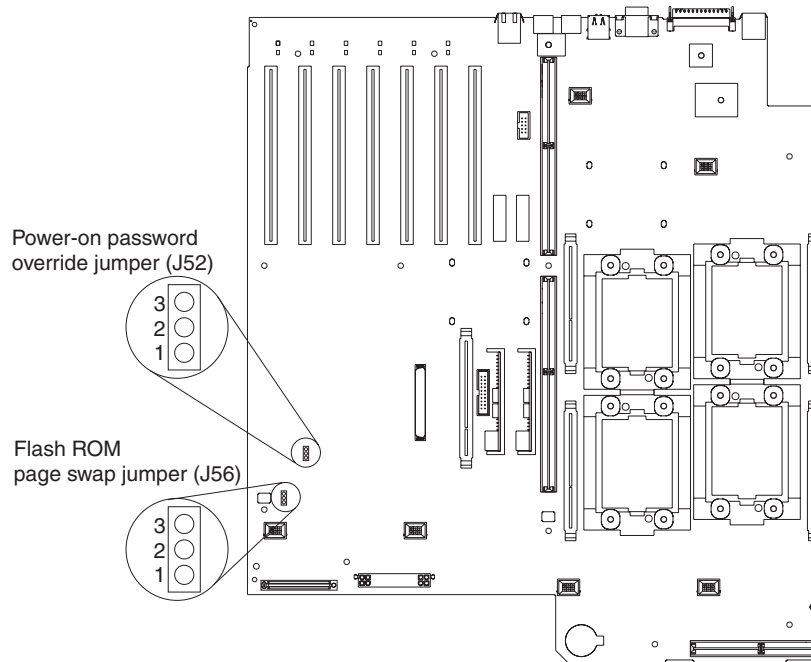
### Using the password-override jumper

Complete the following steps to change the position of the password-override jumper:

1. Read the information at “Safety” on page vii.
2. Turn off the server and disconnect all power cords and external cables, and remove the top cover.
3. Change the position of the jumper on J52 to bypass the power-on password check. You can then start the Configuration/Setup Utility program and change the power-on password.

The following illustration shows the power-on password override jumper (J52) on the system board.





Changing the position of the jumper on J52 bypasses the power-on password check *if* the jumper has been moved since the server was last powered on.

Changing the position of this jumper does not affect the administrator password check if an administrator password is set.

4. Install the top cover and reconnect all external cables and power cords.

## Administrator password

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

**Attention:** If an administrator password is set and then forgotten, it cannot be overridden or removed. You must have an IBM service technician replace the operator information panel card.

The following table provides a summary of the password features.

Table 1. Power-on and administrator password features.

Type of password	Results
Power-on password	<ul style="list-style-type: none"> <li>Type the password to complete the system startup.</li> <li>All choices are available on the Configuration/Setup Utility main menu.</li> </ul>
Administrator password	<ul style="list-style-type: none"> <li>No password is required to start the system.</li> <li>Type the password to access the Configuration/Setup Utility program.</li> <li>All choices are available on the Configuration/Setup Utility main menu.</li> </ul>

Table 1. Power-on and administrator password features.

Type of password	Results
Administrator and power-on password	<ul style="list-style-type: none"> <li>You can type either password to complete the system startup.</li> <li>The administrator password provides access to all choices on the Configuration/Setup Utility main menu. You can set, change, or delete both the administrator and power-on passwords and allow a power-on password to be changed by the user.</li> <li>The power-on password provides access to a limited set of choices on the Configuration/Setup Utility main menu. This limited access might include changing or deleting the power-on password.</li> </ul>

## Remote-control security settings

Select this choice to set a remote-control password, which provides remote access to all choices on the Configuration/Setup Utility main menu. You can set the following features:

- Set or read current Remote Supervisor Adapter.
- Set lockout threshold. Enter a number of failed login attempts. Once this number is reached, the server locks up. You can also set the server to lock up if no password is entered for a set number of minutes.

See “Setting up the Remote Supervisor Adapter” on page 26 for information on cabling and configuring the Remote Supervisor Adapter.

---

## Using the SCSISelect utility program

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

- View the default SCSI IDs
- Locate and correct configuration conflicts

**Note:** If the server has a redundant arrays of independent disks (RAID) adapter installed, use the configuration method that is supplied with the RAID adapter to view or change SCSI settings for devices attached to the adapter.

## Starting the SCSISelect utility program

Complete the following steps to start the SCSISelect utility program:

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

**Note:** If an administrator password has been set, a prompt appears asking you to type the password to start the SCSISelect utility program.
- When the Would you like to configure the host adapter or run the SCSI disk utility? question appears, make a selection and press Enter.
- Use the arrow keys to select a choice from the menu.
  - Press Esc to exit from the SCSISelect utility program.
  - Press the F5 key to switch between color and monochrome modes (if the monitor permits).
- Follow the instructions on the screen to change the settings of the selected items; then, press Enter.

---

## Choices available from the SCSISelect menu

The following choices are available from the SCSISelect utility menu:

- **Configure/View Host Adapter Settings**

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

You can view or change the following controller settings:

- **Host Adapter SCSI ID**

Select this choice to view the SCSI controller ID, which is usually 7.

- **SCSI Parity Checking**

Select this choice to view the assigned value. The assigned value is **Enabled**, and it cannot be changed.

- **Host Adapter SCSI Termination**

Select this choice to view the assigned value. The assigned value is **Enabled**, and it cannot be changed.

- **Boot Device Options**

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

- **SCSI Device Configuration**

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

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

- The transfer rate for Ultra160 SCSI LVD devices is 160.0 MBps.
- The transfer rate for Ultra2 SCSI LVD devices is 80.0 MBps.
- The transfer rate for Fast SCSI devices is 20.0 MBps.

- **Advanced Configuration Options**

Select this choice to view or change the settings for advanced configuration options.

- **SCSI Disk Utilities**

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

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

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

---

## Using the PXE Boot Agent Utility program

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

- Select the boot protocol and other boot options

- Select whether to display the PXE setup prompt and the display duration
- Select a power management option

**Note:** The RPL selection for the Boot Protocol option is not supported for this server.

## Starting the PXE Boot Agent Utility program

Complete the following steps to start the PXE Boot Agent Utility program:

1. Turn on the server.
2. When the Initializing Intel Boot Agent Version X.X (Dev Build XXX) prompt appears, press Ctrl+S.

### Notes:

- a. If the PXE setup prompt does not display, use the Configuration/Setup Utility program to set the enable Ethernet PXE/DHCP option.
  - b. By default, you have 2 seconds after the prompt appears on the screen to press Ctrl+S.
3. Use the arrow keys or press Enter to select a choice from the menu.
    - Press Esc to return to the previous menu.
    - Press the F4 key to exit.
  4. Follow the instructions on the screen to change the settings of the selected items; then, press Enter.

---

## Choices available from the PXE Boot Agent Utility menu

The following choices are available from the PXE Boot Agent Utility menu:

- **Boot Protocol**  
PXE is the default value. Do not change this value. No other network boot protocols are supported.
- **PnP/BEV**  
PnP is the default value.
- **Default Boot**  
Local is the default value.
- **Local Boot**  
Enabled is the default value.
- **Prompt time**  
Select this choice to specify the amount of time (in seconds) that the system will pause during initialization for a Ctrl+S response to the PXE setup prompt. Two (2) seconds is the default value.
- **Setup Message**  
Select this choice to either display the PXE setup prompt or disable it. **Disable** is the default value.  
If this choice is enabled, the message Press Ctrl+S to enter the setup menu will display on the screen under the initializing prompt.
- **Power Mgmt**  
Select this choice to specify a power management protocol.

**Notes:**

1. Use the default setting for Advanced Configuration and Power Interface (ACPI)-aware operating systems, such as Microsoft® Windows® 2000 and Windows NT®.
2. If the server is running a non-ACPI operating system, you must set this selection to **Enable** to use the Wake on LAN support.
3. When using a non-ACPI operating system, do not send a wake-up packet to the server while it is turned on. If a wake-up packet has been sent while the server is on and you are unable to turn the server off, see the "Power" section in Table 16 on page 129 for more information.

---

## Using the ServeRAID™ configuration programs

A ServeRAID adapter enables you to use multiple physical SCSI hard-disk drives as logical drives, operating as a disk array. To enable you to configure the ServeRAID controller, the adapter comes with a CD containing the ServeRAID Manager program and the ServeRAID Mini-Configuration program. For details about using these programs, see the documentation that comes with the ServeRAID adapter.

---

## Configuring the Ethernet controller

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

To use the Ethernet port, connect a Category 3 or better unshielded twisted-pair (UTP) cable to the server Ethernet port on the rear panel of the server.

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

The Ethernet connectors on the rear panel and on the Remote Service Adapter each have two LEDs. When the Ethernet link-status LED is on, there is an active connection on the Ethernet port. When the Ethernet transmit/receive TX/RX LED is on, there is activity between the server and the network. For a description of the server Ethernet port, see "Ethernet port" on page 91.

When you connect the server to the network, the Ethernet controller automatically detects the data-transfer rate (10Mbps or 100Mbps) on the network and then sets the controller to operate at the appropriate rate. In addition, if the Ethernet port that the server is connected to supports auto-negotiation, the Ethernet controller will set the appropriate duplex state. That is, the Ethernet controller will adjust to the network data rate, whether the data rate is standard Ethernet (10BASE-T), Fast Ethernet (100BASE-TX), half duplex (HDX), or full duplex (FDX). The controller supports half-duplex (HDX) and full-duplex (FDX) modes at both speeds.

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

## High-performance Ethernet modes

If you install an optional Ethernet adapter, you can use it together with the integrated Ethernet controller to support optional modes, such as teaming, priority packets, and virtual LANs, which provide higher performance and throughput for the server. These modes apply to the integrated Ethernet controller and to the controllers on the supported Ethernet adapters.

### Teaming Mode

Teaming options increase throughput and fault tolerance when running with Windows NT, Windows 2000, or NetWare 4.1x or later.

- **Adapter fault tolerance (AFT)** provides automatic redundancy for the Ethernet controller. If the primary controller fails, the optional Ethernet adapter takes over. Adapter fault tolerance supports from 2 to 4 controllers per team.
- **Adaptive load balancing (ALB)** enables you to balance the transmission data flow among 2 to 4 Ethernet controllers. ALB also includes the AFT option. You can use ALB with any 100BASE-TX switch.
- **Cisco Fast EtherChannel (FEC)** creates a team of 2 to 4 Ethernet controllers to increase transmission and reception throughput. FEC also includes the AFT option. You can only use FEC with a switch that has FEC capability.

Teaming requires at least two Ethernet controllers. For additional information about the teaming modes, refer to the documentation that comes with the additional Ethernet adapters.

### Priority Packet mode

Priority Packet is a traffic-prioritization utility that enables you to set up filters to process high-priority traffic before normal traffic. You can send information from critical nodes or applications with an indicated priority. Because you set this priority at the host or entry point of the network, the network devices can base forwarding decisions on priority information defined in the packet.

Priority Packet information is available on the IBM Networking Web site at <http://www.ibm.com/networking/support>.

Priority Packet prioritizes traffic based on priority filters. These are parameters you assign to outgoing (transmit) packets. Using the Priority Filter Wizard, you can set up predefined or custom priority filters based on a node (MAC) address, Ethernet type, or by various properties of the protocol and port. Priority Packet provides two different methods for prioritizing traffic: IEEE 802.1p tagging and High Priority Queue.

IEEE 802.1p is an IEEE standard for tagging, or adding additional bytes of information to packets with different priority levels. Packets are tagged with 4 additional bytes, which increase the packet size and indicate a priority level. When you send these packets out on the network, the higher priority packets are transferred first. Priority Packet tagging (also known as Traffic Class Expediting) enables the Ethernet controller to work with other elements of the network (such as switches and routers) to deliver priority packets first. You can assign specific priority levels from 0 (low) to 7 (high).

You can assign values to packets based on their priority when you use the IEEE 802.1p standard for packet tagging. This method requires a network infrastructure that supports packet tagging. The routing devices receiving and transferring these packets on the network must support 802.1p for tagging to be effective.

After you set up the priority filter in Priority Packet, you must start PROSet, click the Advanced tab, and select **QoS Packet Tagging** from the list.

**Note:** IEEE 802.1p tagging increases the size of the packets it tags. Some hubs and switches will not recognize the larger packets and will drop them. Check the hub or switch documentation to see if they support 802.1p. (You can configure the switch to strip the tags from the packets and send it on to the next destination as normal traffic.) If these devices do not support 802.1p or if you are not sure, use High Priority Queue (HPQ) to prioritize network traffic.

The requirements for effectively using IEEE 802.1p tagging are:

- The other devices receiving and routing 802.1p tagged packets must support 802.1p.
- The adapters on these devices must support 802.1p. The Ethernet controller in the server, all IBM Netfinity 10/100 Ethernet Security Adapters, and IBM 10/100 Ethernet Server Adapters support 802.1p.
- The adapter cannot be assigned to an adapter team.
- If you are setting up VLANs and packet tagging on the same adapter, you must start PROSet, click the Advanced tab, and select **QoS Packet Tagging** from the list.

If the network infrastructure devices do not support IEEE 802.1p or you are not sure, you can still define filters and send packets as high priority. While High Priority Queue (HPQ) does not provide the precise priority levels of 802.1p tagging, it does assign traffic as either high or low priority and sends high priority packets first. Therefore, if there are multiple applications on a system sending packets, the packets from the application with a filter are sent out first. HPQ does not change network routing, nor does it add any information to the packets.

To assign HPQ, you can specify it using Priority Packet when you create or assign a filter.

To effectively use HPQ, the adapter cannot be assigned to an adapter team.

## Virtual LAN mode

A virtual LAN (VLAN) is a logical grouping of network devices put together as a LAN, regardless of their physical grouping or collision domains. Using VLANs increases network performance and improves network security.

VLANs offer you the ability to group users and devices together into logical workgroups. This can simplify network administration when connecting clients to servers that are dispersed geographically across the building, campus, or enterprise network.

Typically, VLANs are configured at the switch and any computer can be a member of one VLAN per installed network adapter. The Ethernet controller supersedes this by communicating directly with the switch, enabling multiple VLANs on a single network adapter (up to 64 VLANs).

To set up VLAN membership, the Ethernet controller must be attached to a switch that has VLAN capability. You also need to use Windows 2000, Windows NT 4.0 or later, or Novell NetWare 4.1x or later.

### Notes:

1. Windows NT versions prior to 4.0 do not support VLANs.

2. VLANs require Windows 2000 or Windows NT 4.0 with Service Pack 5.0 from Microsoft.

To join a VLAN from Windows 2000 or Windows NT 4.0:

1. Create a VLAN on the switch. Use the parameters you assign there to join the VLAN from the server. Refer to the switch documentation for more information.
2. Double-click the **ProSet** icon in the Control Panel window.
3. Right-click the adapter in the list that you want to add to the VLAN, then click **Add VLAN**. Note that VLANs cannot be assigned to adapters that are already defined to have an adapter teaming option.
4. Type the VLAN ID and VLAN name. The VLAN ID must match the VLAN ID of the switch. The ID range is from 1 to 1000. The VLAN name is for information only and does not need to match the name on the switch.
5. Click **OK**. Repeat steps 3 through 5 for each VLAN you want the server to join. The VLANs you add are listed on the Adapters page.
6. Click **Close** and restart the server.

---

## Setting up the Remote Supervisor Adapter

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

### Remote Supervisor Adapter features

The Remote Supervisor Adapter provides the following:

- Continuous health monitoring and control
- Advanced Predictive Failure Analysis (PFA)
- Configurable notification and alerts
- Event logs that are timestamped, saved in nonvolatile memory, and can be attached to e-mail alerts
- Remote graphics console redirection
- LAN, serial, and Advanced System Management (ASM) interconnect remote access
- Point-to-point protocol (PPP) support
- Simple Network Management Protocol (SNMP)
- Domain Name System (DNS) and Dynamic Host Configuration Protocol (DHCP) support
- Remote power control
- Microsoft Windows NT and Windows 2000 blue-screen capture
- Remote firmware update and access to critical server settings
- Optional independent power, which enables around-the-clock access to the server even if the server is powered off



## Setup requirements

Before you set up the Remote Supervisor Adapter, you must download to a diskette the DOS Remote Supervisor Utility program from the World Wide Web at <http://www.ibm.com/pc/support>.

The most current Remote Supervisor Adapter firmware and the management information base (MIB) automatically download to the same diskette. However, the firmware and MIB available on the ServerGuide CD are fully functional; it is not necessary to install either one unless you want the most current items. You need the MIB if you plan to configure Simple Network Management Protocol (SNMP) trap alerts on the Remote Supervisor Adapter.

Do the following before you set up the Remote Supervisor Adapter.

- Install the operating system on the server, using ServerGuide and the documentation that comes with the operating system.
- Download to a diskette the most current server basic input/output system (BIOS) code from the World Wide Web at <http://www.ibm.com/pc/support>. Install the BIOS code using the instructions that download to the diskette.
- If you plan to configure Simple Network Management Protocol (SNMP) trap alerts on the Remote Supervisor Adapter, you must install and compile the management information base (MIB) on your SNMP manager.
- You must install the agent component of UM Server Extensions to use the following Advanced System Management (ASM) Web interface features:
  - Shutdown O/S and then Power Off Server
  - Shutdown O/S and then Restart Server

UM Server Extensions is on the system-management software CD that comes with the server. For information about installing the agent component, see the documentation that comes with the system-management CD.

- To configure the remote alert recipients for Director over LAN or Director over modem, the remote alert recipient must be an IBM Director-enabled server with UM Server Extensions.
- If you want to use a Web browser to access the Remote Supervisor Adapter remotely, the supported Web browsers and browser requirements are:
  - Microsoft Internet Explorer 4.0 (with Service Pack 1), or later
  - Netscape Navigator 4.72, or later (version 6.0 is not currently supported)
  - Java™ enabled Web browser (See your browser documentation or online Help for instructions about enabling its Java support.)
  - Support for JavaScript 1.2, or later (See your browser documentation or online Help for instructions about enabling its JavaScript support.)
  - Support of HTTP version 1.0, or later
  - Minimum display resolution of 800 x 600 pixels and 256 colors

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

## Using the documentation

The documentation for the Remote Supervisor Adapter includes the following publications on the *xSeries 360 Documentation* CD.

- *IBM @server xSeries 360 User's Reference* (this document, specifically the topics in this section, which assist you with cabling and configuring)

- *Remote Supervisor Adapter User's Guide for the IBM @server xSeries 360*

This document explains how to configure and use an ASM network to manage the server remotely through either the Web-based interface or the text-based user interface.

## Cabling and configuring the Remote Supervisor Adapter

This section explains how to cable and configure the Remote Supervisor Adapter. The following tasks are necessary to accomplish this.

**Note:** After you initially configure the adapter, use the Web-based interface to create a backup copy of the configuration. If you need to replace the adapter in the future, this enables you to restore the configuration and resume normal operation more quickly. See the *Remote Supervisor Adapter User's Guide for the @server xSeries 360* for details.

**Task 1.** Connect the Ethernet and serial port cables. See “Cabling the Ethernet LAN port and serial port”.

**Task 2.** Perform the initial configuration to enable remote access to the Remote Supervisor Adapter. See “Enabling remote access to the adapter” on page 30. This enables you to:

1. Configure the Ethernet port
2. Configure the serial (COM) port
3. Set up the point-to-point protocol

**Task 3.** Configure the remote control password to enable the ASM Web interface remote control features. See “Configuring the remote control password” on page 37.

**Task 4.** Install the ASM device drivers. See “Installing Advanced System Management device drivers” on page 35.

For service, assistance, or additional information on the World Wide Web, see “Getting information, help, and service” on page 144.

### Cabling the Ethernet LAN port and serial port

This section describes how to cable the Remote Supervisor Adapter. You can manage the server remotely through the Remote Supervisor Adapter using one of the user interfaces and one of the connection methods that are described in Table 2. Choose the interface method you want to use to perform remote management; then, perform the indicated cabling procedure.

If you plan to set up an ASM interconnect network, before you begin cabling the server, see “Using the ASM interconnect network” on page 38 for instructions about cabling the ASM interconnect port and setting up the network. You might want to review the information in “ASM interconnect network configuration examples” on page 42 before you connect the cables. Then, return here to start the cabling procedures.

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

User interface to Remote Supervisor Adapter	Connection to Remote Supervisor Adapter	For the cabling procedure, see:
ASM Web interface using the HTTP protocol	LAN using the Ethernet port	“Cabling the Ethernet LAN port” on page 29
Text-based user interface using the TELNET protocol		

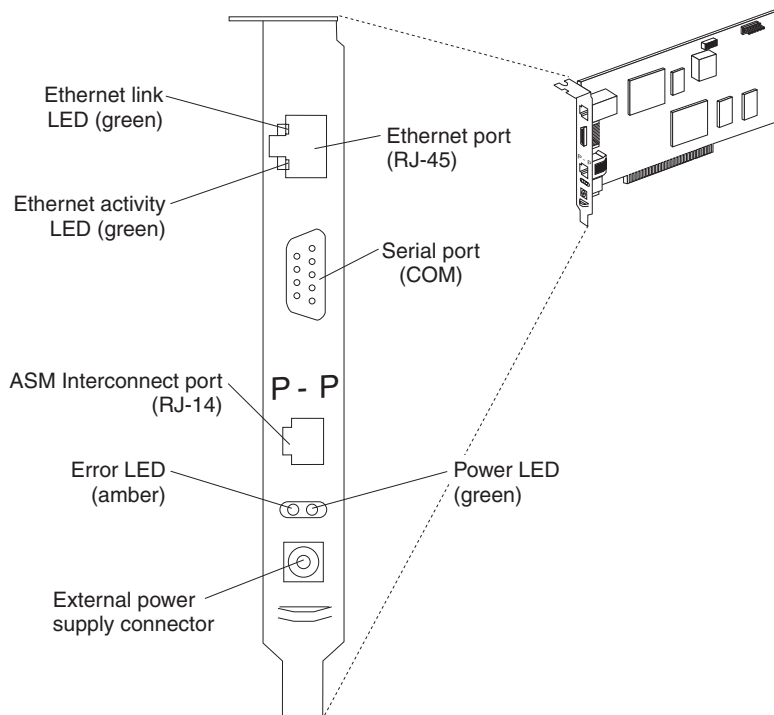
Table 2. Cabling tasks to enable remote access to the Remote Supervisor Adapter.

User interface to Remote Supervisor Adapter	Connection to Remote Supervisor Adapter	For the cabling procedure, see:
Text-based user interface using a modem or a null modem	Serial (COM) port	"Cabling the serial (COM) port" on page 30
ASM Web interface using point-to-point (PPP) protocol		
Text-based user interface using the TELNET protocol over PPP		

**Cabling the Ethernet LAN port:** Complete the following steps to attach the Ethernet cables.

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

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



**Ethernet link LED**

The green Ethernet link LED is lit when the Ethernet cable is connected properly.

**Ethernet activity LED**

The green Ethernet activity LED flashes when there is Ethernet activity.

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

**Cabling the serial (COM) port:** To cable the serial (COM) port, connect a modem or null modem cable to the serial port on the Remote Supervisor Adapter.

Continue with “Configuring the adapter”.

## Configuring the adapter

This section describes the following:

- Enabling remote access to the Remote Supervisor Adapter
- Installing ASM device drivers

These procedures assume that you have an operational keyboard and pointing device attached to the server.

**Enabling remote access to the adapter:** The Remote Supervisor Adapter requires configuration to enable remote access through either the Ethernet port or the serial port. From Table 3, choose the interface method that you want to use to perform remote management; then, perform the indicated configuration procedure.

**Note:** For detailed information about using the ASM Web interface and the text-based user interface, see the *Remote Supervisor Adapter User's Guide* on the *xSeries 360 Documentation CD*.

Table 3. Configuration tasks to enable remote access to the Remote Supervisor Adapter.

User interface to Remote Supervisor Adapter	Connection to Remote Supervisor Adapter	For the configuration procedure, see:
ASM Web interface using the HTTP protocol	LAN using the Ethernet port	“Configuring the Ethernet settings for Web-based remote access”
Text-based user interface using the TELNET protocol		
Text-based user interface using a modem or a null modem	Serial (COM) port	“Configuring the serial port for text-based remote access” on page 32 and “Setting up point-to-point protocol” on page 33
ASM Web interface using point-to-point (PPP) protocol		
Text-based user interface using the TELNET protocol over PPP		

**Configuring the Ethernet settings for Web-based remote access:** If you have an accessible, active, and configured dynamic host configuration protocol (DHCP) server on the network, the hostname, IP address, gateway address, subnet mask, and DNS server IP address are set automatically. You do not need to perform further configuration tasks to enable the Ethernet connection because the default value for the DHCP Setting field is Enabled. If you need to configure the serial port, go to “Configuring the serial port for text-based remote access” on page 32; otherwise, go to “Configuring the remote control password” on page 37.

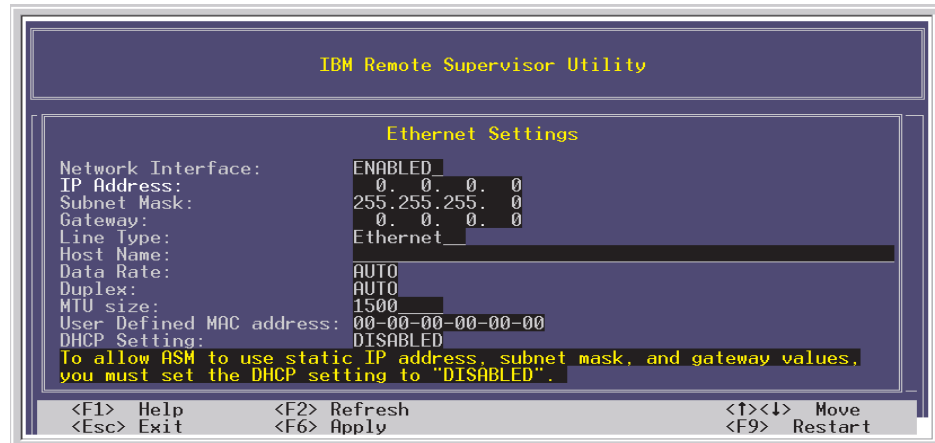
If you do not have a DHCP server on the network, complete the following steps to configure the Ethernet settings.

1. With the server turned off, insert the diskette with the downloaded utility program into the diskette drive; then, turn on the server.

2. The utility starts automatically, displaying the Remote Supervisor Utility window.
3. Use the Up Arrow and Down Arrow keys (↑ and ↓) to select **Configuration Settings**; then, press Enter. The Configuration Settings window opens.
4. Use the arrow keys to select **Ethernet Settings**; then, press Enter.

The Ethernet Settings window opens, as shown in the following illustration.

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



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

**Network Interface**

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

**IP Address**

Type the IP address of the Remote Supervisor Adapter.

**Subnet Mask**

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

**Gateway**

Type the IP address of the gateway.

**Host Name**

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

For detailed information about the Ethernet settings, see the *Remote Supervisor Adapter User's Guide* on the *xSeries 360 Documentation CD*.

6. Change the DHCP Setting field to **Disabled**. The default value is Enabled.
7. Press F6 to apply the change.
8. Press Esc. In the Warning window that opens, press Enter to restart the Remote Supervisor Adapter.
9. Press Esc to return to the Configuration Settings window.  
If you need to configure the serial port, go to "Configuring the serial port for text-based remote access" on page 32.
10. Press Esc to return to the Utility program main window.
11. Use the arrow keys to select **Exit Utility** from the menu or press Esc to close the Utility program.
12. Remove the diskette from the diskette drive. The server restarts automatically.

- If you also want to configure the serial port, continue with “Configuring the serial port for text-based remote access”. Otherwise, go to “Installing Advanced System Management device drivers” on page 35.

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

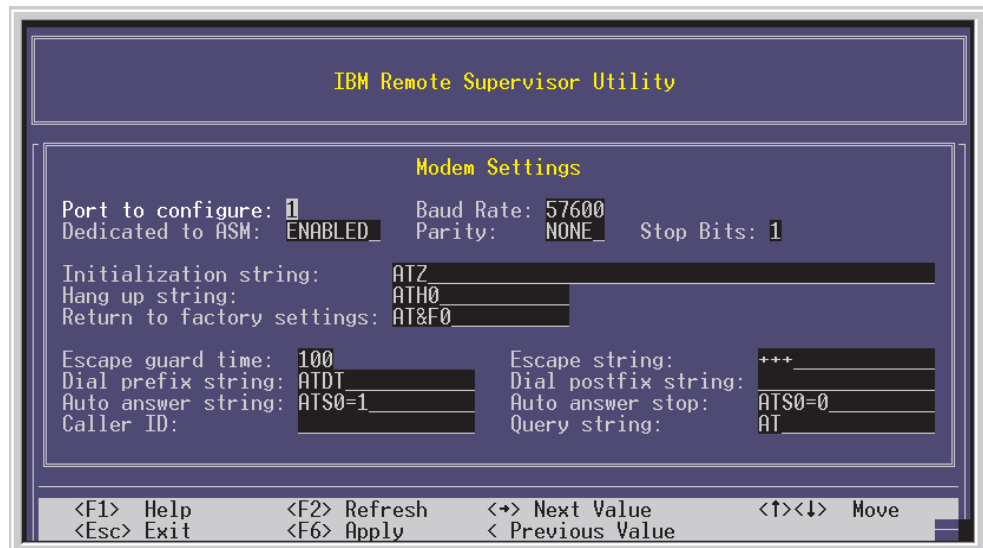
- With the server turned off, insert the diskette with the downloaded utility program into the diskette drive; then, turn on the server.
- The utility starts automatically, displaying the Remote Supervisor Utility window.
- Use the Up Arrow and Down Arrow keys (↑ and ↓) to select **Configuration Settings**;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

The Configuration Settings window opens.

- Use the arrow keys to select **Modem Settings**; then, press Enter.

The Modem Settings window opens, as shown in the following illustration.

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



- Verify the following serial port values:

#### **Baud Rate**

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

#### **Dedicated to ASM**

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

You can dedicate the integrated serial port on the Remote Supervisor Adapter to system management or share it with the operating system. If the serial port is dedicated to system management, it serves only the Remote Supervisor Adapter and is always available for dial-in or dial-out alerting purposes. You cannot view the port using the operating system or any application.

**Note:** To use this serial port, you must first install the ASM device drivers as described in “Installing Advanced System Management device drivers” on page 35.

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

### Parity

The default is None.

### Stop Bits

The default is 1.

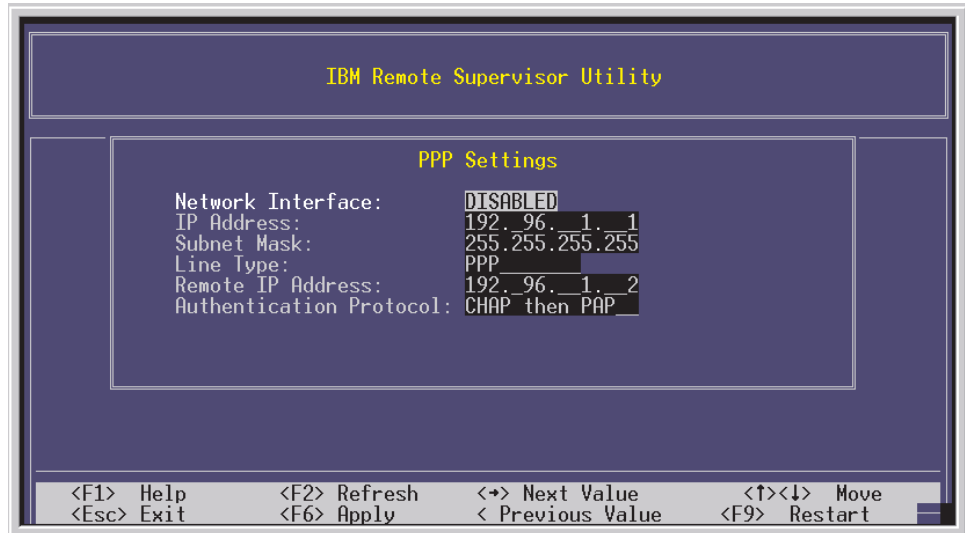
**Note:** The data bits value is preset to 8 and cannot be changed.

For detailed information about the serial port and modem settings, see the *Remote Supervisor Adapter User's Guide* on the *xSeries 360 Documentation CD*.

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

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

1. With the server turned off, insert the downloaded utility program into the diskette drive; then, turn on the server.
2. The utility starts automatically, displaying the Remote Supervisor Utility window.
3. Use the Up Arrow and Down Arrow keys (↑ and ↓) to select **Configuration Settings**; then, press Enter.  
The Configuration Settings window opens.
4. Use the arrow keys to select **PPP Settings**; then, press Enter.  
The PPP Settings window opens, as shown in the following illustration.  
**Note:** The values in the window are only examples; your settings will be different.



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

**Network Interface**

The default is Disabled. Change this field to Enabled.

**IP Address**

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

**Subnet Mask**

The default value is 255.255.255.255.

**Line Type**

The value is set to PPP.

**Remote IP Address**

The default value is 192.96.1.2.

**Authentication Protocol**

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

For detailed information about the PPP settings, see the information about configuring PPP access over a serial port in the *Remote Supervisor Adapter User's Guide* on the *xSeries 360 Documentation CD*.

6. Press F6 to apply the changes.
7. Press Esc. In the Warning window that opens, press Enter to restart the Remote Supervisor Adapter.
8. Press Esc to return to the Configuration Settings window.  
If you need to configure the serial port, go to "Configuring the serial port for text-based remote access" on page 32.
9. Press Esc to return to the Utility program main window.
10. Use the arrow keys to select **Exit Utility** from the menu or press Esc to close the Utility program.
11. Remove the diskette from the diskette drive. The server restarts automatically.



12. Continue with “Installing Advanced System Management device drivers” on page 35.

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

The following sections describe the procedure for installing the ASM device drivers for the server, depending on your operating system.

**Notes:**

1. If you are installing device drivers manually, note the following requirements:
  - Make sure that the operating system is installed on the server before you install the ASM device drivers. For information about installing the operating system, see the documentation that comes with the operating system.
  - Before installing the ASM device drivers for the Remote Supervisor Adapter, stop any system-management application.
2. If you are using ServerGuide to install device drivers and your operating system is either Microsoft Windows NT or Windows 2000, ServerGuide installs the ASM device drivers automatically.
  - Windows 2000: Continue with “Installing Windows 2000 ASM device drivers”
  - Windows NT: Go to “Installing Windows NT ASM device drivers”
  - Novell NetWare: Go to “Installing Novell NetWare ASM device drivers” on page 36
  - SCO UnixWare: Go to “Installing SCO UnixWare ASM device drivers” on page 37

After you install the ASM device drivers, go to “Configuring the remote control password” on page 37 to set the remote control password.

*Installing Windows 2000 ASM device drivers:* To install the ASM device drivers for Windows 2000, complete the following steps.

**Notes:**

1. Do not use the Hardware Wizard to install the drivers. If the Hardware Wizard starts itself for the installation of any System Management Driver hardware, exit the Hardware Wizard by selecting **Cancel**.
2. If IBM Netfinity<sup>®</sup> Director, IBM Director, or UM Services is running on the server, stop the system-management application before proceeding.

Complete the following steps to manually install the Windows 2000 ASM device drivers.

1. Open a command prompt.
2. If you are installing from a diskette, type: A:\WIN2000\SETUP, where A is the drive letter of the diskette drive.
3. If you are installing from a CD, type: D:\DD\WIN2000\SETUP, where D is the drive letter of the CD-ROM drive.
4. Follow the directions that display on the screen.
5. Go to “Configuring the remote control password” on page 37.

*Installing Windows NT ASM device drivers:* Choose one of the following methods to install the ASM device drivers for Windows NT:

- Non-interactive

The non-interactive method for installing the ASM device drivers accepts the default values for any window prompts that appear. You are prompted to respond only if an error occurs during installation.

- **Interactive**

The normal (interactive) method for installing the ASM device drivers prompts you with instructions and waits for you to respond before continuing with the installation.

**Note:** If IBM Netfinity Director, IBM Director, UM Services, or IBM Netfinity Manager is running on the server, stop the system-management application before proceeding.

*Using the non-interactive method:* Complete the following steps to use the non-interactive method.

1. Open a Windows NT command prompt; then, type one of the following commands:
  - If the installation is from a diskette, type:  
A:\NT\SETUP -q  
(where *A* is the drive letter assigned to the diskette drive).  
Press Enter.
  - If the installation is from a CD, type:  
D:\DD\NT\SETUP -q  
(where *D* is the drive letter assigned to the CD-ROM drive).  
Press Enter.
2. Follow the instructions that appear in the window.
3. Go to “Configuring the remote control password” on page 37.

*Using the interactive method:* Complete the following steps to use the interactive method.

1. Open a Windows NT command prompt; then, type one of the following commands:
  - If the installation is from a diskette, type:  
A:\NT\SETUP  
(where *A* is the drive letter assigned to the diskette drive).  
Press Enter.
  - If the installation is from a CD, type:  
D:\DD\NT\SETUP  
(where *D* is the drive letter assigned to the CD-ROM drive).  
Press Enter.
2. Follow the instructions that appear in the window.
3. Continue with “Configuring the remote control password” on page 37.

*Installing Novell NetWare ASM device drivers:* Complete the following steps to install the ASM device drivers for the Novell NetWare operating system:

**Note:** If IBM Netfinity Director, IBM Director, or IBM Netfinity Manager is running on the server, stop the system-management application before proceeding.

1. From a system console session, type one of the following commands:
  - If the installation is from a diskette, type:

```
LOAD A:\NETWARE\SETUP
```

(where *A* is the drive letter assigned to the diskette drive).

Press Enter.

- If the installation is from a CD, type:

```
LOAD D:\DD\NETWARE\SETUP
```

(where *D* is the drive letter assigned to the CD-ROM drive).

Press Enter.

2. Follow the instructions that appear in the window.
3. Go to “Configuring the remote control password”.

*Installing SCO UnixWare ASM device drivers:* Choose one of the following methods to install the SCO UnixWare ASM device drivers.

**Note:** If IBM Netfinity Director or IBM Director is running on the server, stop it before proceeding.

- Complete the following steps to use the SCO UnixWare package utility:
  1. Open a shell prompt.
  2. Type `scoadmin` and press Enter.
  3. Click **Application Installer**.
  4. Click to access the diskette or CD-ROM drive (for example, DISK\_A or CD-ROM\_1); then, install the package file that displays.
  5. Continue with “Configuring the remote control password”.
- Complete the following steps to use the interactive installation from a shell prompt:

**Note:** The commands in the following steps are case-sensitive.

1. Open a shell prompt.
2. If the installation is from a diskette, type:

```
pkgadd -d diskette1
```
3. If the installation is from a CD, type:

```
pkgadd -d cdrom1
```

4. Continue with “Configuring the remote control password”.

- Complete the following steps to use the non-interactive installation from a shell prompt:

**Note:** The commands in the following steps are case sensitive.

1. Open a shell prompt.
2. If the installation is from a diskette, type:

```
pkgadd -d diskette1 -q-p-n uw7advmg
```
3. If the installation is from a CD, type:

```
pkgadd -d cdrom1 -q-p-n uw7advmg
```

4. Continue with “Configuring the remote control password”.

**Configuring the remote control password:** If you want to use the remote control features of the Remote Supervisor Adapter ASM Web interface, you must configure the remote control password using the Configuration/Setup Utility program that comes with the server. This program is part of the basic input/output system (BIOS) code.

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

1. Start the server, and watch the monitor screen.
2. When the message Press F1 for Configuration/Setup is displayed, press F1. The Configuration/Setup Utility main menu window opens.
3. Use the Up Arrow and Down Arrow keys (↑ and ↓) to select **System Security**; then, press Enter. The System Security window opens.
4. Select **Remote Control Security Settings**; then, press Enter. The Remote Control Security Settings window opens.
5. Enter the Remote Control Password that you will use each time you log into the remote control features of the Remote Supervisor Adapter ASM Web Interface.
6. Select **Save New Remote Control Password**; then, press Enter.
7. In the System Security window, press Esc.
8. Select **Save Settings**; then, press Enter.
9. Confirm your selection; then, exit the Configuration/Setup Utility.
10. Continue with “Completing the configuration”.

**Completing the configuration:** To complete the configuration of the Remote Supervisor Adapter, see the *Remote Supervisor Adapter User's Guide* on the *xSeries 360 Documentation CD*. The tasks include the following:

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

If you want to set up an ASM interconnect network and have not already done so, continue with “Using the ASM interconnect network”. If you do not want to set up an ASM interconnect network, Remote Supervisor Adapter configuration is now complete. To start managing the server remotely, see the *Remote Supervisor Adapter User's Guide* on the *xSeries 360 Documentation CD*.

## Using the ASM interconnect network

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

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

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

## Planning and cabling the interconnect network

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

**Note:** To ensure the stability of the system, you must have the most current level of firmware installed on the Remote Supervisor Adapter that is the main interconnect gateway for the ASM interconnect network. The most current level of firmware is available on the World Wide Web at <http://www.ibm.com/pc/support>. For more information on updating firmware, see the *Remote Supervisor Adapter User's Guide for the @server xSeries 360* on the Documentation CD.

You must connect an ASM Interconnect module to the Remote Supervisor Adapter and to each xSeries 360 server that you connect to the ASM interconnect network bus.

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

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

- Make sure that the ASM interconnect network is set up as a bus, not as a ring. You must connect the servers to the ASM interconnect network in a series, with terminated beginning and end points.
- Make sure that the total combined length of all Ethernet cables connecting the server in the ASM interconnect network does not exceed 91 M (300 ft).
- Each Remote Supervisor Adapter, ASM PCI adapter, or ASM processor that is connected to the ASM interconnect network bus counts as one connection. For example, if an ASM PCI adapter is installed in a server that has an ASM processor, the processor and the adapter connect to each other using one ASM interconnect connection, but the processor and the adapter count as two connections on the ASM interconnect network bus.

## Forwarding alerts

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

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

When alerts are generated, they are forwarded to the Remote Supervisor Adapter, ASM processor, or ASM PCI adapter on the ASM interconnect network that has the communication resources to forward the alert. If no system on the ASM interconnect

network meets the requirements, the alert is set for transmission if the connection type is configured or becomes available later.

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

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

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

### **Cabling for the ASM interconnect network**

Depending upon the servers you have, you might need additional ASM Interconnect modules or Category 5 or Category 3 Ethernet cables. Table 4 on page 41 lists some IBM Netfinity and IBM xSeries products, and indicates whether you need to use an ASM Interconnect module to set up the ASM interconnect network.

Table 4. ASM interconnect network server list.

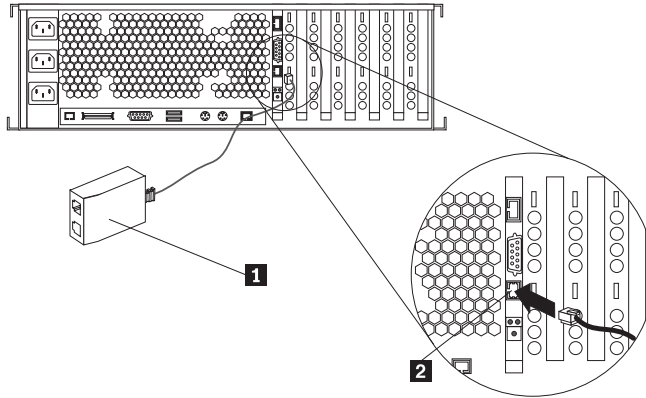
Server Name	ASM Interconnect module needed
Netfinity 4500R	yes
Netfinity 5000	yes
Netfinity 5500	yes
Netfinity 5500-M10	yes
Netfinity 5500-M20	yes
Netfinity 5600	yes
Netfinity 6000R	no
Netfinity 7100	no
Netfinity 7600	no
xSeries 220	yes
xSeries 232	yes
xSeries 240	yes
xSeries 330	The ASM interconnect module is required to link the Remote Supervisor Adapter to the microprocessor in the server. Use the RS-485 ports to create the ASM interconnect network.
xSeries 340	yes
xSeries 342	yes
xSeries 350	no
xSeries 360	yes

For the servers that do not need an ASM Interconnect module, a module is still needed to connect the Remote Supervisor Adapter in the gateway server to the integrated ASM processor. After you make that connection, you can connect the servers together using their ASM interconnect ports. For additional information, see “ASM interconnect network configuration examples” on page 42.

**Connecting the ASM Interconnect module to the xSeries 360:** The ASM Interconnect module connects the Remote Supervisor Adapter to the ASM interconnect network. This module comes with the server. To connect the ASM interconnect module to the Remote Supervisor Adapter, complete the following steps.

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

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



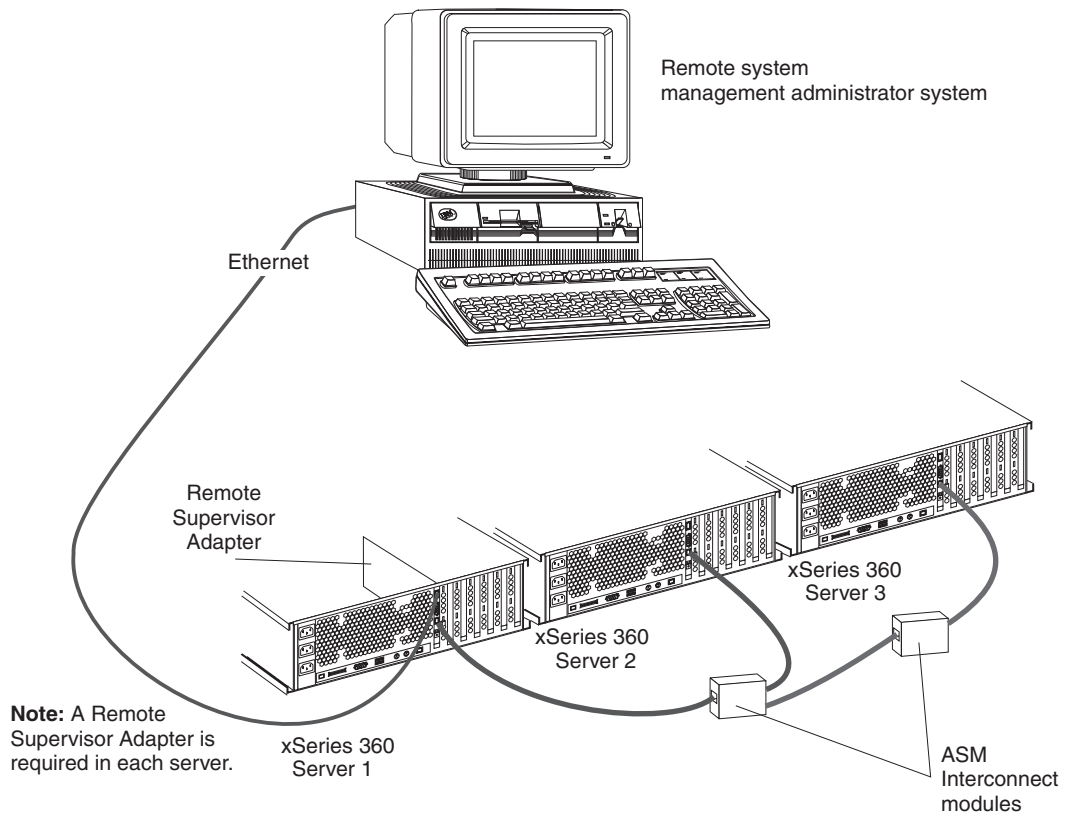
2. Connect one or two Category 3 or Category 5 Ethernet cables to the other end of the ASM Interconnect module.
3. Continue with “ASM interconnect network configuration examples”.

### **ASM interconnect network configuration examples**

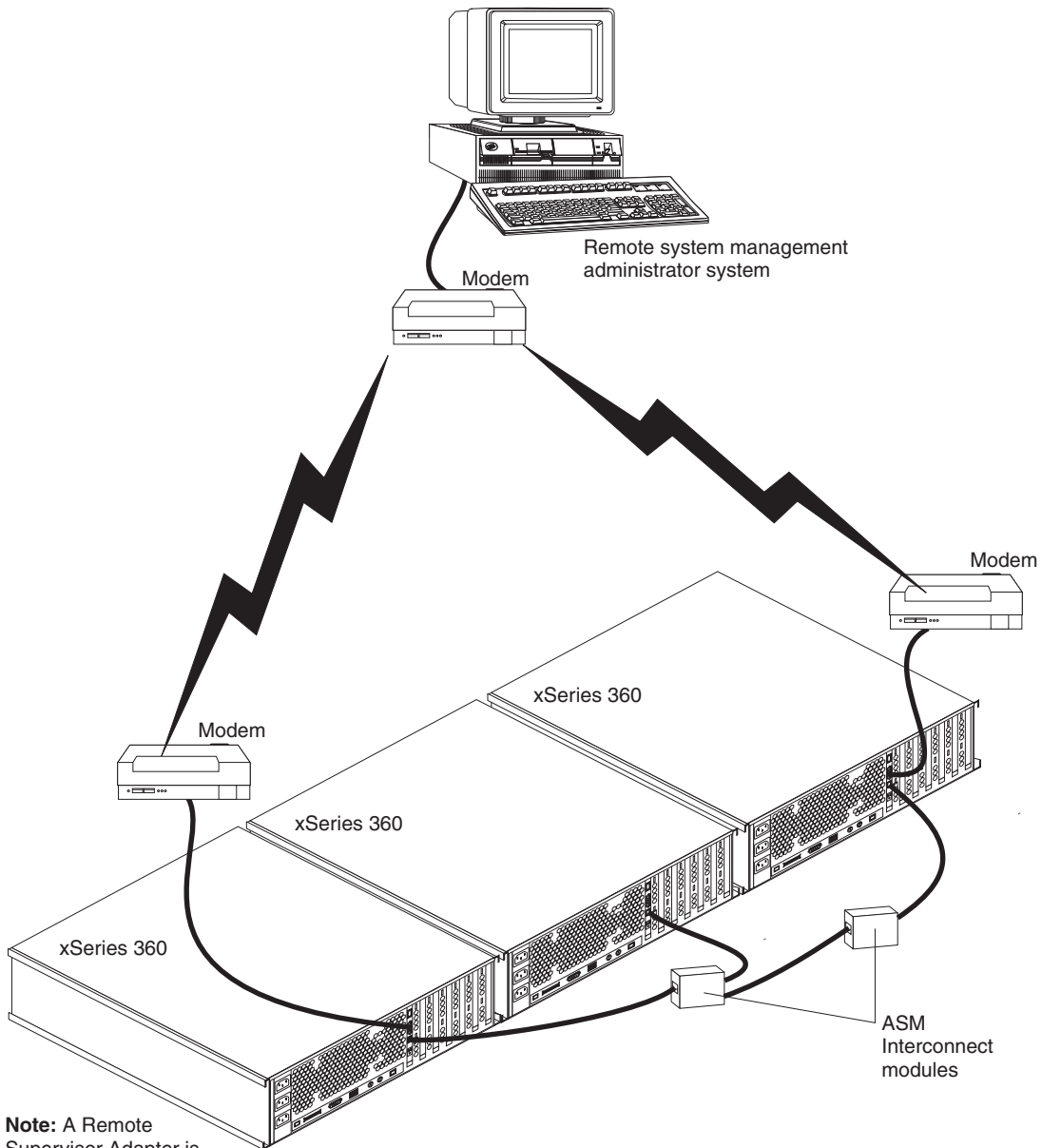
The illustrations in this section show sample ASM interconnect network configurations.

The following illustration shows an Ethernet cable connecting the remote administrator system to the Remote Supervisor Adapter that is installed in an xSeries 360. Server 1 uses the LAN connection to forward system-management data generated by the other xSeries 360s in the ASM interconnect network bus to the remote system-management administrator.





The following illustration shows a modem connected to the serial port of the Remote Supervisor Adapter in the xSeries 360 on the left, a modem connected to the serial port of the Remote Supervisor Adapter in the xSeries 360 on the right, and a modem connected to the remote administrator system. Placing modems at opposite ends of the ASM interconnect network bus ensures that if an ASM interconnect connection in the bus fails, all of the servers on the ASM interconnect network have access to a modem to forward system-management data to the remote system-management administrator.



**Note:** A Remote Supervisor Adapter is required in each server.

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

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## Chapter 4. Using the ServerGuide™ CDs

The ServerGuide CDs include state-of-the-art software setup and installation tools that are specifically designed for your IBM server. The ServerGuide Setup and Installation program detects the server model and hardware options that are installed and uses that information during setup to configure the hardware. The ServerGuide tools simplify network operating system (NOS) installations by providing updated device drivers, and in some cases, installing them automatically.

If a later version of the ServerGuide software is available, you can download a free image of the software, or you can purchase the ServerGuide CDs. To download the latest ServerGuide software, see the ServerGuide page on the IBM Support Web site at: <http://www.ibm.com/pc/qtechinfo/MIGR-4ZKPPT.html>.

To purchase the latest ServerGuide CDs, see the ServerGuide Updates form that comes with the server library, or go to the ServerGuide fulfillment Web site at <http://www.ibm.com/pc/coupon/>.

The ServerGuide software has these features to make setup easier:

- An easy-to-use interface with online help
- Diskette-free setup and configuration programs that are based on detected hardware
- Performance Optimizer program, which easily tunes the ServeRAID adapter settings for your server environment
- A system BIOS update program, which updates the BIOS directly from the CD
- Device drivers that are provided for your server model and detected hardware
- NOS partition size and file-system type that are selectable during setup
- Powerful application programs and administration tools

## Features at a glance

The following is a summary of ServerGuide features.

**Note:** Exact features and functions can vary with different versions of the ServerGuide software. To learn more about the version that you have, start the *Setup and Installation* CD and view the online Overview.

<b>Setup and Installation CD</b>	<b>Setup and Installation CD</b> (continued)	<b>System Updates and Applications CD</b> (continued)
<p><b>Note:</b> The ServerGuide program requires a supported IBM server with an <i>enabled</i> startable (bootable) CD-ROM drive. Not all features are supported on all models.</p> <ul style="list-style-type: none"> <li>• Sets system date and time.</li> <li>• Detects the ServeRAID adapter or controller and runs the ServeRAID configuration program.</li> <li>• Updates the licensed internal code (firmware) level without creating diskettes.</li> <li>• Checks the system BIOS code and microcode (firmware) levels of supported options to determine whether a later level is available from the CD. You can perform updates without the use of diskettes.</li> <li>• Provides the Performance Optimizer program to easily tune the ServeRAID adapter settings for your server environment.</li> <li>• Creates a System Partition on the default drive. You can run server-specific utility programs after setup.</li> <li>• Detects installed hardware options and provides updated device drivers for most adapters and devices.</li> </ul>	<ul style="list-style-type: none"> <li>• Creates a <i>Setup Replication Diskette</i> for replicating setup selections for other servers of the same model.</li> <li>• Provides diskette-free installation for supported operating systems.</li> <li>• Provides a replicated installation path for multiple installations of supported operating systems.</li> <li>• Includes an online README file with links to tips for the hardware and NOS installation.</li> </ul> <p><b>Note:</b> Installation requires the NOS CD.</p> <p><b>System Updates and Applications CD</b></p> <ul style="list-style-type: none"> <li>• Creates diagnostic, RAID, device driver, and other support diskettes from the CD; or with an Internet connection, you can check for an update from a dedicated IBM file transfer protocol (FTP) server.</li> <li>• Installs some updates without requiring diskettes. Where applicable, you can run executable files directly from the CD or unzip files to any drive on the server or another server on the network.</li> </ul>	<ul style="list-style-type: none"> <li>• Includes a vast library of fully tested device drivers for the server.</li> <li>• Includes a search function to help you locate updates by title or keywords.</li> <li>• Installs powerful applications directly from the CD. See the CD label for a current list of applications.</li> </ul>

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## Setup and configuration overview

When you use the *Setup and Installation* CD, you do not need setup diskettes. You can use the CD to configure any supported IBM server model. The setup program checks the system BIOS code, Remote Supervisor Adapter, and other system hardware to determine whether system updates are available. The setup program provides a list of tasks that are required to set up the server model. On RAID servers, you can run the ServeRAID Manager program to create logical drives.

**Note:** Specific features and functions can vary with different versions of the ServerGuide software.

When you start the *Setup and Installation* CD:

- You are prompted for the language, country, and keyboard layout. (This information is stored and later passed on to the NOS installation program.)
- The ServerGuide program displays choices for running the configuration programs. For example:
  - The Express Configuration method runs the required programs for the server, based on the hardware that is detected.
  - The Custom Configuration method displays all programs that are available for the server, and you decide which programs to run.
  - The Replicated Configuration method provides the option of duplicating your setup selections to other servers that are the same model.
- If you select the Custom Configuration method, the following programs are optional. If you select the Express Configuration method, some or all of these programs are run, depending on the hardware that is detected.
  - The Set Date and Time feature is provided so that you do not have to use the Configuration/Setup Utility program to access these settings.
  - The Clear Hard Disks program is provided so that you can delete all partitions on all hard disk drives. If the server has a ServeRAID adapter installed, you can select to restore the configuration on the ServeRAID adapter to the factory default settings.
  - The ServerGuide program checks the server BIOS code and microcode (firmware) levels for supported options and then checks the CD for a newer level. CD content can be newer than the hardware. The ServerGuide program can perform a flash update of the BIOS code and supported microcode (firmware) options without the use of diskettes.
  - The ServeRAID program starts, guiding you through the entire configuration process.
  - The Performance Optimizer program easily tunes the server for your environment.
  - The ServerGuide program creates a System Partition on the default drive.
- The ServerGuide program displays a confirmation summary, so that you will know when you have completed all the required tasks. Then, you are ready to install the NOS.

**Notes:**

1. Plug and Play adapters are configured automatically. Non-Plug and Play adapters or non-IBM adapters might require switch settings, additional device drivers, and installation after the NOS is installed. See the documentation that comes with the adapter.
2. Diagnostics for the server come in BIOS code or on a separate diagnostics CD.

---

## System Partition

The ServerGuide program creates a 50 MB System Partition on the default drive. The System Partition contains server-specific utility programs such as Remote Supervisor Adapter disk operating system (DOS) utilities, system diagnostics, flash BIOS updates, and other programs.

**Note:** Programs in the System Partition vary by server model, and not all server models run utility programs from the System Partition. To determine which ones do, start the *Setup and Installation* CD and view the online Overview.

After setup is complete, you can access programs in the System Partition by restarting the server and pressing Alt+F1 when the prompt is displayed. The System Partition menu displays the programs that are available on the server model.

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## Typical NOS Installation

You can use the ServerGuide program to shorten the installation time. The ServerGuide program provides the necessary device drivers, based on the hardware that you have and the NOS that you are installing. If you prefer to install the NOS without using ServerGuide, go to “Installing the NOS without ServerGuide” on page 49. The following is a brief explanation of a typical ServerGuide NOS installation.

**Note:** Specific features and functions can vary with different versions of the ServerGuide software

- After you have completed the setup process, the operating system installation program starts. (You will need a copy of the NOS CD to complete the installation.)
- The ServerGuide program stores information about the server model, Remote Supervisor Adapter, hard disk controllers, and network adapters. It then checks the CD for newer device drivers. This information is stored and then passed to the NOS installation program.
- With some NOS installations, you can create a *NOS Replication Diskette* for setting up additional servers. The diskette will contain the Internet protocol (IP) address, server name, and other selections.
- The ServerGuide program presents NOS partition options that are based on your NOS selection and the installed hard disk drives.
- If you are installing the NOS from diskette, the ServerGuide program displays the required diskettes that you must create, and the optional diskettes that you might want to create. The diskettes that you can create are the device driver diskettes for the installed adapters or controllers.

The ServerGuide program prompts you to insert the NOS CD and restart the server. At this point, the installation program for the NOS takes control to complete the installation.

---

## Setting up or updating multiple servers

You can use the ServerGuide program to create diskettes that help you set up or update multiple servers. You can modify information on the diskettes as you use them to set up or update other servers.

**Note:** Availability and function can vary by server model and by the hardware that is installed.

You can create a *Setup Replication Diskette*, which contains your hardware configuration selections. Use this diskette to replicate selections to other servers that are of the same model.

You can create a *NOS Replication Diskette*, which contains information that you need to complete multiple installations. This feature supports servers running some operating systems.

---

## Installing the NOS without ServerGuide

If you have already configured the server hardware and you decide not to use the ServerGuide program to install the NOS, download the latest NOS installation instructions by going to the IBM support site at <http://www.ibm.com/pc/support> on the World Wide Web and selecting the appropriate NOS information for the xSeries 360.

**Note:** If you select Microsoft Windows NT 4.0 as the NOS, **do not** install the network adapter driver that comes with that product. It does not support the newer onboard network adapter in this server. Instead, install the driver available at the IBM support site.

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## Additional programs included with ServerGuide

As a convenience, the ServerGuide program comes with additional software to assist you with the server installation.

A variety of powerful applications are included with the ServerGuide software. Offerings can vary with the different versions of the ServerGuide software. Check the application CD labels for a list of applications, or start the *Setup and Installation* CD and view the online overview.





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## Chapter 5. Installing options

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

**Attention:** When you handle Electrostatic Discharge-Sensitive devices (ESD), take precautions to avoid damage from static electricity. For details on handling these devices, see "Handling static-sensitive devices" on page 52.

---

### Before you begin

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

- Become familiar with the safety and handling guidelines provided in "Safety information" beginning on page 53, and "Handling static-sensitive devices" on page 52. These guidelines will help you work safely while working with your server or options.
- You do not need to turn off the server to install or replace hot-swap power supplies, hot-swap drives, hot-swap fans, Active PCI-X (hot-plug) adapters, or hot-plug USB devices.
- The orange color on components and labels in the server identifies hot-swap or hot-plug components. You can install or remove these components while the system is running, provided that the server is configured to support this function.
- The blue color on components and labels identifies touch points where you can grip a component, move a latch, and so on.
- Make sure that you have an adequate number of properly grounded electrical outlets for the server, monitor, and any other options that you intend to install.
- Back up all important data before you make changes to hard disk drives.
- For a list of supported options for the xSeries 360 server, refer to <http://www.ibm.com/pc/us/compat> on the World Wide Web.

### System reliability considerations

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

- Each of the drive bays has either a drive or a filler panel installed.
- Each of the power-supply bays has either a power supply or a filler panel installed.
- There is at least 50 mm (2 inches) of ventilated space at the sides of the server and 100 mm (4 inches) at the rear of the server.
- The top cover is in place during normal operation.
- The top cover is removed for no longer than 30 minutes while the server is operating.
- A removed hot-swap drive is replaced within 10 minutes of removal.
- Cables for optional adapters are routed according to the instructions that are provided with the adapters.
- A failed fan is replaced within 48 hours.

## Working inside the server with the power on

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

**Note:** Operating the server for more than 30 minutes with the top cover removed might damage server components.

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

## Handling static-sensitive devices

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

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

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

## Safety information

Before installing this product, read the Safety Information.

مع، يجب قراءة دات السلامة

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 přečtete 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.



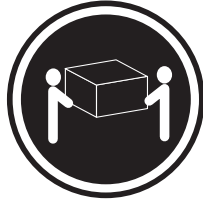
### DANGER

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.

Class 1 Laser Product  
Laser Klasse 1  
Laser Klass 1  
Luokan 1 Laserlaite  
Appareil À Laser de Classe 1

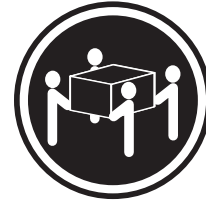
**Statement 4**



≥ 18 kg (39.7 lb)



≥ 32 kg (70.5 lb)



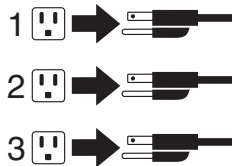
≥ 55 kg (121.2 lb)

**CAUTION:**  
Use safe practices when lifting.

**Statement 5**



**CAUTION:**  
The power control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.



**Statement 8**



**CAUTION:**

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



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

**Statement 10**



**CAUTION:**

Do not place any object weighing more than 82 kg (180 lb) on top of rack-mounted devices.



>82 kg (180 lb)

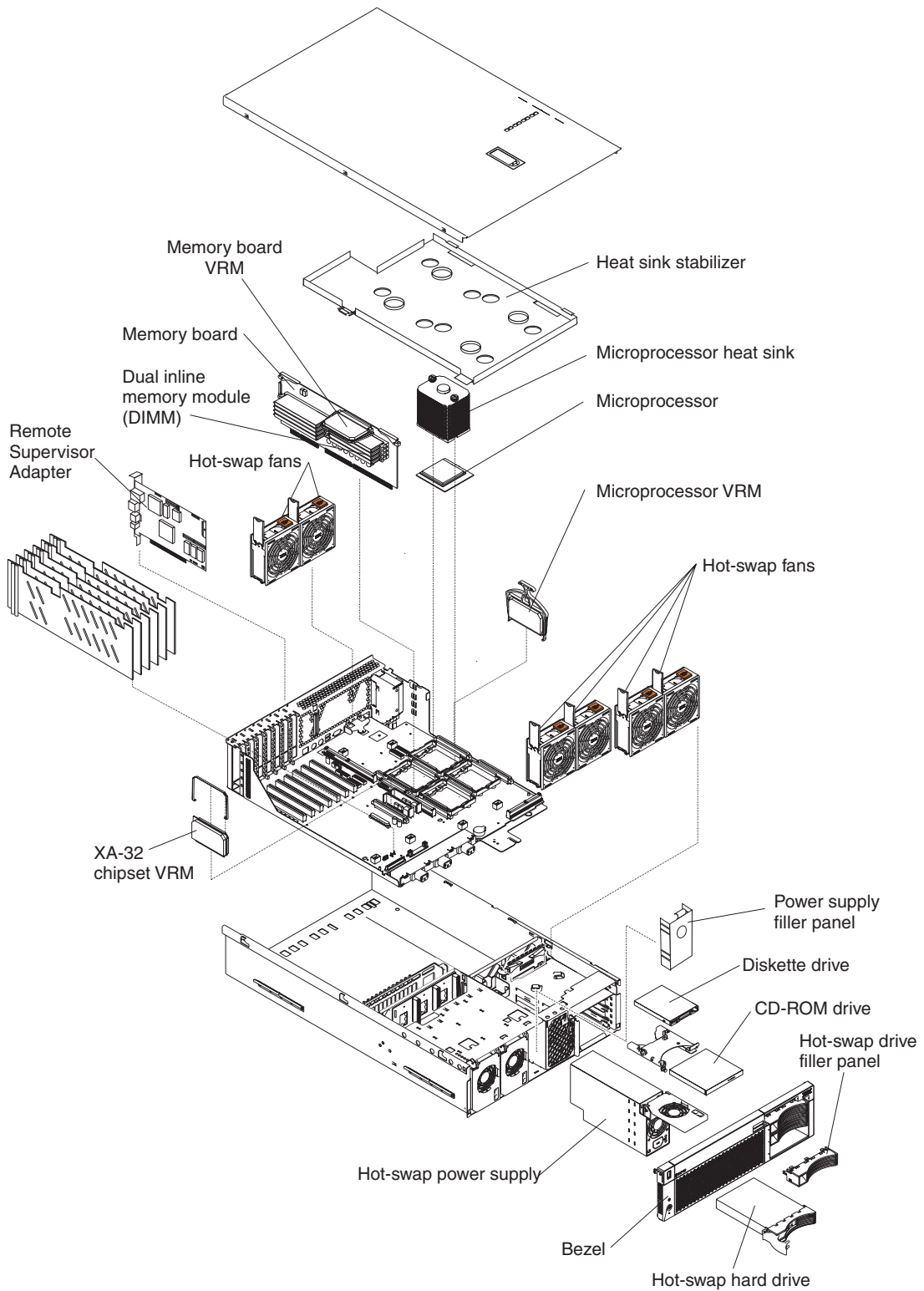
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## Major components of the xSeries 360 server

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

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

The following illustration shows the major components of the xSeries 360 server.





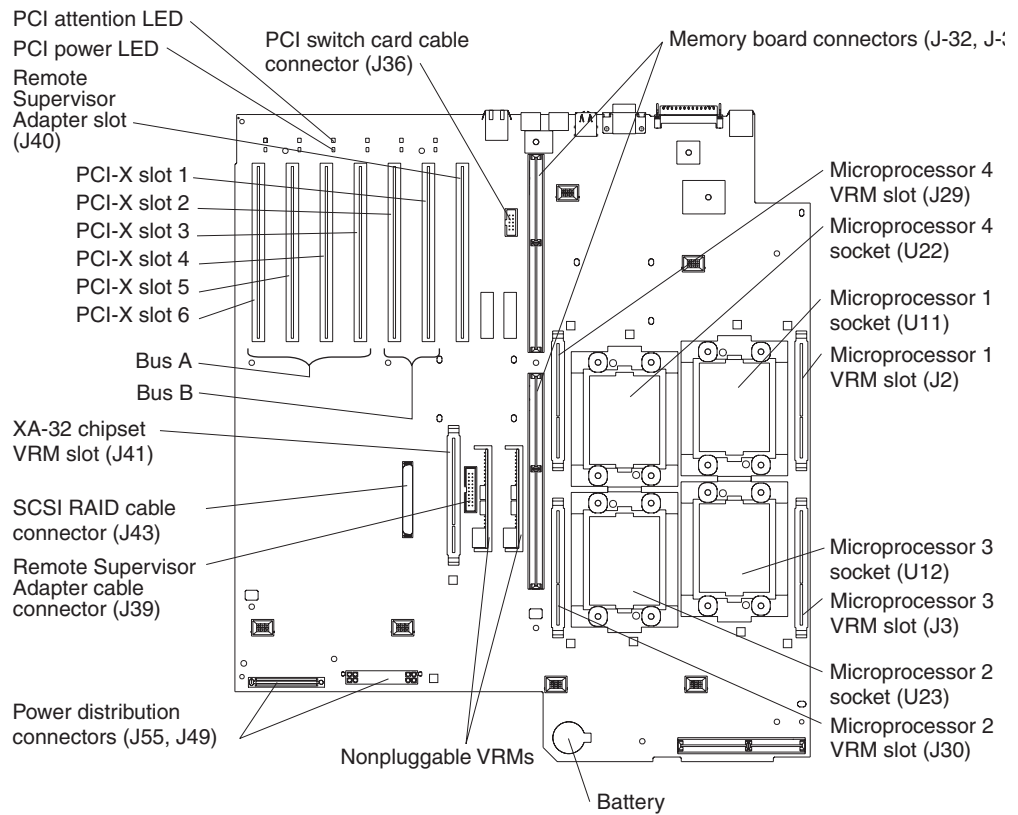
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## Component locations

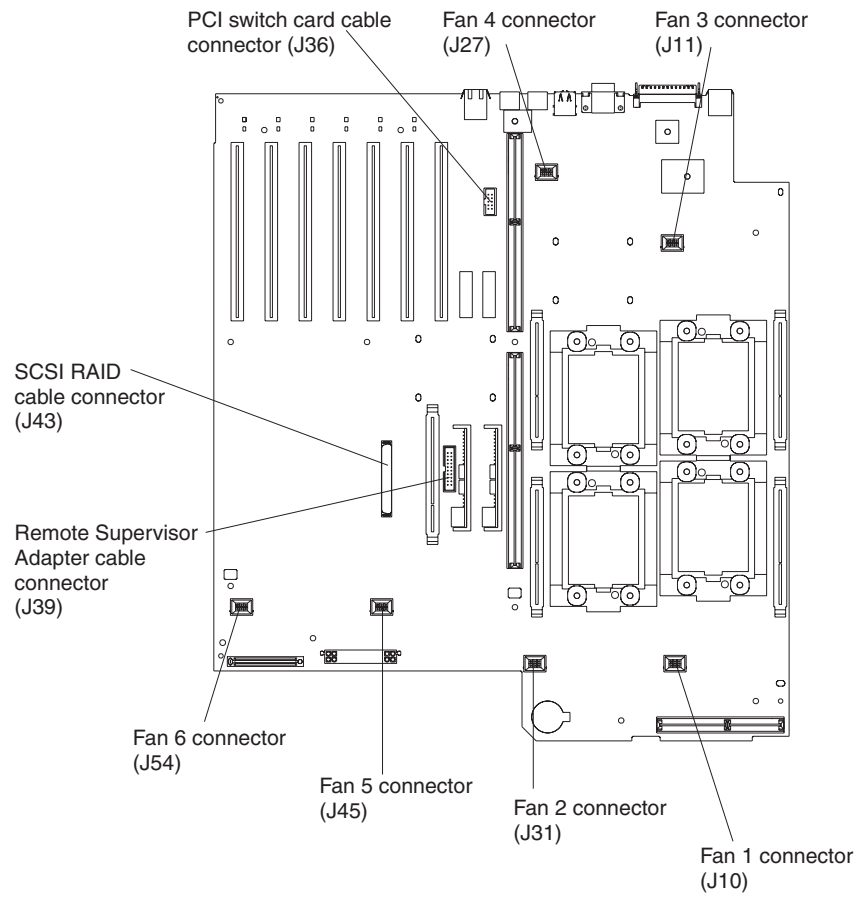
This section shows the locations of components on the system board, level 2 diagnostic LED panel, memory board, and Remote Supervisor Adapter.

### System board component locations

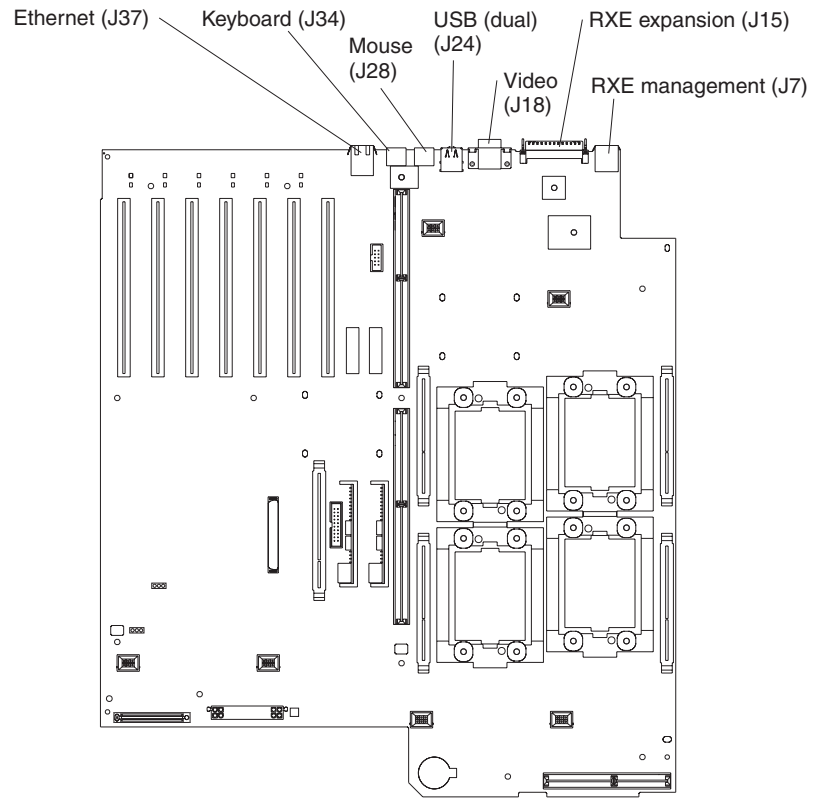
The following illustration shows the location of the connectors on the system board for pluggable components, and the location of the two nonpluggable VRMs used for the PCI-X slots.



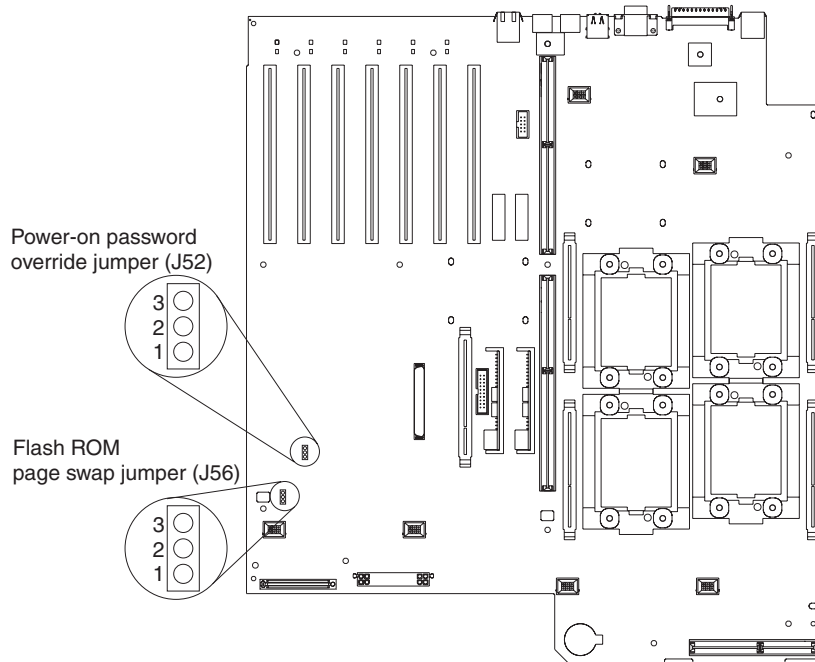
The following illustration shows the location of the internal connectors on the system board.



The following illustration shows the location of the external I/O port connectors on the system board.



The following illustration shows the location of the flash ROM page swap jumper (J52) and power-on password override jumper (J56) on the system board. See “Changing jumper positions” for information on changing jumper positions.



## Changing jumper positions

Jumpers on the system board help you to customize the way the server operates. The server system board contains three-pin jumper blocks. In some cases, jumper settings might be combined to define a function. Table 5 describes the purpose of the jumpers.

Table 5. Jumpers J52 and J56 on the system board.

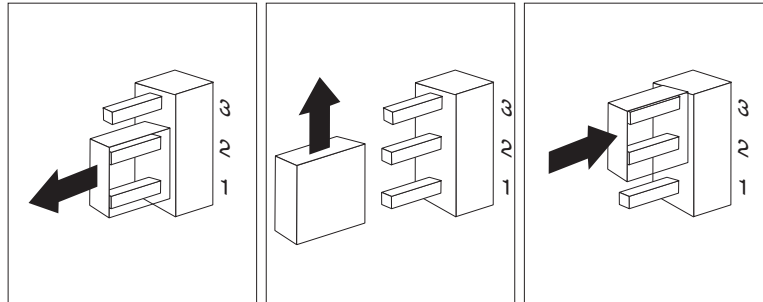
Jumper name	Description
Flash ROM page swap (J52)	<p>The default position is pins 1 and 2.</p> <p>See “Recovering the BIOS code” on page 120 for additional information.</p>
Power-on password override (J56)	<p>Changing the position of this jumper bypasses the power-on password check if the jumper has been moved since the server was last powered on.</p> <p>Changing the position of this jumper does not affect the administrator password check if an administrator password is set.</p> <p>See “Power-on password” on page 18 for additional information on the power-on password.</p>

On a three-pin jumper block, each jumper covers two of the three pins. You can position the jumper to fit over the center pin and either of the other two pins. To identify pins 1, 2, and 3 on the system board, see the following illustration.

To change a jumper position for a three-pin jumper block:

1. Read the information in “Before you begin” on page 51.

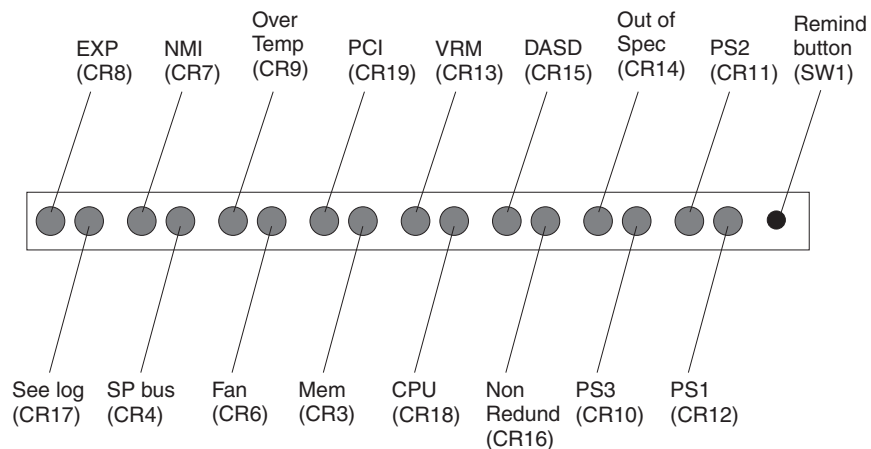
2. Turn off the server, disconnect all power cords and external cables, and remove the top cover (see “Removing the server top cover and bezel” on page 66) before moving any jumpers.
3. Lift the jumper straight off the pin block.
4. Align the holes in the bottom of the jumper with the center pin and the pin that was not covered previously.



5. Slide the jumper fully onto these pins.
6. Reinstall the top cover, and connect the external cables and power cords (see “Installing the server top cover and bezel” on page 86).

## Level 2 diagnostic LED panel and system board LED locations

The following illustration shows the location of the LEDs on the level 2 diagnostic panel, which is attached to the same metal frame as the hot-swap drive backplane. You can view the diagnostic panel LEDs through a special cutout area on the top cover, to the right of the cover-release latch. However, to determine the exact source of the error condition in the server, you might need to remove the top cover to view the location of a specific error LED on the system board.



The meanings of these LEDs are as follows:

<b>EXP</b>	Attached expansion I/O failure
<b>NMI</b>	Nonmaskable interrupt
<b>Over Temp</b>	System over temperature condition
<b>PCI</b>	PCI failure
<b>VRM</b>	VRM failure

<b>DASD</b>	Hard disk drive failure
<b>Out of Spec</b>	Power supplies being overdriven
<b>PS2</b>	Power supply number 2 failure
<b>Remind button</b>	Remind to invoke remind mode
<b>PS1</b>	Power supply number 1 failure
<b>PS3</b>	Power supply number 3 failure
<b>Non Redund</b>	Nonredundant power mode
<b>CPU</b>	Microprocessor failure
<b>MEM</b>	Memory failure
<b>FAN</b>	Fan failure
<b>SP Bus</b>	Remote Supervisor Adapter failure
<b>See Log</b>	See event log or Remote Supervisor Adapter log for non-optimal condition information

**Notes:**

1. The server supports six replaceable voltage regulator modules (VRMs).
2. The server supports a maximum of three power supplies.
3. See “Level 2 Light Path Troubleshooting” on page 125 for a detailed description of these LEDs and how to use them to resolve problems.

**Remind button**

You can use the Remind button to place the Fault light on the front panel into the remind mode (blinks every 2 seconds). By pressing the button, you acknowledge the failure but indicate that you are not taking immediate action. If a new failure occurs, the Fault light turns on again.

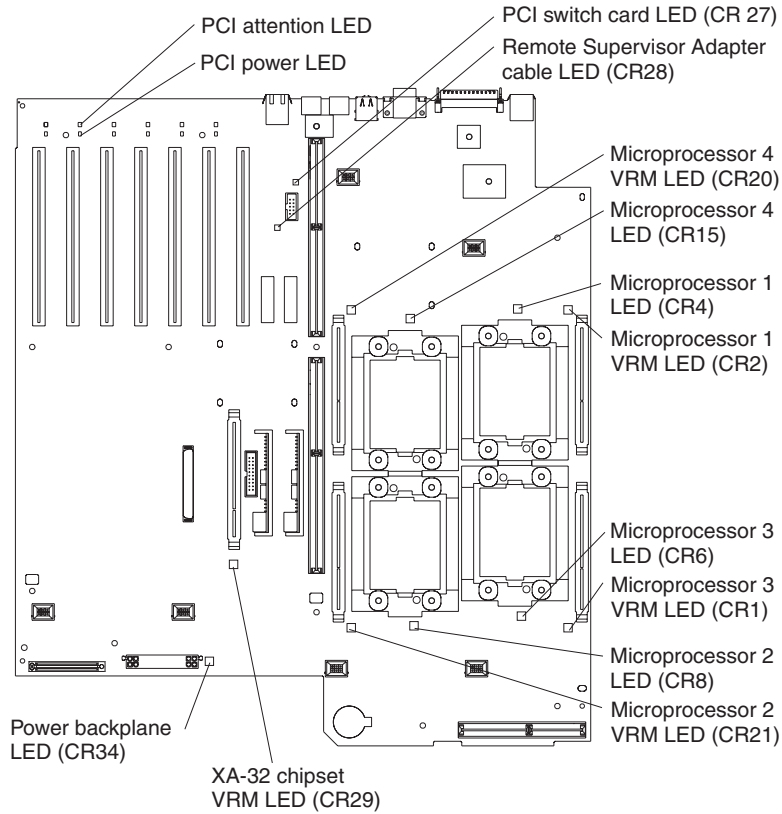
The Fault light stays in remind mode until one of the following conditions occurs:

- All known problems are resolved
- The system is restarted
- A new problem occurs

You can use the Remind button to delay server maintenance until a later time. However, if the light is still blinking from an error condition, it is unable to indicate a subsequent error. Resetting the Fault light by resolving the problem enables the light to indicate a subsequent error.

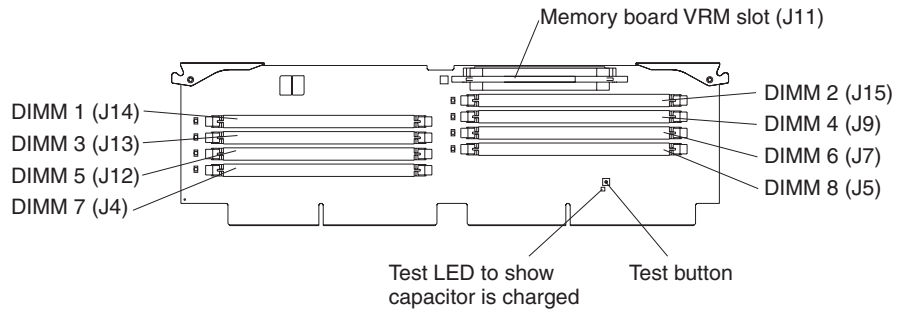
The following illustration shows the location of the LEDs on the system board. You might need to refer to this illustration when solving problems with the server.

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



## Memory board component locations

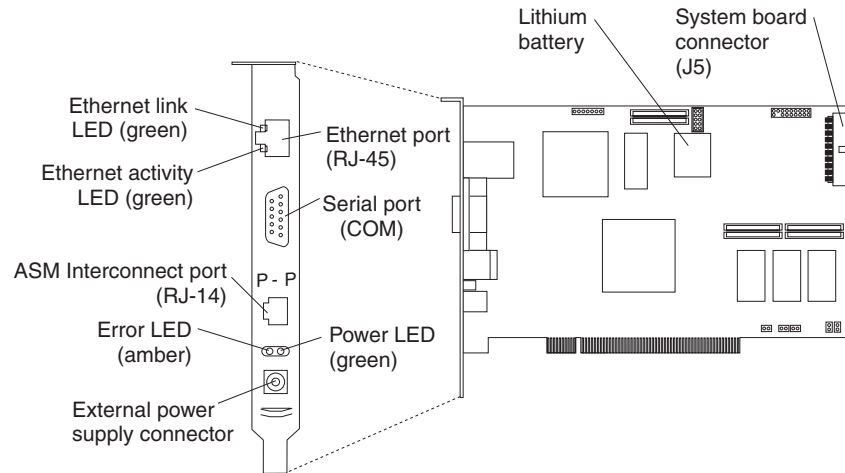
The following illustration shows the location of the dual inline memory module (DIMM) slots on the memory board.



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## Remote Supervisor Adapter component locations

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

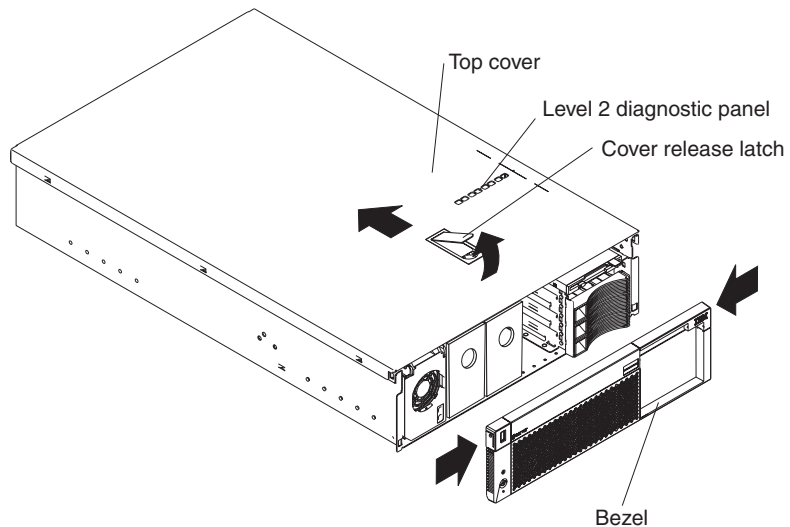


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## Removing the server top cover and bezel

Complete the following steps to remove the server top cover and bezel:

1. Read the safety precautions beginning on page 53, and “Handling static-sensitive devices” on page 52.



2. Lift the plastic cover-release latch on the top cover. Slide the top cover toward the rear of the server approximately one inch, and then lift it off the server and set it aside.

**Attention:** For proper cooling and airflow, replace the top cover before turning on the server. Operating the server for extended periods of time (over 30 minutes) with the top cover removed might damage server components.

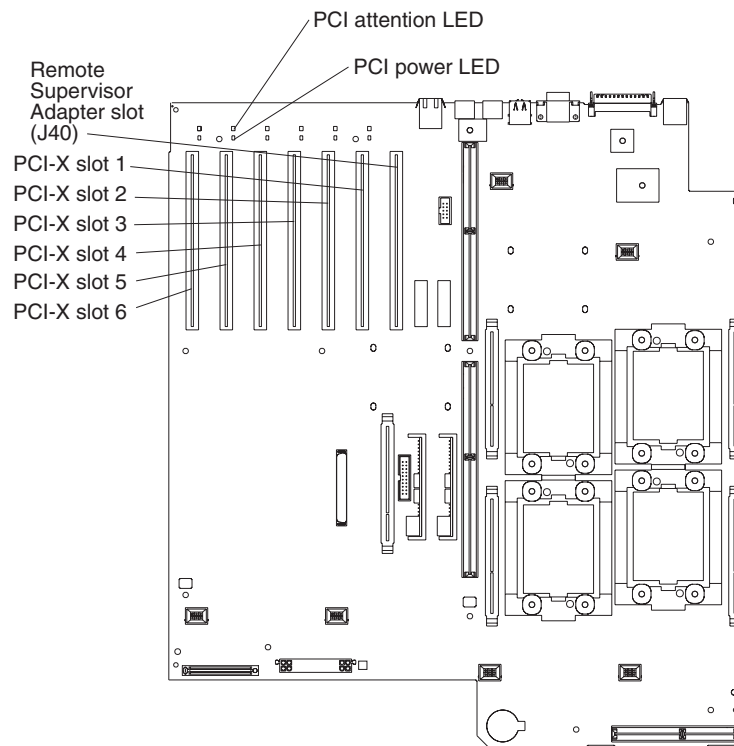


3. Press the bezel release latches at the top edge of the bezel, and pull the top of the bezel slightly away from the server.
4. Pull the bezel up to release the two tabs at the bottom edge of the bezel. Store the bezel in a safe place.

---

## Working with adapters

The following illustration shows the location of the six hot-plug PCI-X adapter expansion slots, the Remote Supervisor Adapter slot, and their related components on the system board.



This server supports the following adapter configurations:

- Bus A (hot-plug)
  - Four 66 MHz 64-bit PCI-X adapters (slots 3 through 6)
  - Two 66 MHz 64-bit PCI adapters (slots 3 and 4)
  - Four 33 MHz 64-bit PCI adapters (slots 3 through 6)
- Bus B (hot-plug)
  - One 133 MHz 64-bit PCI-X adapter (slot 1)
  - Two 100 MHz 64-bit PCI-X adapters (slots 1 and 2)
  - Two 66 MHz 64-bit PCI-X adapters (slots 1 and 2)
  - Two 66 MHz 64-bit PCI adapters (slots 1 and 2)
  - Two 33 MHz 64-bit PCI adapters (slots 1 and 2)

To the right of PCI-X slot number 1 (as viewed from the front), there is a 33 MHz 64-bit slot dedicated to the Remote Supervisor Adapter.

The following lights are provided for monitoring adapter status:

- Power-on lights for hot-plug PCI-X slots
- Internal attention lights for hot-plug PCI-X slots

If the operating system supports hot-plug PCI/PCI-X adapters, you can replace a failing hot-plug PCI/PCI-X adapter with a new adapter of the same type without turning off power to the server. If the operating system and adapter also support the hot-add feature, you can install a new adapter without turning off the power to the server.

**Attention:** Do not remove a hot-plug PCI/PCI-X adapter before determining whether the operating system requires you to disable the hot-plug PCI-X slot that contains the adapter. Failing to disable the slot in this situation might cause the server to lock up. Refer to the operating-system documentation.

## Adapter considerations

Before you install adapters, review the following:

- Locate the documentation that comes with the adapter and follow those instructions in addition to the instructions in this chapter. If you need to change switch settings or jumper settings on the adapter, follow the instructions that come with the adapter.
- Locate the documentation that comes with your operating system. If the operating system provides a way to disable or enable a PCI-X slot you will need this documentation.
- If you install a ServeRAID adapter for use with the internal hot-swap hard disk drives, you must connect the internal channel cable between the adapter and the SCSI RAID cable connector (J43) on the system board. However, if you do this, you cannot install a full-length, wide adapter in PCI-X slot 1.
- The server supports only 3.3 V PCI or PCI-X adapters.
- The server uses a rotational interrupt technique to configure PCI/PCI-X adapters. You can use this technique to install PCI/PCI-X adapters that currently do not support sharing of PCI interrupts.
- PCI-X slots 3 through 6 are on PCI bus A; PCI-X slots 1 and 2 are on PCI bus B.
- By default, the server starts (boots) devices in the following order: system IDE and SCSI devices, then PCI/PCI-X devices.

**Note:** To change the startup order, start the Configuration/Setup Utility program and select **Start Options** from the main menu. Then, select the **Startup Sequence Options**.

## Installing a hot-plug PCI or PCI-X adapter

This section describes how to install a hot-plug PCI/PCI-X adapter. Before you continue with the adapter-installation procedure, note that all six PCI-X slots support hot-plug, 64-bit, PCI/PCI-X adapters. If PCI/PCI-X adapters are installed in both slots 1 and 2, they operate at 100 MHz or less, depending on the capacity of the adapter. If one adapter is installed in slot 1 and slot 2 is empty, the adapter in slot 1 can operate at 133 MHz.

### Notes:

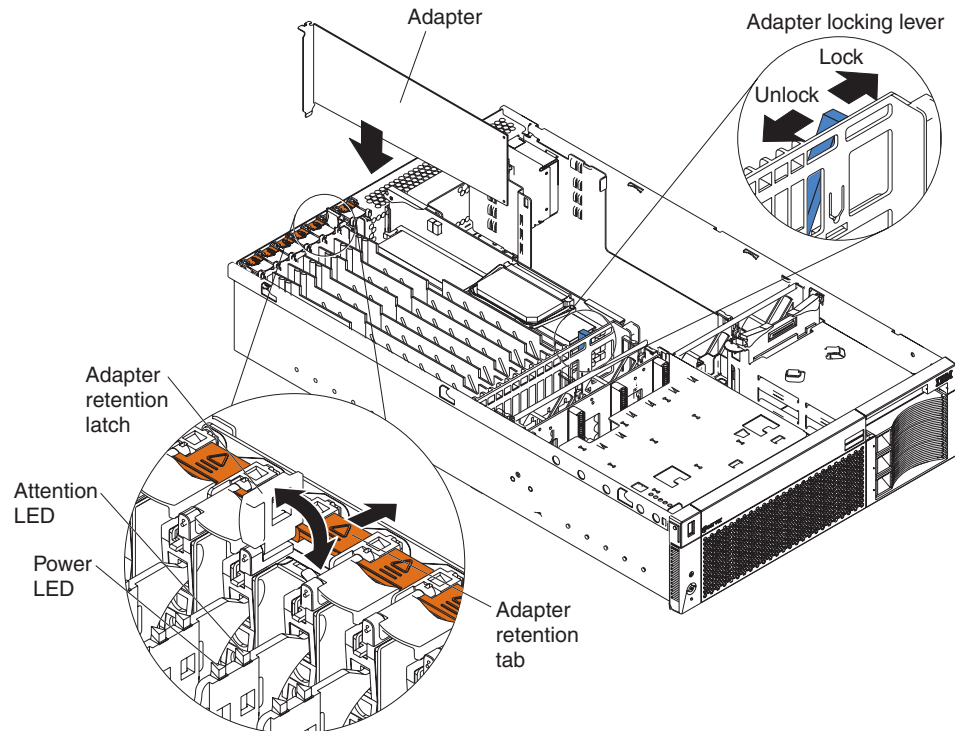
1. Ensure that the PCI hot-plug device driver is installed. For details, see the documentation that came with the adapter.
2. If you are installing a ServeRAID adapter, go to “Installing a ServeRAID adapter” on page 70. If you are replacing the Remote Supervisor Adapter, go to

“Replacing the Remote Supervisor Adapter” on page 70; otherwise, continue with the following instructions.

Complete the following steps to install a hot-plug PCI/PCI-X adapter:

1. Review the safety precautions beginning on page 53, “Handling static-sensitive devices” on page 52, and “Working inside the server with the power on” on page 52.
2. Remove the top cover (see “Removing the server top cover and bezel” on page 66) and determine which PCI-X expansion slot you will use for the adapter.

**Note:** All six PCI-X slots support hot-plug PCI/PCI-X adapters.



3. Slide the orange adapter-retention tab toward the rear of the server and lift the adapter-retention latch. The power LED turns off for the appropriate slot.
4. Slide the expansion-slot cover up and out of the server; then move the blue PCI-adapter locking lever to the right (as viewed from the front) to enable insertion of the new adapter.

**Attention:** Avoid touching the components and gold-edge connectors on the adapter. Ensure that the adapter is completely and correctly seated in the slot. Incomplete insertion might cause damage to the system board or the adapter.

**Attention:** When you handle Electrostatic Discharge-Sensitive devices (ESD), take precautions to avoid damage from static electricity. For details on handling these devices, see “Handling static-sensitive devices” on page 52.

5. Remove the adapter from the static-protective package and install the adapter, pressing it *firmly* into the slot.
6. Move the blue PCI-adapter locking lever to the left (as viewed from the front) to secure the adapter; then, lower the adapter-retention latch over the top corner of the adapter. The orange adapter-retention tab snaps into place and the power LED turns on for the slot.
7. Connect any needed cables to the adapter.

8. If you have other options to install or remove, do so now; otherwise, go to “Completing the installation” on page 86.

## Replacing the Remote Supervisor Adapter

The server comes with a non-hot-plug Remote Supervisor Adapter in a dedicated slot to the right of PCI-X slot number 1 (as viewed from the front).

Complete the following steps to replace the Remote Supervisor Adapter:

**Note:** It is recommended that after you initially configure the adapter you create a backup copy of it so that if you need to replace the adapter in the future, you can restore the configuration and resume normal operation more quickly.

1. Review the safety precautions beginning on page 53, and “Handling static-sensitive devices” on page 52.
2. Turn off the server, disconnect all power cords and external cables, and remove the top cover (see “Removing the server top cover and bezel” on page 66).
3. Using the illustrations in “Working with adapters” on page 67 and “Installing a hot-plug PCI or PCI-X adapter” on page 68 as references for the rest of this procedure, unplug the cable from the connector (J5) on the upper-rear corner of the Remote Supervisor Adapter.
4. Slide the Remote Supervisor Adapter-retention tab toward the rear of the server and lift the adapter-retention latch.

**Attention:** When you handle Electrostatic Discharge-Sensitive devices (ESD), take precautions to avoid damage from static electricity. For details on handling these devices, see “Handling static-sensitive devices” on page 52.

5. Lift the adapter out of the slot.
6. Touch the static-protective package that contains the replacement adapter to any unpainted metal surface on the server. Then, remove the adapter from the package.
7. Press the replacement adapter *firmly* into the slot.

**Attention:** When you install an adapter in the server, be sure that it is completely and correctly seated in the system-board slot. Incomplete insertion might cause damage to the system board or the adapter.

8. Reconnect the cable to the connector (J5) on the rear edge of the adapter.
9. Close the adapter-retention latch. The adapter-retention tab snaps into place.
10. If you have other options to install or remove, do so now; otherwise, go to “Completing the installation” on page 86.

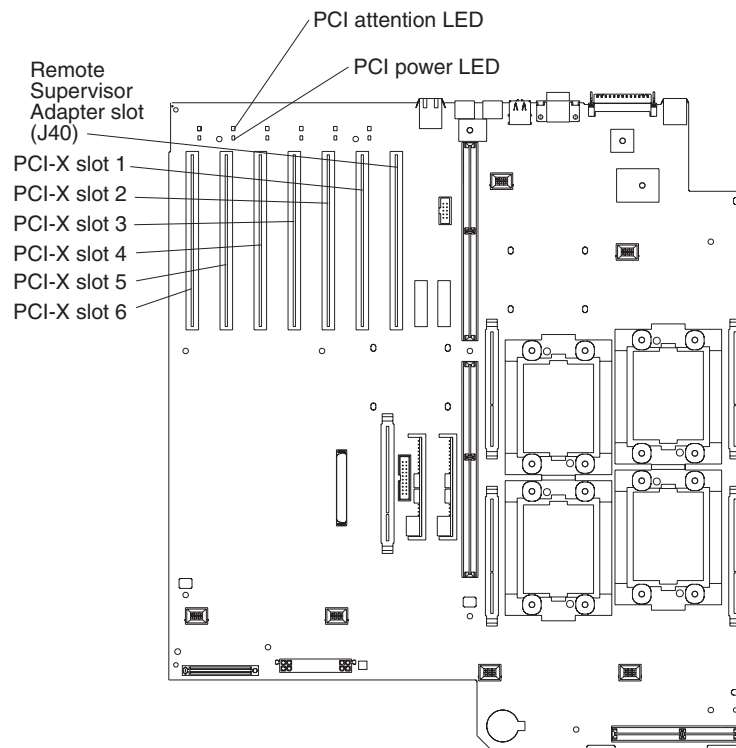
**Note:** For information about using the Remote Supervisor Adapter, see the *Remote Supervisor Adapter User's Guide* on the *xSeries 360 Documentation CD*.

## Installing a ServeRAID adapter

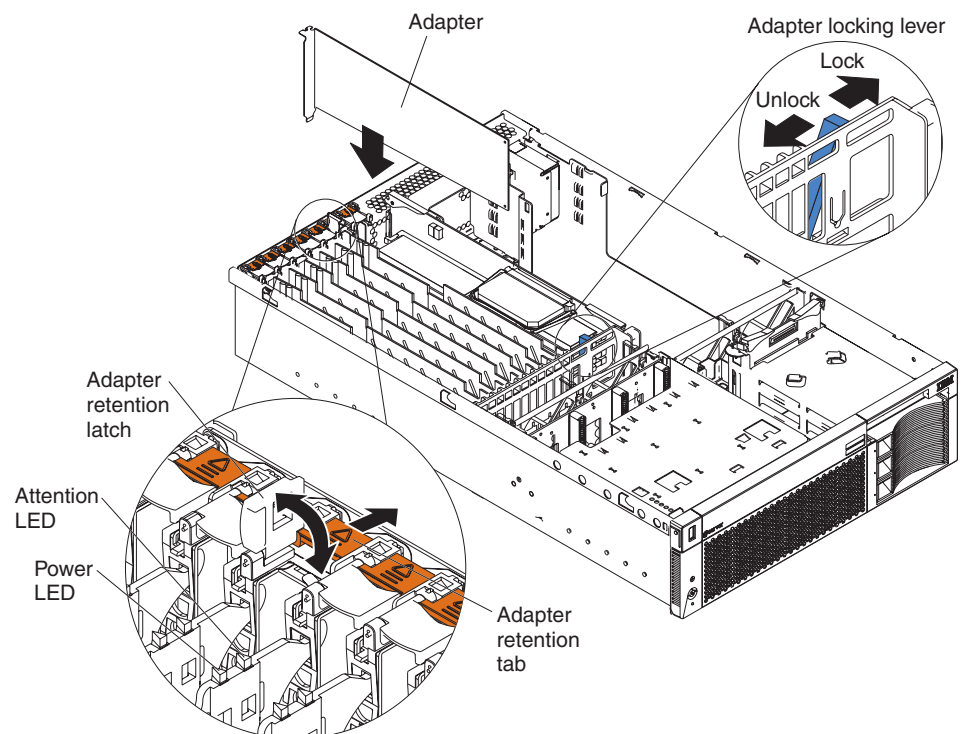
You can install an optional IBM ServeRAID adapter in any PCI-X slot in the server to enable using internal and external hot-swap hard disk drives as disk arrays. The server supports a variety of ServeRAID adapters for both internal and external configurations. For the most current list of supported RAID adapters, go to <http://www.ibm.com/pc/us/compat> on the World Wide Web.

Complete the following steps to install a ServeRAID adapter:

1. Review the safety precautions beginning on page 53, and “Handling static-sensitive devices” on page 52.
2. Turn off the server, disconnect all power cords and external cables, and remove the top cover (see “Removing the server top cover and bezel” on page 66).



3. Determine which PCI-X expansion slot you will use, slide its orange adapter-retention tab toward the rear of the server, and lift the adapter-retention latch.



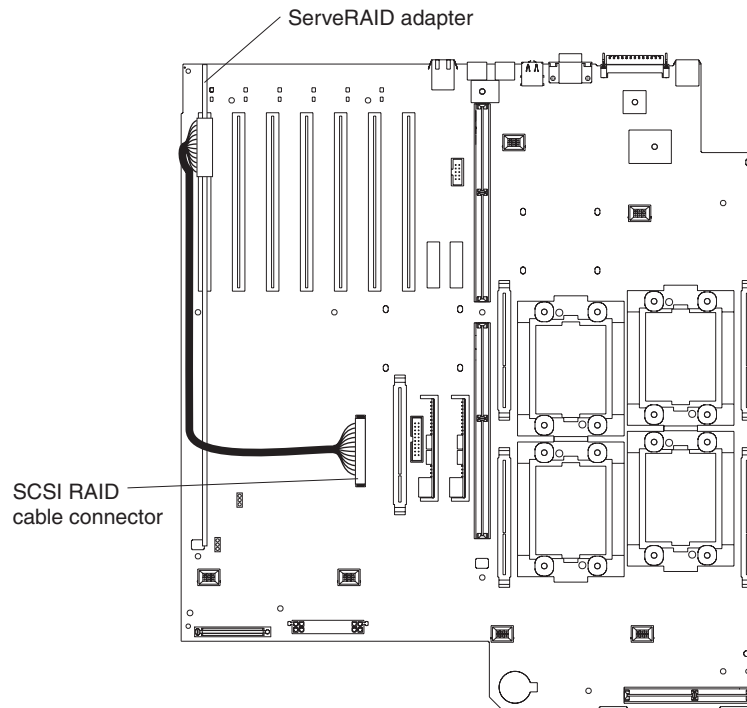
4. Slide the expansion-slot cover up out of the server and move the blue PCI-adapter locking lever (near the rear of the Remote Supervisor Adapter) to the right (as viewed from the front) to permit inserting the ServeRAID adapter.

**Attention:** When you handle Electrostatic Discharge-Sensitive devices (ESD), take precautions to avoid damage from static electricity. For details on handling these devices, see “Handling static-sensitive devices” on page 52.

5. Remove the ServeRAID adapter from the static-protective package and install the adapter, pressing it *firmly* into the selected PCI-X slot.
6. Move the blue PCI-adapter locking lever to the left (as viewed from the front) to secure the adapter; then, lower the adapter-retention latch over the top corner of the adapter. The orange adapter-retention tab snaps into place.
7. For internal hard disk drive connections:
  - a. Plug in one end of the ServeRAID internal channel cable (shipped with the server) to an internal ServeRAID channel connector on the top edge of the ServeRAID adapter as shown in the following illustration. You can install the adapter in any PCI-X slot. It is shown in slot 6 here only as an example.
  - b. Route the cable along the surface of the system board toward the front of the server, then to the right under the adapters and dividers, and plug it into the SCSI RAID cable connector (J43) on the system board.

**Notes:**

- 1) You cannot install a full-length, wide adapter in PCI-X slot 1 if the SCSI RAID adapter cable connector is in use.
- 2) You might need to remove adapters or plastic dividers to access the ServeRAID connector on the system board.



8. Refer to the documentation provided with the ServeRAID adapter for information about installing the ServeRAID software and configuring the ServeRAID adapter.
9. If you have other options to install or remove, do so now; otherwise, go to “Completing the installation” on page 86.

---

## Installing internal drives

If you add different types of drives, the system can read multiple types of media and store more data. The supported types of drives are:

- Diskette drive
- CD-ROM drive
- Hard disk drive

The server comes with one 3.5-inch 1.44 MB diskette drive and one IDE CD-ROM drive, and it supports a maximum of three hot-swap hard-disk drives.

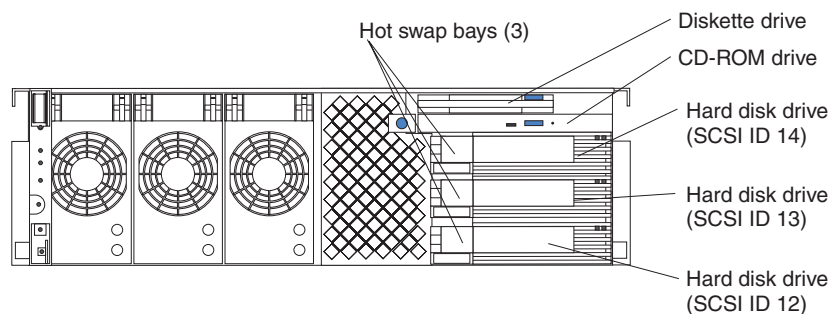
The server contains hardware that enables you to replace a failed hard disk drive without turning off the server. Therefore, you have the advantage of continuing to operate the system while a hard disk drive is removed or installed. These drives are known as *hot-swap* drives.

Each hot-swap hard disk drive has two indicator LEDs (see “Server controls and indicators” on page 6). If the amber hard disk drive status LED for a drive is lit continuously, that individual drive is faulty and requires replacement. You can replace the hot-swap drive without turning off the server.

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

## Internal drive bays

Internal drives are installed in *bays*, as shown in the following illustration.



- The server comes with one 3.5-inch, 1.44 MB diskette drive and one integrated drive electronics (IDE) CD-ROM drive, located above the hard disk drives. The CD-ROM drive bay supports 5.25-inch, half-high, removable-media drives.
- The server supports up to three 26 mm (1-inch) slim-high, 3.5-inch, hot-swap hard disk drives in the hot-swap bays. The bays are located at the right front of the server.
- The hot-swap bays are connected to a hot-swap drive backplane. The backplane is a printed circuit board behind the bays.

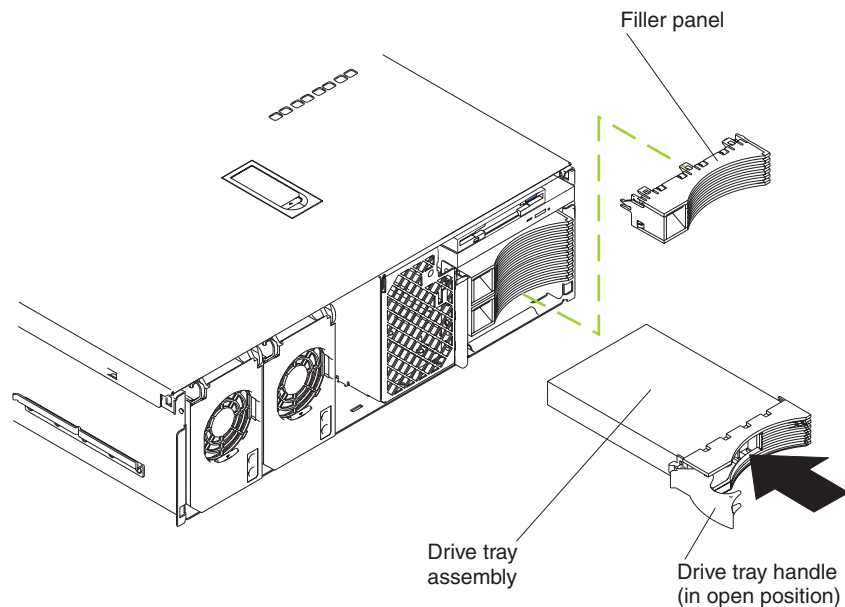
## Installing a hot-swap hard disk drive

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

Complete the following steps to install the drive in a hot-swap bay:

1. Review the safety precautions beginning on page 53, and “Handling static-sensitive devices” on page 52.
2. Remove the bezel (see “Removing the server top cover and bezel” on page 66).
3. Remove the filler panel from one of the empty hot-swap bays by inserting your finger into the depression at the left side of the filler panel and pulling the panel out of the server, as shown in the following illustration.

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



4. Install the hard disk drive in the hot-swap bay:
  - a. Ensure that the tray handle is open (that is, perpendicular to the drive).
  - b. Align the drive assembly with the guide rails in the bay.
  - c. Gently push the drive assembly into the bay until the drive stops.
  - d. Push the tray handle to the closed (locked) position.
  - e. Check the hard disk drive status LED to verify that the hard disk drive is operating properly. If the amber hard disk drive status LED for a drive is lit continuously, that individual drive is faulty and needs to be replaced. If the green hard disk drive activity LED is flashing, the drive is being accessed.
5. If you have other options to install or remove, do so now; otherwise, go to “Completing the installation” on page 86.

**Note:** If the server has a ServeRAID adapter installed, you might need to reconfigure the disk arrays after installing hard disk drives. See the documentation for the ServeRAID option for details.

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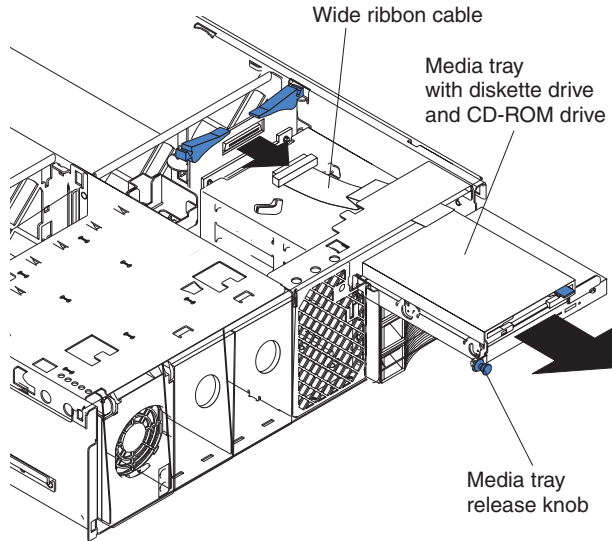
## Replacing the diskette drive or CD-ROM drive

Complete the following steps to replace either the diskette drive or the CD-ROM drive:

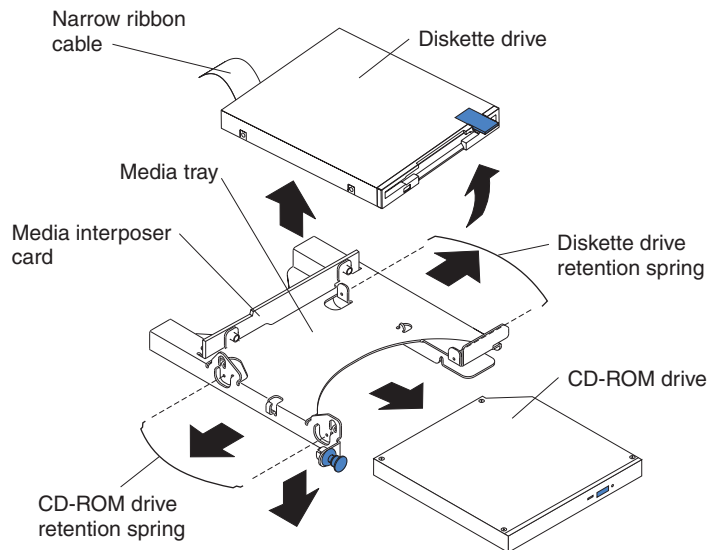
1. Review the safety precautions beginning on page 53, and “Handling static-sensitive devices” on page 52.



2. Turn off the server, disconnect all power cords and external cables, and remove the top cover and bezel (see “Removing the server top cover and bezel” on page 66).



3. Release two connector retaining clips and unplug the wide ribbon cable between the media interposer card and the hard-disk drive backplane where it plugs into the backplane.
4. Pull out the media tray release knob at the left of the CD-ROM drive and slide the media tray out the front of the server.



5. To detach the diskette drive from the media tray:
  - a. Unplug the narrow ribbon cable between the media interposer card and the diskette drive where it plugs into the diskette drive.
  - b. Release the diskette drive retention spring on the right side of the tray, lift up the right side of the diskette drive, and separate the drive from the alignment pins on the tray.

- c. To attach the replacement diskette drive to the tray, reverse these steps.
6. To detach the CD-ROM drive from the tray:
  - a. Release the CD-ROM drive retention spring on the left side of the tray and slide the CD-ROM drive toward the front of the tray. As you remove the drive, it unplugs from the media interposer card.
  - b. To attach the replacement CD-ROM drive to the tray, reverse these steps.
7. Slide the tray into the bay and press the media tray release knob to secure it to the frame.
8. Reconnect the wide cable between the media interposer card and the hard disk drive backplane.
9. If you have other options to install or remove, do so now; otherwise, go to “Completing the installation” on page 86.

---

## Installing memory modules

The server supports up to four pairs of DIMMs and supports memory interleaving. Adding memory to the server is an easy way to make programs run faster.

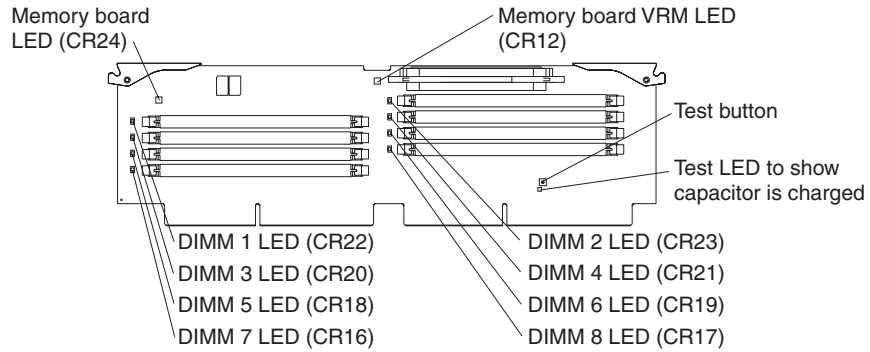
### Notes:

1. The server supports a minimum of 512 MB of system memory and a maximum of 8 GB of system memory. The DIMM slots are arranged in two columns of four rows each. The server supports DIMMs of 256 MB, 512 MB, and 1 GB capacities.
2. Each pair of DIMMs must be the same type, capacity, and speed. However, you can install DIMM pairs of different capacities as long as both DIMMs in each pair are the same.
3. Installing or removing DIMMs changes the configuration information in the server. Therefore, after installing or removing DIMMs, you must save the new configuration information using the Configuration/Setup Utility program. When you restart the server, the system displays a message indicating that the memory configuration has changed. Start the Configuration/Setup Utility program and select **Save Settings**. See Chapter 3, “Configuring the server,” on page 13 for more information.

Complete the following steps to install the DIMMs:

1. Review the safety precautions beginning on page 53, “Handling static-sensitive devices” on page 52, and the documentation that comes with the DIMMs.
2. Turn off the server, disconnect all power cords and external cables, and remove the top cover (see “Removing the server top cover and bezel” on page 66).

**Note:** If the server had a DIMM failure, a DIMM LED on the memory board indicates the failing module.

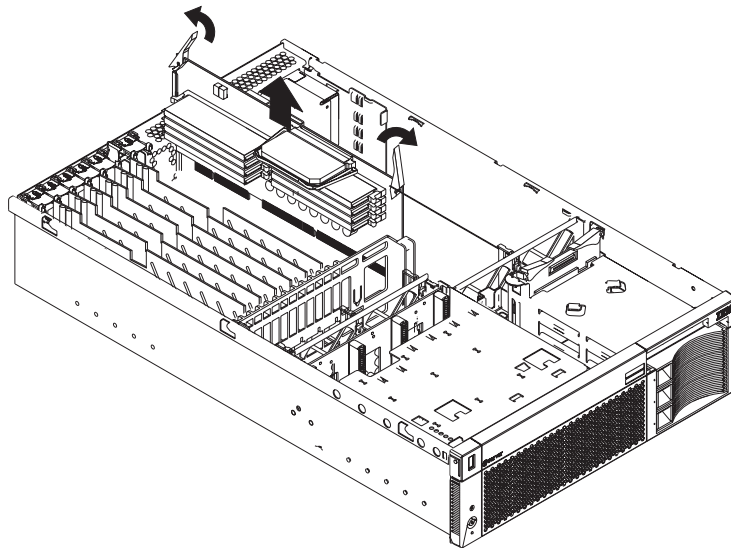


If the DIMM LED is not visible with the memory board in place, after removing the memory board you can press the Test button on the board to relight the failing DIMM's LED. If no DIMM has failed, pressing the Test button lights the Test LED.

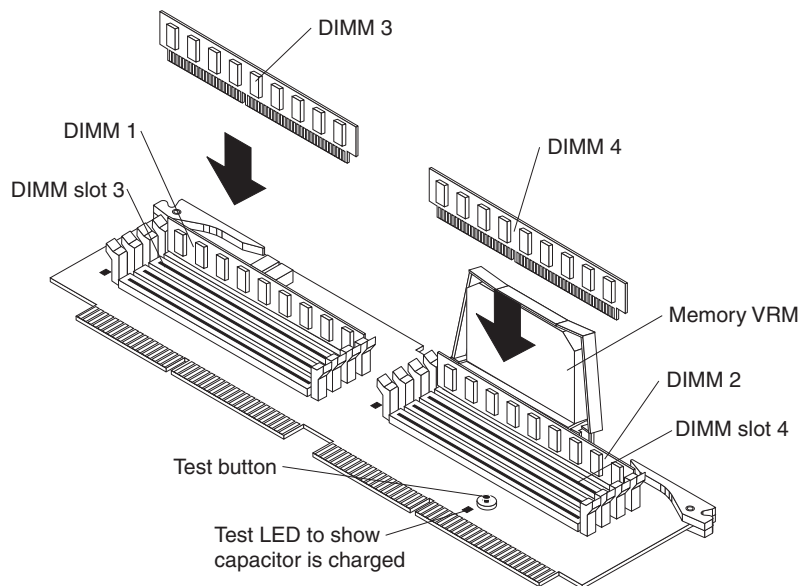
3. Remove the memory board as shown in the following illustration:

**Attention:** When you handle Electrostatic Discharge-Sensitive devices (ESD), take precautions to avoid damage from static electricity. For details on handling these devices, see "Handling static-sensitive devices" on page 52.

- a. Lift up the two memory-board locking latches to release the board.
- b. Lift the memory board out of the server.



4. When installing additional DIMMs, determine the DIMM slots into which you will install them. You must populate the slots in pairs, one DIMM in each column, proceeding from top to bottom. Use only 2.5 V, 184-pin, PC1600, DDR registered synchronous dynamic random-access memory (SDRAM) with error correcting code (ECC).



First pair	DIMMs 1 and 2
Second pair	DIMMs 3 and 4
Third pair	DIMMs 5 and 6
Fourth pair	DIMMs 7 and 8

5. Touch the static-protective package that contains the DIMM option to any unpainted metal surface on the server. Then, remove the DIMM from the package.
6. Turn the DIMM so that the DIMM keys align correctly with the slot.
 

**Attention:** To avoid breaking the DIMM locking latches or damaging the DIMM slots, handle the latches gently.
7. Ensure that the DIMM locking latches are in the open position. Insert the DIMM by pressing it straight into the slot. Make sure that the locking latches snap into the closed position. If a gap exists between the DIMM and the latches, the DIMM has not been properly installed. In this case, open the latches, remove the DIMM, and reinsert it.
8. Repeat steps 4 through 7 for each additional DIMM that you install.
9. Install the memory board:
  - a. Align the board in the guides over the connector.
  - b. Open the memory-board locking latches and insert the memory board into the connector. Be sure that the locking latches snap into the closed position.
10. If you have other options to install or remove, do so now; otherwise, go to "Completing the installation" on page 86.

**Attention:** When you restart the server, the system displays a message indicating that the memory configuration has changed.

- If you installed additional memory, start the Configuration/Setup Utility program and select **Save Settings**.

- If you just replaced a failed DIMM, you must start the Configuration/Setup Utility program, select **Advanced Setup**, select **Memory Settings**, highlight the connector or bank of connectors that you want to enable, and then select **Enable**.
- If the 3-3-3 beep code sounds during POST, the memory board might not be fully seated. In some memory configurations, if the 3-3-3 beep code is followed by a blank display screen, *and* the Boot Fail Count feature in the Start Options of the Configuration/Setup Utility is set to **Enabled** (its default setting), you must restart the server three times to force the system BIOS to reset the memory connector or bank of connectors from **Disabled** to **Enabled**.

---

## Installing a microprocessor

The server comes with a minimum of one microprocessor installed on the system board and supports up to four microprocessors. With more than one microprocessor, the server can operate as a symmetric multiprocessing (SMP) server. With SMP, certain operating systems and application programs can distribute the processing load among the microprocessors.

Before you begin:

- Read the documentation that comes with the microprocessor to determine if you need to update the server basic input/output system (BIOS) code. The most current level of BIOS code for the server is available through the World Wide Web at <http://www.ibm.com/pc/support>.
- Obtain an SMP-capable operating system (optional). For a list of supported operating systems, go to <http://www.ibm.com/pc/us/compat/> on the World Wide Web.

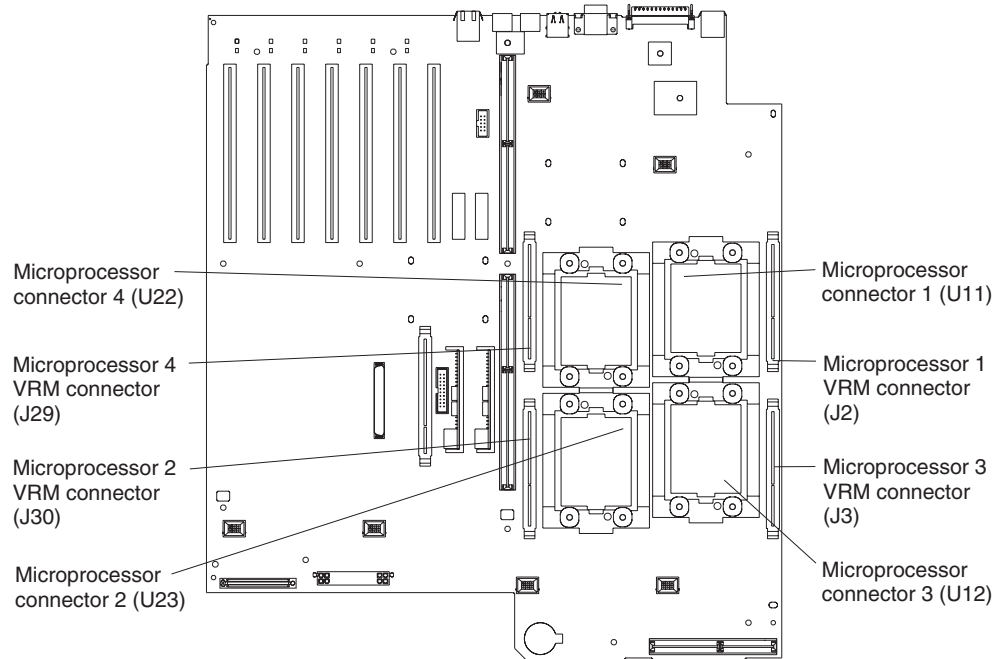
**Attention:** To avoid damage and ensure proper server operation when you install a replacement or an additional microprocessor, use a microprocessor that has the same cache size and type, clock speed, and internal and external clock frequencies as the microprocessors already installed.

**Notes:**

1. To order additional microprocessor options, contact your IBM reseller or IBM marketing representative.
2. The microprocessor in socket 1 is the startup (boot) microprocessor.

If you want to install additional microprocessors, populate the microprocessor sockets in numeric order, starting with socket 2. The following illustration shows the locations of the microprocessor sockets and VRMs on the system board.

**Note:** If you install the microprocessors in the wrong order, the server will not power on.

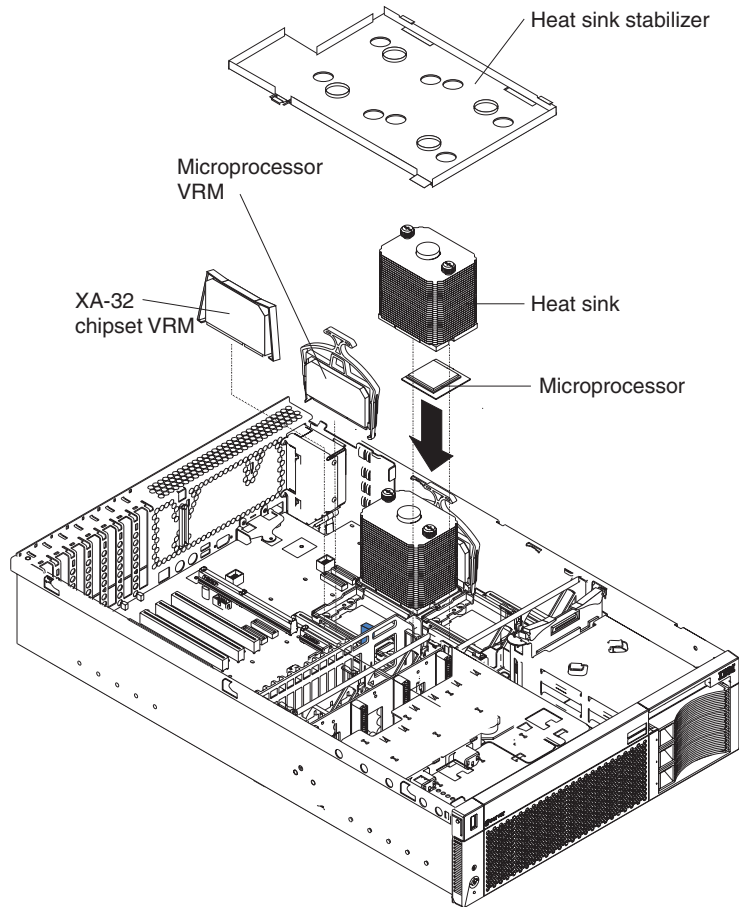


Complete the following steps to install a microprocessor:

1. Read the safety precautions beginning on page 53, and “Handling static-sensitive devices” on page 52.
2. Turn off the server, disconnect all power cords and external cables, remove the top cover (see “Removing the server top cover and bezel” on page 66).

**Attention:** When you handle Electrostatic Discharge-Sensitive devices (ESD), take precautions to avoid damage from static electricity. For details on handling these devices, see “Handling static-sensitive devices” on page 52.

3. Lift off the microprocessor heat sink stabilizer as shown in the following illustration and determine the socket where the microprocessor is to be installed.



**Notes:**

- a. The new microprocessor comes in a kit with a VRM and a heat sink.
- b. If you are replacing a failed microprocessor, verify that you have selected the correct microprocessor to be replaced. The LED next to the failing microprocessor will be on.

**Attention:** Before attempting to remove the heat sink, note that the heat-conducting grease between the heat sink and the microprocessor might have formed a strong bond. Do not force the components apart; doing so can damage the microprocessor pins. If the heat sink does not separate from the microprocessor easily, loosen one heat sink thumbscrew first. This allows one corner of the heat sink to lift off of the microprocessor; then, you can loosen the other thumbscrew and remove the heat sink.

After removing the heat sink, lift the microprocessor locking lever to the open position and remove the microprocessor.

- c. If you are installing an additional microprocessor, *first* install a VRM in the slot adjacent to the microprocessor socket you have selected and remove the protective tape from the microprocessor socket.
4. Install the microprocessor:
- a. Touch the static-protective package containing the new microprocessor to any *unpainted* metal surface on the server; then, remove the microprocessor from the package.
  - b. Ensure that the microprocessor locking lever is in the open position to permit plugging in the microprocessor.

- c. Align the triangle icon on the microprocessor with the triangle icon on the socket and press the microprocessor gently into the socket.  
**Attention:** Make sure that the microprocessor is aligned correctly before you proceed. To avoid bending the pins on the microprocessor, do not use excessive force when pressing it into the socket.
  - d. Close the locking lever to secure the microprocessor.
5. Install the microprocessor heat sink.  
**Attention:** Do not disturb or contaminate the heat-conducting grease on the bottom of the new heat sink. Doing so damages its heat-conducting capability and exposes the new microprocessor to overheating.  
Remove the heat sink from its package and secure it to the top of the microprocessor (two thumbscrews). Press firmly on the thumbscrews and tighten them, alternating between screws until finger tight. Do not overtighten the screws.
  6. Install the heat-sink stabilizer.
  7. If you have other options to install or remove, do so now; otherwise, go to “Completing the installation” on page 86.

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## Installing or replacing a VRM

The server comes with one pluggable VRM for each of the microprocessors, one for the chipset, and one on the memory board for the memory components.

### Installing a microprocessor VRM

Complete the following steps to install a microprocessor VRM:

1. Read the safety precautions beginning on page 53, and “Handling static-sensitive devices” on page 52.
2. Turn off the server, disconnect all power cords and external cables, and remove the top cover (see “Removing the server top cover and bezel” on page 66).
3. Lift off the microprocessor heat sink stabilizer.  
**Attention:** When you handle Electrostatic Discharge-Sensitive devices (ESD), take precautions to avoid damage from static electricity. For details on handling these devices, see “Handling static-sensitive devices” on page 52.
4. If you are replacing a microprocessor VRM, grasp the blue tab and lift the old VRM out of its slot, as shown in the section on installing a microprocessor.
5. Holding the new VRM by the blue tab, plug it *firmly* into the slot; then install the microprocessor heat sink stabilizer.
6. If you have other options to install or remove, do so now; otherwise, go to “Completing the installation” on page 86.

### Replacing the XA-32 chipset VRM or the memory board VRM

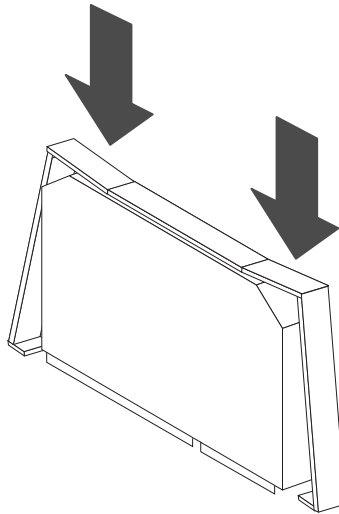
Complete the following steps to replace either the XA-32 chipset VRM or the memory board VRM:

1. Read the safety precautions beginning on page 53, and “Handling static-sensitive devices” on page 52.
2. Turn off the server, disconnect all power cords and external cables, and remove the top cover (see “Removing the server top cover and bezel” on page 66).
3. Lift off the microprocessor heat sink stabilizer.



**Attention:** When you handle Electrostatic Discharge-Sensitive devices (ESD), take precautions to avoid damage from static electricity. For details on handling these devices, see “Handling static-sensitive devices” on page 52.

4. If you are replacing the memory board VRM, remove the memory board and lay it component side up on a clean, dry surface. If you are replacing the XA-32 chipset VRM, see “System board component locations” on page 59 for the location of the VRM.
5. Press down on the VRM retaining clip at one of the points shown. The end of the clip releases from the slot. Release the other end of the clip from the slot and lift off the clip; then remove the VRM from its slot.



6. Holding the replacement VRM by the upper corners, plug it *firmly* into the slot; then install the microprocessor heat sink stabilizer.
7. Reverse the process in step 5 to install the retaining clip over the VRM.
8. If you have other options to install or remove, do so now; otherwise, go to “Completing the installation” on page 86.

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## Installing a hot-swap power supply

The server comes with a minimum of one power supply and supports up to three power supplies. If you install or remove a power supply, observe the following precautions.

### Statement 8



### CAUTION:

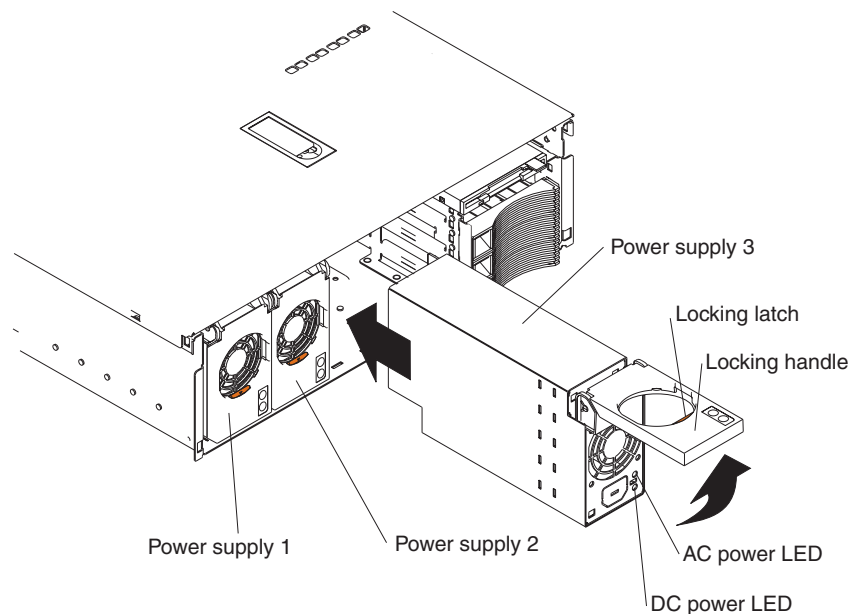
**Never remove the cover on a power supply or any part that has the following label attached.**



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

Complete the following steps to install a hot-swap power supply:

1. Read the safety precautions beginning on page 53.
2. Remove the bezel. See “Removing the server top cover and bezel” on page 66.
3. Remove the appropriate power-supply filler panel by inserting a finger into the hole and pulling the panel forward. The panel pivots at the top.



**Note:** The power supplies are numbered from left to right (1 to 3) as viewed from the front of the server. Power supplies do not have to be installed in a particular sequence.

**Attention:** To ensure proper system cooling, do not leave the filler panel off the server for more than 30 minutes.

4. Press down on the locking latch and move the locking handle to the open position.
5. Slide the power supply into the chassis, and fully close the locking handle.
6. Plug one end of the power cord for the new power supply into the corresponding connector on the back of the server (connectors are numbered 1 through 3 from top to bottom, illustrated at “Input/output ports” on page 87). Plug the other end of the power cord into a properly grounded electrical outlet.

7. Verify that the dc power and ac power LEDs on the front of the power supply are lit, indicating that the power supply is operating properly.
8. If you have other options to install or remove, do so now; otherwise, go to “Completing the installation” on page 86.

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## Replacing a hot-swap fan

The server comes with six hot-swap fans. You do not need to turn off the power to the server to replace a hot-swap fan.

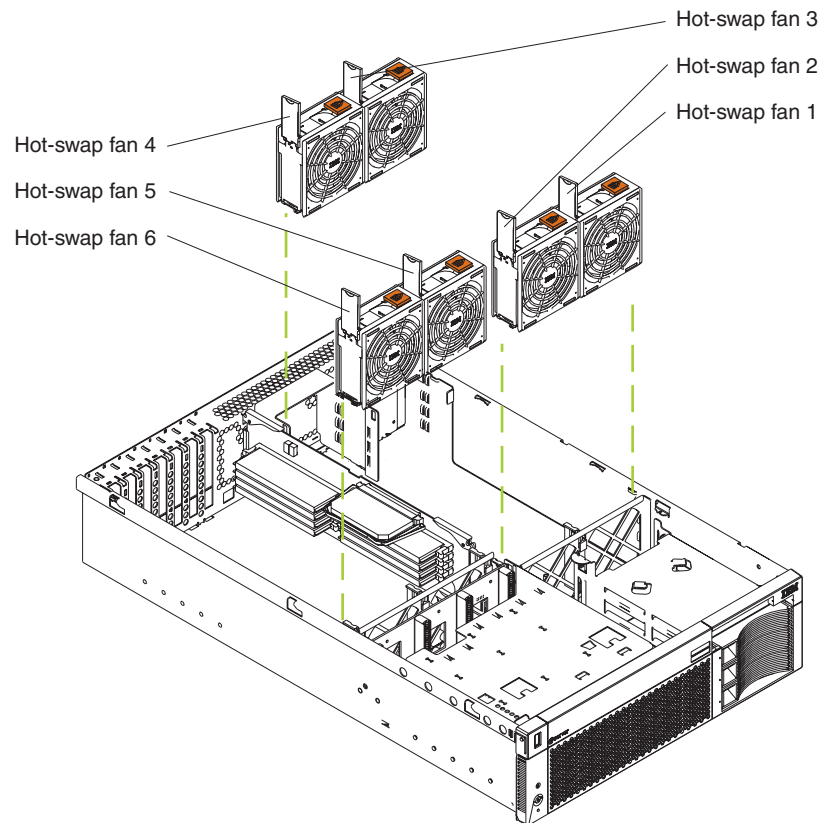
**Attention:** If a fan fails, replace it within 48 hours to help ensure proper cooling.

Complete the following steps to replace a hot-swap fan:

1. Read the safety precautions beginning on page 53, and “Working inside the server with the power on” on page 52.
2. Remove the top cover (see “Removing the server top cover and bezel” on page 66).

**Attention:** To ensure proper system cooling, do not leave the top cover off the server for more than 30 minutes.

3. Lift up the free end of the fan-locking handle and pull upward on the handle to lift the fan out of the server.



4. Open the locking handle on the replacement fan, lower the fan into its socket, and rotate the handle to the locked position.

5. If you have other options to install or remove, do so now; otherwise, go to “Completing the installation”.

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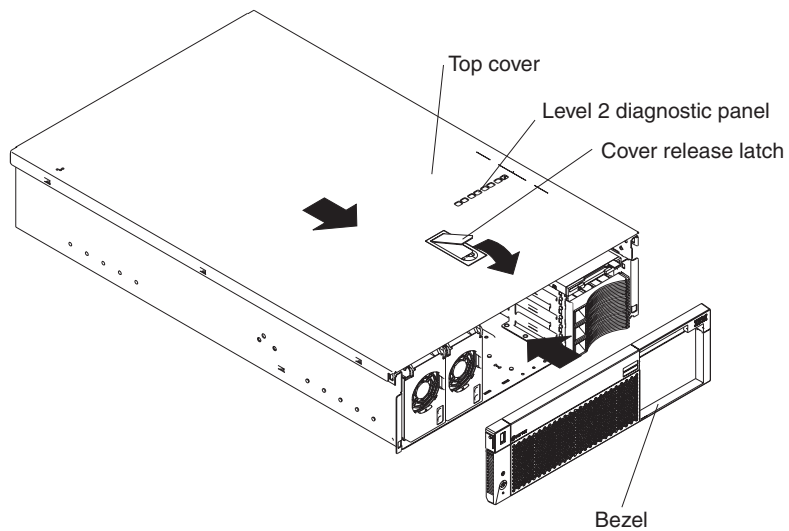
## Completing the installation

This section provides the information needed to complete the installation.

### Installing the server top cover and bezel

Complete the following steps to install the server top cover and bezel:

1. Before installing the cover, check that all internal cables, adapters, and other components are installed and seated correctly and that you have not left loose tools or parts inside the server.
2. Move the cover-release latch to the open (up) position.



3. Insert the tabs on the top cover into the matching slots in the server chassis.
4. Close the cover-release latch to pull the top cover forward and lock the top cover in place.
5. Insert the tabs on the bottom of the bezel into the matching holes on the server chassis.
6. Push the top of the bezel toward the server until the two tabs at the top of the bezel snap into place.
7. If you disconnected any external cables from the back of the server, reconnect the cables; then, plug the power cords into properly grounded electrical outlets.

**Notes:**

- a. If necessary, see “Input/output ports” on page 87 for connector locations.
- b. If you have just plugged the power cords of the server into an electrical outlet, you must wait approximately 30 seconds before pressing the power-control button.

### Updating the server configuration

When you start the server for the first time after you add or remove an internal option or an external SCSI device, you might see a message telling you that the

configuration has changed. The Configuration/Setup Utility program automatically starts so that you can save the new configuration information. See Chapter 3, “Configuring the server,” on page 13.

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

The server comes with at least one microprocessor installed on the system board. If you have installed one or more additional microprocessors, the server can now operate as an SMP server. Therefore, you might need to upgrade the operating system to support SMP. See Chapter 4, “Using the ServerGuide™ CDs,” on page 45 and the operating-system documentation for additional information.

If the server has a ServeRAID adapter installed and you have installed or removed a hard disk drive, see the documentation that comes with the ServeRAID adapter for information about reconfiguring the disk arrays.

If you are using the Remote Supervisor Adapter to manage the server from a remote location, see “Setting up the Remote Supervisor Adapter” on page 26 and the *Remote Supervisor Adapter User's Guide* on the *xSeries 360 Documentation* CD for information about setting up and configuring the adapter and using the adapter to manage the server remotely.

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## Connecting external options

You can attach external options to the input/output (I/O) connectors on the rear of the server. (See “Input/output ports” for more information.)

Complete the following steps to attach an external device:

1. Read the safety precautions beginning on page 53, and the documentation that comes with the options.
2. Turn off the server and all attached devices.
3. Follow the instructions that come with the option to prepare it for installation and to connect it to the server.

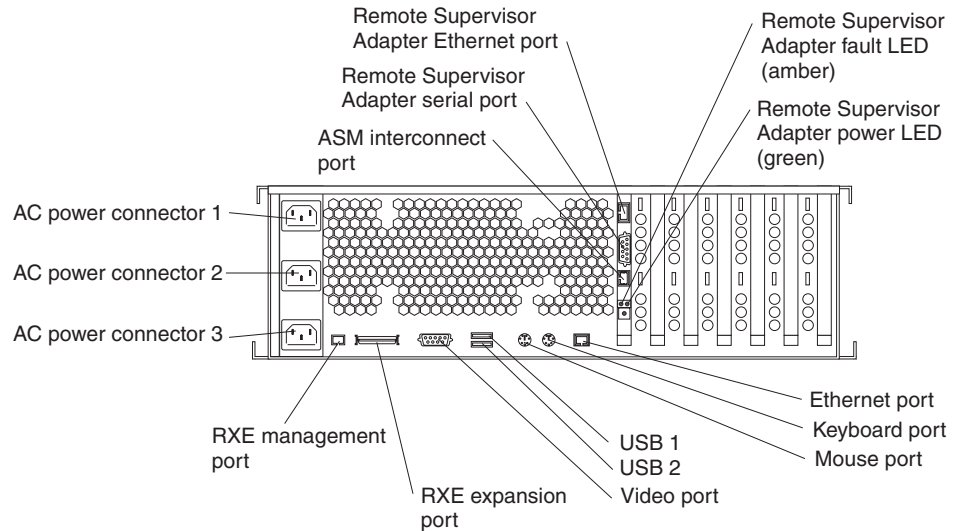
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## Input/output ports

This section provides information about the following input/output (I/O) ports on the front and rear panels of the server:

- Three Universal Serial Bus (USB) ports (one front, two rear)
- One video port
- One keyboard port
- One auxiliary-device (pointing device) port
- One RXE management port
- One RXE expansion port
- One Ethernet port
- Remote Supervisor Adapter ports
  - One ASM interconnect (peer-to-peer) port
  - One Ethernet port (remote server management using a network)
  - One serial port (remote server management using a modem)
  - One external power connector

The following illustration shows the I/O ports on the rear of the server.



## Universal Serial Bus ports

The server has three Universal Serial Bus (USB) ports (one on the front, two on the rear), which are configured automatically. USB is a serial interface standard for telephony and multimedia devices. It uses Plug and Play technology to determine the type of device that is attached to the connector.

### Notes:

1. If you attach a standard (non-USB) keyboard to the keyboard connector, the USB ports and devices will be disabled during the power-on self-test (POST).
2. If you install a USB keyboard that has a mouse port, the USB keyboard emulates a mouse, and you will not be able to disable the mouse settings in the Configuration/Setup Utility program.

## USB cables and hubs

You need a 4-pin cable to connect devices to the USB ports. If you plan to attach more than three USB devices, you must use a hub to connect the devices. The hub provides multiple connectors for attaching additional external USB devices.

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

## USB-port pin assignments

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

The following table shows the pin-number assignments for the USB ports.

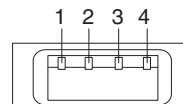


Table 6. USB-port connector pin-number assignments.

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

## Video port

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

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

The following table shows the pin-number assignments for the 15-pin analog video connector on the rear of the server.

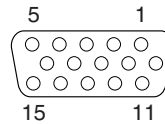


Table 7. Video-port connector pin-number assignments.

Pin	Signal	Pin	Signal	Pin	Signal
1	Red	6	Ground	11	Not connected
2	Green or monochrome	7	Ground	12	DDC SDA
3	Blue	8	Ground	13	Horizontal synchronization (Hsync)
4	Not connected	9	+5 V dc	14	Vertical synchronization (Vsync)
5	Ground	10	Ground	15	DDC SDL

## Keyboard port

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

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

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

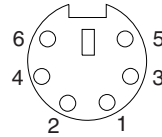


Table 8. Keyboard connector pin-number assignments .

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

## Auxiliary-device (pointing device) port

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

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

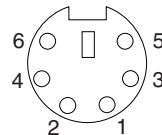


Table 9. Auxiliary-device connector pin-number assignments.

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



Table 9. Auxiliary-device connector pin-number assignments.

Pin	Signal
6	Not connected

## Ethernet port

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

The following illustration and table show the pin-number assignments for the Ethernet connector. These assignments apply to both 10BASE-T and 100BASE-TX devices.

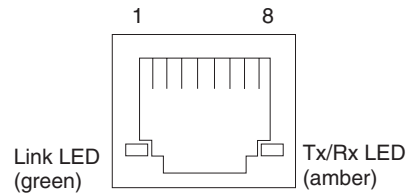


Table 10. Ethernet connector pin-number assignments..

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

## Remote Supervisor Adapter communication ports

The server has four communication ports that are used by the Remote Supervisor Adapter. Three of the ports are located on the adapter and one is located at the lower left corner of the rear panel (as viewed from the rear).

- The interconnect function uses the ASM interconnect (peer-to-peer) port and enables you to connect the server with other servers.
- The remote expansion I/O management function uses the RXE management port and enables the Remote Supervisor Adapter to manage an attached optional IBM RXE-100 Remote Expansion Enclosure. The RXE expansion port enables the exchange of data between the server and the enclosure.
- The Ethernet port enables remote management of the server through a network.
- The serial port enables remote management of the server through a modem.

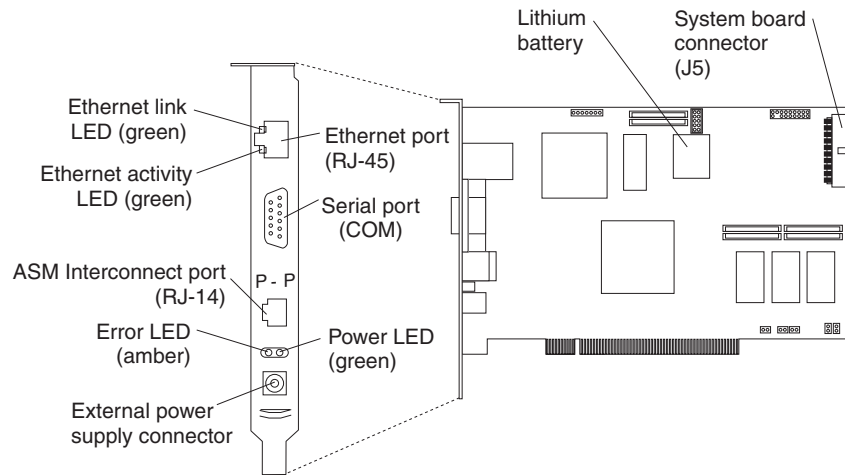
If you want to use the Remote Supervisor Adapter to manage the server remotely or to connect the server to another server, connect the appropriate cables to the Remote Supervisor Adapter ports.

**Attention:** Do *not* connect the ASM interconnect port to the RXE management port (shown at “Input/output ports” on page 87).

To enable remote server management through a network, use the Remote Supervisor Adapter Ethernet port. To enable remote server management using a modem, use the Remote Supervisor Adapter serial port. To connect the server with another server, use the ASM interconnect port.

See the Remote Supervisor Adapter documentation on the *xSeries 360 Documentation CD* for more information.

The following illustration shows the communication ports and other major components on the Remote Supervisor Adapter.



### **Ethernet port**

Connect a CAT 3 or CAT 5 Ethernet cable to this port to enable a LAN connection or TELNET session. The Ethernet port LEDs on the Remote Supervisor Adapter indicate whether the link is good and whether activity is taking place on the network.

### **Serial port**

Connect a serial cable to this port to enable system management through a modem, or connect a null modem cable to enable system management through a workstation or laptop computer.

### **Advanced System Management (ASM) interconnect port**

Attach an ASM Interconnect module (which comes with the server) to this port to connect the Remote Supervisor Adapter to the other devices on the ASM Interconnect network.

### **Power and error LEDs**

The green power LED indicates the status of the power connection. The amber Error LED indicates an error on the Remote Supervisor Adapter.

### **External power-supply connector**

Connect the optional power-supply adapter to this connector. This connection provides power to the Remote Supervisor Adapter, independent of the server power supply.

### **Lithium battery**

This battery provides backup of the Remote Supervisor Adapter real-time clock, event log, and configuration settings.

### System board connector

This cable connects to the Remote Supervisor Adapter cable connector (J39) on the system board.

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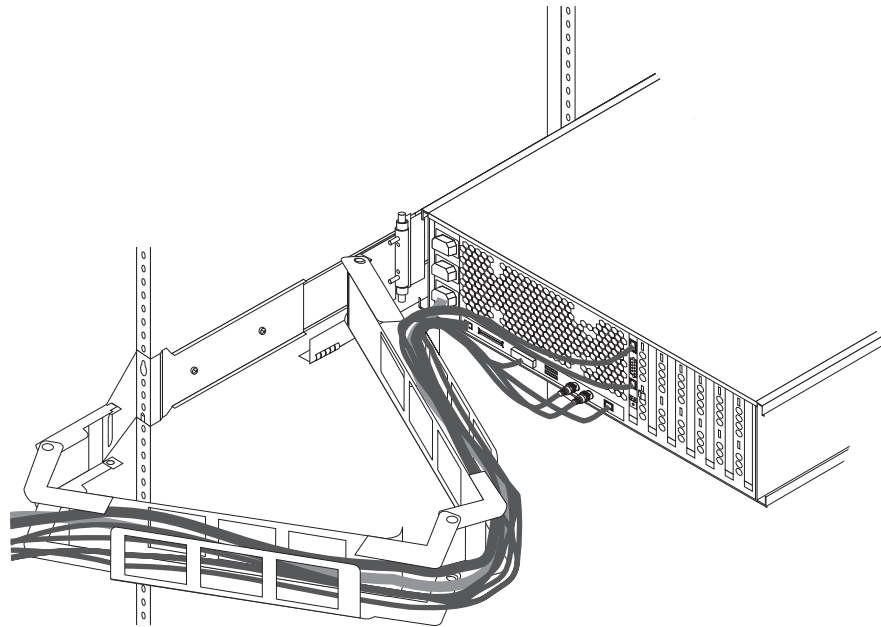
## Cabling the server

See “Input/output ports” on page 87 for a description of the I/O ports on the rear of the server.

The following illustration shows the cable routing for a typical server configuration. Detailed cabling instructions, including the use of the cable management arm (shipped with the server) are in the *Rack Installation Instructions* provided with the server.

### Notes:

1. The illustrations in this document might differ slightly from your hardware.
2. See the documentation that comes with the options for additional cabling instructions. It might be easier for you to route any cables before you install certain options.
3. If you have just plugged the power cords of the server into an electrical outlet, you must wait 30 seconds before pressing the power-control button.





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## Chapter 6. Solving Problems

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

If you cannot locate and correct the problem using the information in this chapter, see “Getting information, help, and service” on page 144 for more information.

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### 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 97 for more information.

- **Diagnostic programs and error messages**

The server diagnostic programs are stored in upgradable read-only memory (ROM) on the system board. These programs are the primary method of testing the major components of the server. See “Diagnostic programs and error messages” on page 111 for more information.

- **Light Path Diagnostics feature**

The server has light-emitting diodes (LEDs) to help you identify problems with server components. By following the light path, you can quickly identify the type of problem that occurred. The light path begins with the LEDs on the operator information panel (also known as the front LED panel). See “Light Path Diagnostics” on page 123 for more information.

- **Troubleshooting charts**

These charts list problem symptoms, and suggested steps to correct the problems. See “Troubleshooting charts” on page 129 for more information.

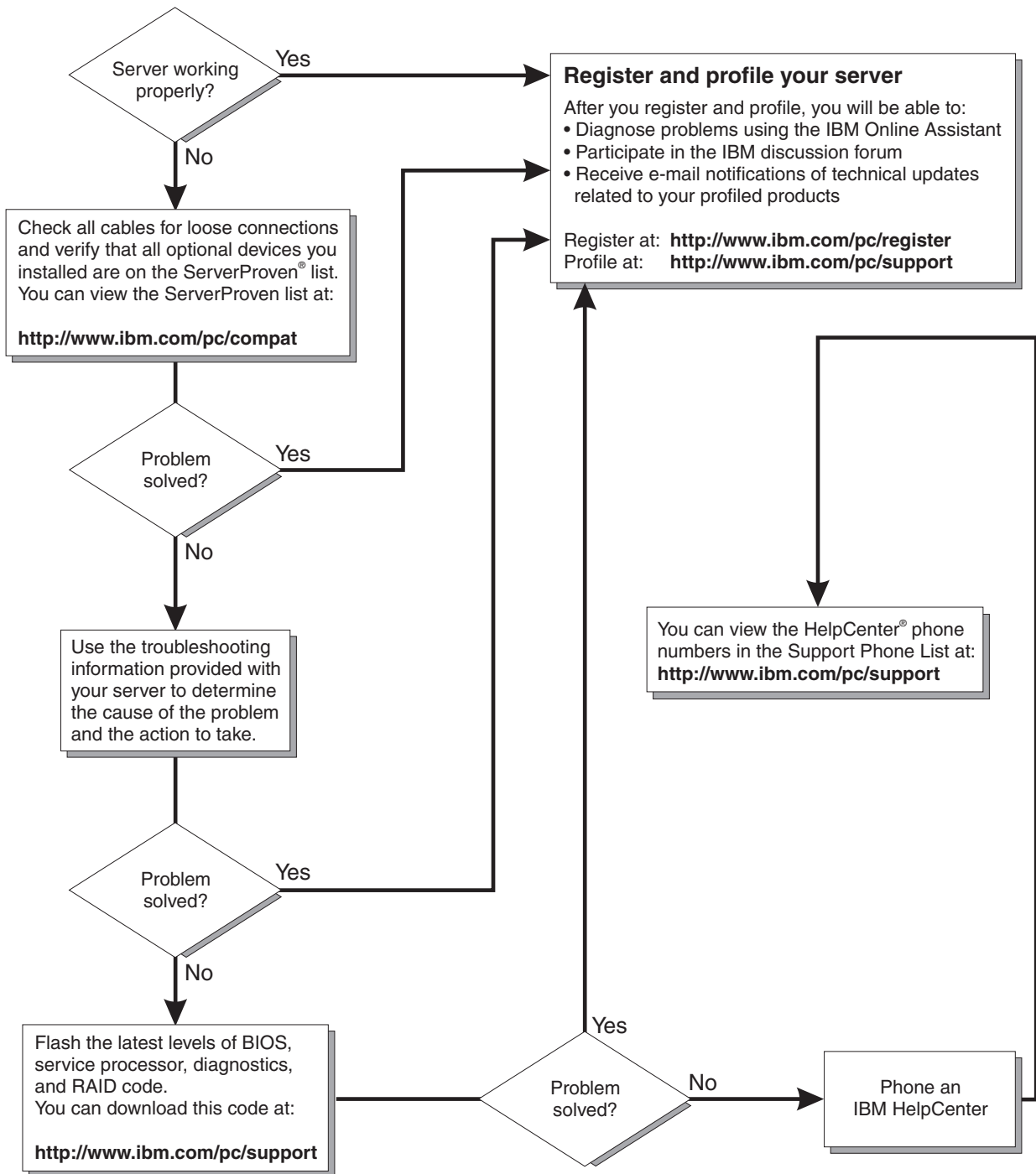
- **Customized support page**

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 create a profile for your IBM 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



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## 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 that are 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 the operating system or application program appears.

If POST detects a problem, more than one beep sounds, and an error message appears on the screen. See “POST beep code descriptions” and “POST error messages” on page 100 for more information.

### Notes:

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

## POST beep code descriptions

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

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

### No beep

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

### Continuous beep

The startup (boot) microprocessor has failed, or the 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 microprocessor has failed; replace the startup microprocessor.

### One short beep

One beep indicates that the server successfully completed POST and that POST did not detect any configuration or functional errors. One beep also occurs after the server completes POST if you type an incorrect power-on password.

### Two short beeps

POST encountered an error. The Configuration/Setup Utility program displays additional information; follow the instructions that appear on the screen. See “POST error messages” on page 100 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) code cannot display the error message. Replace the failing memory module.

### Repeating short beeps

The system board might contain a failing component, the 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 the system serviced. If the error code 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 code does not occur, replace the device.

**One long and one short beep**

POST encountered an error in the video controller. Call for service.

**One long and two short beeps**

The video I/O adapter ROM is not readable, or the video subsystem is defective. This beep combination might also indicate that the system board contains a failing component.

**One long and three short beeps**

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



## POST beep codes

In addition to the beep codes that are described in “POST beep code descriptions” on page 97, the server might emit beep codes that are described in the following table. The numbers and hyphens describe the sequence of beeps and pauses. For example, a 1-2-3 beep code is one beep, a pause, two consecutive beeps, another pause, and three more consecutive beeps.

Table 11. POST beep codes.

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 remains, call for service.	
1-3-1	First 64 Kb RAM test has failed.		
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 server, unplug all power cords, and reconnect all power cords; then, restart the server. If the problem remains, 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.		
3-2-4	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 remains, call for service.	

Table 11. POST beep codes.

3-3-2	I <sup>2</sup> C bus has failed.	Turn off the server, unplug all power cords, and reconnect all power cords; then, restart the server. If the problem remains, call for service.
3-3-3	No memory has been detected in the server.	Reseat the memory modules or install a memory module. If the problem remains, call for service.  <b>Note:</b> 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 <b>Boot Fail Count</b> feature in the <b>Start Options</b> of the Configuration/Setup Utility is set to <b>Enabled</b> (its default setting), you must restart the server three times to force the system BIOS code to reset the memory connector or bank of connectors from <b>Disabled</b> to <b>Enabled</b> .

## POST error messages

The following table provides information about the error messages that might appear during POST.

**Note:** The operator information panel is also known as the front LED panel.

Table 12. POST error messages.

POST message	Description
062	The server failed to start on three consecutive attempts.  All microprocessor caches are disabled. Repeatedly turning the server on and then off or resetting the server might cause this problem. <b>Action:</b> Start the Configuration/Setup Utility program and verify that all settings are correct. Use the <b>Cache Control</b> selection in the Advanced Setup menu of the Configuration/Setup Utility program to enable the microprocessor caches.  If the problem remains, call for service. When the problem is corrected, be sure to enable the caches.
101 102 106	An error occurred during the system board and microprocessor test. <b>Action:</b> Call for service.
114	An adapter read-only memory (ROM) error occurred. <b>Action:</b> 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.  If you cannot isolate and correct the problem, call for service.
151	A real-time clock (RTC) error occurred. <b>Action:</b> Call for service.

Table 12. POST error messages.

POST message	Description
161	<p>The real-time clock battery has failed.</p> <p><b>Action:</b> 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"> <li>• A new device has been installed.</li> <li>• A device has been moved to a different location or cable connection.</li> <li>• A device has been removed or disconnected from a cable.</li> <li>• A device is failing and is no longer recognized by the server as being installed.</li> <li>• An external device is not turned on.</li> <li>• An invalid checksum is detected in the battery-backed memory.</li> </ul> <p><b>Action:</b> 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 test 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><b>Action:</b> 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>

Table 12. POST error messages.

POST message	Description
164	<p>A change in the memory configuration occurred. This message might appear after you add or remove memory.</p> <p><b>Note:</b> The server can be used with decreased memory capacity.</p> <p><b>Action:</b></p> <ol style="list-style-type: none"> <li>1. If POST error message 289 also occurred, follow the instructions for that error message first.</li> <li>2. If you just installed or removed memory, run the Configuration/Setup Utility program; then exit, saving the new configuration settings.  If the message appears again, shut down the server, reseal the memory modules, and restart the server.</li> <li>3. If the problem remains, check to see if the system has isolated the problem to a memory module: <ul style="list-style-type: none"> <li>• If the Fault light on the operator information panel is on, check to see if the MEM LED on the diagnostic LED panel is on. (See “Level 2 diagnostic panel LEDs” on page 124.) If it is on, check the DIMM Error LEDs next to the memory sockets. If a DIMM error LED is on, run the diagnostic program for the memory. <p><b>Note:</b> If the server had a DIMM failure, an LED on the memory board indicates the failing DIMM. If the LED is not visible with the memory board in its connector, you can remove the memory board and press the button on the board to light the LED for the failing DIMM.</p> <ul style="list-style-type: none"> <li>— If the tests fail, replace the DIMM. If the problem remains after you replace the DIMM, call for service.</li> <li>— If the memory tests do not fail, call for service.</li> </ul> </li> <li>• If no error LED is on, the error logs in the Configuration/Setup Utility program might provide additional information on the memory error.</li> </ul> </li> </ol> <p>If the problem remains, call for service.</p>
175	<p>A vital product data (VPD) error occurred.</p> <p><b>Action:</b> Call for service.</p>
176 177 178	<p>A security hardware error occurred.</p> <p><b>Action:</b> 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 the server has been removed.</p> <p><b>Action:</b> From the Configuration/Setup Utility program main menu, select <b>System Security</b>. 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><b>Action:</b> From the Configuration/Setup Utility program main menu, select <b>Start Options</b>; 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><b>Action:</b> Call for service.</p>

Table 12. POST error messages.

POST message	Description
187	<p>The VPD serial number is not set.</p> <p><b>Action:</b> 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 <b>System Information</b>, and then select <b>Product Data</b>. If the problem remains, call for service.</p>
188	<p>A vital product data (VPD) error occurred.</p> <p><b>Action:</b> 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> <p><b>Action:</b> Call for service.</p>
201	<p>An error occurred during the memory controller test. This error can be caused by:</p> <ul style="list-style-type: none"> <li>• Incorrectly installed memory</li> <li>• A failing memory module</li> <li>• A system-board problem</li> <li>• A memory-board problem</li> </ul> <p><b>Action:</b></p> <ol style="list-style-type: none"> <li>1. If you just installed memory, verify that the new memory is correct for the server. Also verify that the memory is installed and seated correctly.</li> <li>2. If the problem remains, check to see if the system has isolated the problem to a memory module: <ul style="list-style-type: none"> <li>• If the system-error light on the operator information panel is on, check the diagnostic panel to see if the MEM LED on the diagnostic LED panel is on. See “Level 2 diagnostic panel LEDs” on page 124 to identify the diagnostic panel and locate the LED. If it is on, check the DIMM error lights next to the memory sockets. If a DIMM error LED is on, run the diagnostic program for the memory.</li> </ul> <p><b>Note:</b> If the server had a DIMM failure, an LED on the memory board indicates the failing DIMM. If the LED is not visible with the memory board in its connector, you can remove the memory board and press the button on the board to light the LED for the failing DIMM.</p> <ul style="list-style-type: none"> <li>• If the tests fail, replace the DIMM. If the problem remains after you replace the DIMM, call for service.</li> <li>• If the memory tests do not fail, call for service.</li> </ul> </li> <li>3. If no error LED is on, the error logs in the Configuration/Setup Utility program might provide additional information on the memory error.</li> </ol> <p>If the problem remains, call for service.</p>

Table 12. POST error messages.

POST message	Description
289	<p>An error occurred during POST memory tests and a failing DIMM was disabled.</p> <p><b>Note:</b> You can use the server with decreased memory.</p> <p><b>Action:</b></p> <ol style="list-style-type: none"> <li>1. If you just installed memory, verify that the new memory is correct for the server. Also verify that the memory is installed and seated correctly. Start the Configuration/Setup Utility program and select <b>Memory Settings</b> from the <b>Advanced Setup</b> menu to enable the DIMM.</li> <li>2. If the problem remains, replace the failing DIMM.</li> </ol> <p>If the problem remains, 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><b>Action:</b> Ensure that:</p> <ul style="list-style-type: none"> <li>• Nothing is resting on the keyboard and pressing a key.</li> <li>• No key is stuck.</li> <li>• The keyboard cable is connected correctly to the keyboard and to the correct connector on the server.</li> </ul> <p>Running the diagnostic tests can isolate the server component that failed, but you must have the system serviced. If the error message remains, call for service.</p> <p><b>Note:</b> 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><b>Action:</b></p> <ol style="list-style-type: none"> <li>1. Replace the diskette.</li> <li>2. If the problem remains, make sure that the diskette drive cables are correctly and securely connected.</li> <li>3. If the problem remains, replace the diskette drive.</li> </ol> <p>If the problem remains, call for service.</p>
604	<p>An error occurred during a diskette drive test.</p> <p><b>Action:</b></p> <ol style="list-style-type: none"> <li>1. Verify that the Configuration/Setup Utility program correctly reflects the type of diskette drive that you have installed.</li> <li>2. Run the diagnostic tests. If the diagnostic tests fail, call for service.</li> </ol>
662	<p>A diskette drive configuration error occurred.</p> <p><b>Action:</b> 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 remains, call for service.</p>

Table 12. POST error messages.

POST message	Description
11xx	<p>An error occurred during the system-board serial port test.</p> <p><b>Action:</b> If you have a modem, serial printer, or other serial device attached to the server, verify that the serial cable is connected correctly. If it is, use the following procedure:</p> <ol style="list-style-type: none"> <li>1. Turn off the server.</li> <li>2. Disconnect the serial cable from the serial port.</li> <li>3. Wait 5 seconds; then, turn on the server.</li> </ol> <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><b>Action:</b></p> <ol style="list-style-type: none"> <li>1. Make sure the IRQ and I/O port assignments needed by the serial port are available.</li> <li>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.</li> </ol>
1301	<p>Cable to the operator information panel not detected.</p> <p><b>Action:</b> Make sure that the cable to the operator information panel card is connected.</p> <p>If the problem remains, call for service.</p>
1302	<p>Cable to SCSI Backplane not detected.</p> <p><b>Action:</b> Make sure that the cable between the Level 2 Light Path card and the SCSI hard drive back plane is connected.</p> <p>If the problem remains, call for service.</p>
1303	<p>Cable to Hotplug Switch not detected.</p> <p><b>Action:</b> Make sure that the cable between the PCI switch card and the system board (J36) is connected.</p> <p>If the problem remains, call for service.</p>
1304	<p>Cable to Media not detected.</p> <p><b>Action:</b> Make sure that the cable between the media interposer card and the Level 2 Light Path card is connected.</p> <p>If the problem remains, call for service.</p>
1600	<p>The Remote Supervisor Adapter is not functioning.</p> <p><b>Action:</b></p> <ol style="list-style-type: none"> <li>1. Verify that the jumpers for the Remote Supervisor Adapter are set correctly.</li> <li>2. Disconnect the server from all electrical sources, wait for 30 seconds, reconnect the server to the electrical sources, and restart the server.</li> </ol> <p>If the problem remains, call for service.</p>
1162	<p>The serial port configuration conflicts with another device in the server. Start the Configuration/Setup Utility program and ensure that the IRQ and I/O port assignments needed by the serial port are available.</p>

Table 12. POST error messages.

POST message	Description
1800	<p>A PCI/PCI-X adapter has requested a hardware interrupt that is not available.</p> <p><b>Action:</b></p> <ol style="list-style-type: none"> <li>1. Make sure that the PCI/PCI-X 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.</li> <li>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/PCI-X adapter, or you might need to force other adapters to share an interrupt.</li> </ol>
1962	<p>No valid startup devices were found. The system cannot find the startup drive or operating system.</p> <p><b>Action:</b> Be sure that the drive that you want to start from is in the startup sequence.</p> <ol style="list-style-type: none"> <li>1. Select <b>Start Options</b> from the Configuration/Setup Utility program main menu. If you are unable to set the startup sequence, call for service.</li> <li>2. Check the list of startup devices in the <b>Startup device</b> data fields. Is the drive that you want to start from in the startup sequence? <ul style="list-style-type: none"> <li><b>Yes</b> Exit from this screen; then, select <b>Exit Setup</b> to exit from the Configuration/Setup Utility menu. Go to step 3.</li> <li><b>No</b> Follow the instructions on the screen to add the drive; then, save the changes and exit the Configuration/Setup Utility menu. Restart the server.</li> </ul> </li> <li>3. Is an operating system installed? <ul style="list-style-type: none"> <li><b>Yes</b> Turn off the server. Go to step 4.</li> <li><b>No</b> Install the operating system in the server; then, follow the operating system instructions to shut down and restart the server.</li> </ul> </li> <li>4. During server startup, watch for messages indicating a hardware problem.</li> </ol> <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 or a failing system board.</p> <p><b>Action:</b> 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><b>Action:</b> Make sure that the monitor cables are correctly and securely connected to the server.</p> <p>If the problem remains, call for service.</p>
5962	<p>An IDE CD-ROM configuration error occurred.</p> <p><b>Action:</b> Check the signal and power cable connections to the CD-ROM drive.</p> <p>If the problem remains, call for service.</p>



Table 12. POST error messages.

POST message	Description
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><b>Note:</b> 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 30 seconds; then, turn it back on.</p> <p><b>Action:</b> 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"> <li>1. Turn off the server.</li> <li>2. Disconnect the mouse from the server.</li> <li>3. Turn on the server.</li> </ol> <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>Microprocessor machine check.</p> <p><b>Action:</b> 1. Update the system BIOS. 2. If the problem remains, replace the microprocessor.</p>
0001950x	<p>Microprocessor x is not functioning.</p> <p><b>Action:</b> Replace microprocessor x. (The microprocessor x error light will be on.)</p> <p>If the problem remains, call for service.</p>
0001970x	<p>Microprocessor x failed the built-in self test.</p> <p><b>Action:</b> Replace microprocessor x. (The microprocessor x error light will be on.)</p> <p>If the problem remains, call for service.</p>

Table 12. POST error messages.

POST message	Description
00180100	<p>A PCI/PCI-X adapter has requested memory resources that are not available.</p> <p><b>Action:</b></p> <ol style="list-style-type: none"> <li>1. If the PCI/PCI-X adapter that is requesting the memory resources is the start (boot) device, you might need to change the order of the adapters in the PCI-X slots. Memory is allocated to devices in the order that is specified in the <b>Boot Priority</b> option from the Start Options menu in the Configuration/Setup Utility program. Ensure that the adapter is early in the boot priority order so that it is allocated the necessary memory resources.</li> <li>2. Make sure that the PCI/PCI-X 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.</li> <li>3. If all memory resources are being used and either integrated SCSI or integrated Ethernet are not being used, you can make more memory resources available by disabling integrated SCSI, integrated Ethernet, or both, using the Configuration/Setup Utility program.</li> <li>4. If all memory resources are being used, you might need to remove an adapter to make memory available to the PCI/PCI-X adapter. Disabling the adapter BIOS on the adapter might correct the error. Refer to the documentation that comes with the adapter.</li> </ol>
00180200	<p>A PCI/PCI-X adapter has requested an I/O address that is not available, or the PCI/PCI-X adapter might be defective.</p> <p><b>Action:</b></p> <ol style="list-style-type: none"> <li>1. Make sure that the I/O addresses for the PCI/PCI-X adapter and all other adapters are set correctly in the Configuration/Setup Utility program.</li> <li>2. If the I/O port resource settings are correct, the PCI/PCI-X adapter might be defective. Call for service.</li> </ol>
00180300	<p>A PCI/PCI-X adapter has requested a memory address that is not available, or the PCI/PCI-X adapter might be defective.</p> <p><b>Action:</b></p> <ol style="list-style-type: none"> <li>1. Make sure that the memory addresses for all other adapters are set correctly in the Configuration/Setup Utility program. If the memory resource settings are not correct, change the settings.</li> <li>2. If the memory resource settings are correct, the PCI/PCI-X adapter might be defective. Call for service.</li> </ol>
00180400	<p>A PCI/PCI-X adapter has requested a memory address that is not available.</p> <p><b>Action:</b> If all memory addresses are being used, you might need to remove an adapter to make memory address space available to the PCI/PCI-X adapter. Disabling the adapter BIOS code on the adapter might correct the error. Refer to the documentation that comes with the adapter.</p>
00180500	<p>A PCI/PCI-X-adapter ROM error occurred.</p> <p><b>Action:</b> Remove the PCI/PCI-X 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>

Table 12. POST error messages.

POST message	Description
00180600	<p>A PCI-to-PCI bridge error occurred. More than one PCI bus tried to access memory below 1 MB.</p> <p><b>Action:</b> Remove the PCI/PCI-X 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>xxxxyyy System board PCI/PCI-X device does not respond. (Where xxxx is the PCI vendor ID and yyyy is the PCI device ID.)</p> <p><b>Action:</b> Start the Configuration/Setup Utility program, select <b>Devices and I/O Ports</b>, and make sure that the device is enabled. If the problem remains, call for service.</p>
00180800	<p>An unsupported PCI/PCI-X device is installed.</p> <p><b>Action:</b> Remove the PCI/PCI-X 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 remains, call for service.</p>
00181000	<p>PCI error.</p> <p><b>Action:</b> Remove the PCI/PCI-X 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 remains, call for service.</p>
01295085	<p>The ECC checking hardware test failed.</p> <p><b>Action:</b> Call for service.</p>
0129800x	<p>No update data is available for microprocessor x.</p> <p><b>Action:</b> Update the system BIOS code to a level that supports the microprocessors that are installed in the server.</p>
0129810x	<p>The update data for microprocessor x is incorrect.</p> <p><b>Action:</b> Update the system BIOS code to a level that supports the microprocessors that are installed in the server.</p>
01298200	<p>Microprocessor speed mismatch</p> <p><b>Action:</b> The microprocessors that are installed do not run at the same speed; install microprocessors with identical speeds.</p>
I9990301	<p>A hard disk drive error occurred.</p> <p><b>Action:</b> If an amber hard disk drive status light is on, replace the drive. If no light is on, or if the problem remains after replacing the drive, call for service.</p>
I9990305	<p>POST could not find an operating system.</p> <p><b>Action:</b> 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><b>Action:</b> No action is required. This message appears each time ac power is restored to the server after an ac power loss.</p>

Table 12. POST error messages.

POST message	Description
Other Numbers	POST found an error. <b>Action:</b> Follow the instructions on the screen.

## ServerGuide problems

Look for the symptom in the left column of the chart. Probable solutions to the problem are in the right column.

Table 13. Setup and Installation CD.

Symptom	Suggested Action
Setup and Installation CD will not start.	<ul style="list-style-type: none"> <li>Ensure that the system is a supported server with a startable (bootable) CD-ROM drive.</li> <li>If the startup (boot) sequence settings have been altered, ensure that the CD-ROM drive is first in the startup sequence.</li> </ul>
ServeRAID program cannot view all installed drives, or cannot install the NOS.	<ul style="list-style-type: none"> <li>Ensure that there are no duplicate SCSI IDs or IRQ assignments.</li> <li>Ensure that the hard disk drive is connected properly.</li> </ul>
The operating system installation program continuously loops.	Make more space available on the hard disk drive.
ServerGuide will not start the NOS CD.	Ensure that the NOS CD you have is supported by the ServerGuide program. See the Setup and Installation CD label for a list of supported NOS versions.
Cannot install NOS - option is unavailable.	Ensure that the NOS is supported on the 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.

Table 14. System Updates and Applications CD.

Symptom	Suggested Action
Get "time out" or "Unknown host" errors	Ensure that you have access to the Internet through FTP directly.

## Error logs

The POST error log contains the three most recent error codes and messages that the system generated during POST. The System Event/Error log contains all the system error and warning messages that the system has generated.

You can view the contents of the POST error log from the Configuration/Setup Utility program. You can view the contents of the System Event/Error log from either the Configuration/Setup Utility program or from the diagnostic programs:

- Start the Configuration/Setup Utility program and select **Error Logs** from the main menu; then, select either **Post Error Log** or **System Event/Error Log**. See "Starting the Configuration/Setup Utility program" on page 14 for details.
- 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 111 for details.

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## Small computer system interface (SCSI) messages

If you receive a SCSI error message while 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. You must turn on all external SCSI devices *before* turning on 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 remains, run the diagnostic programs to obtain additional information about the failing device. If the error remains or recurs, call for service.

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## Diagnostic programs and error messages

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

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

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

## Starting the diagnostic programs

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 that 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 remains, 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 the server, you will not be able to navigate between test categories using the **Next Cat** and **Prev Cat** buttons. All other functions that are 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.
- f. 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 the help information and return to where you left off, press Esc.

If the diagnostic programs do not detect any hardware errors but the problem remains during typical server operations, a software error might be the cause. If you suspect a software problem, refer to the information that comes with the software package.

## Error code format

This section shows the format of 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:

<b>fff</b>	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.
<b>ttt</b>	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> .)
<b>iii</b>	is the three-digit device ID. (These codes are for trained service personnel and are described in the <i>Hardware Maintenance Manual</i> .)
<b>date</b>	is the date that the diagnostic test was run and the error recorded.
<b>cc</b>	is the check value that is used to verify the validity of the information.
<b>text message</b>	is the diagnostic message that indicates the reason for the problem.

## Text message format

This section shows the format of the diagnostic text messages that might appear in the detailed test log and summary log when running the diagnostic programs.

The diagnostic text message format is as follows:

Function Name: Result (test specific string)

where:

<b>Function Name</b>	The name of the function being tested when the error occurred. This corresponds to the function code (fff) shown in the previous list.
<b>Result</b>	This can be one of the following: <ul style="list-style-type: none"><li><b>Passed</b> This result occurs when the diagnostic test is completed without any errors.</li><li><b>Failed</b> This result occurs when the diagnostic test discovers an error.</li><li><b>User Aborted</b> This result occurs when you stop the diagnostic test before it is complete.</li><li><b>Not Applicable</b> This result occurs when you specify a diagnostic test for a device that is not present.</li><li><b>Aborted</b> This result occurs when the test could not proceed, for example, because of the system configuration.</li><li><b>Warning</b> This result occurs when a possible problem is reported during the diagnostic test, such as when a device that is to be tested is not installed.</li></ul>
<b>test specific string</b>	Additional information that you can use to analyze the problem.

## Viewing the test log

When the tests have been 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 Event/Error log

You can also view the System Event/Error log from the diagnostic programs. See the instructions at "Error logs" on page 110.

## 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. <b>Note:</b> 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"> <li>1. Turn off the server.</li> <li>2. Disconnect all USB devices from the server. Replace any USB keyboard and mouse with a standard keyboard and mouse.</li> <li>3. Turn on the server.</li> <li>4. Run the diagnostic test again.</li> </ol>
		Failed	USB interface failed	Call for service.
020	PCI/PCI-X interface	Failed	PCI/PCI-X slot latch mechanism is defective	Call for service.
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)	See the information provided with the adapter for instructions.  If the problem remains, call for service.
			SCSI controller on system board failed register/counter/power test	Call for service.



Code	Function	Result	Description	Action
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 remains, 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)	Run the ServeRAID Configuration utility.  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)	If the problem remains, call for service.
			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)	
			On system board; internal error	Run the ServeRAID Configuration utility.
			On system board; adapter/drive configuration error	If the problem remains, call for service.
			Logical drive on system board adapter	
			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 remains, 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 remains, 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 socket xyz or BIOS setup problem  (where xyz identifies the microprocessor that is causing the error message)	1. Check the System Error log for related error messages.  2. If the server does not have the most current level of BIOS code installed, update the BIOS code.
			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)  <b>Note:</b> The error light associated with the microprocessor may be lit.	1. Reseat the microprocessor.  2. If the problem remains, replace the microprocessor.  If the problem remains, call for service.
			Microprocessor in socket id xyz is defective  (where xyz identifies the microprocessor that is causing the error message)	Replace the microprocessor.  If the problem remains, call for service.
			Test setup error. Application microprocessor not installed or BIOS setup problem	1. Verify that the application microprocessor is installed and seated correctly.  2. If the server does not have the most current level of BIOS code installed, update the BIOS code.  3. If the problem remains, replace the application microprocessor and run the test again.  If the problem remains, call for service.
			VRM corresponding to Microprocessor in socket xyz is defective  (where xyz identifies the microprocessor whose VRM is causing the error message)	Replace the VRM.  If the problem remains, call for service.
			VRM corresponding to Microprocessor in socket id xyz is not installed  (where xyz identifies the microprocessor whose VRM is causing the error message)	Install a VRM.  If the problem remains, call for service.

Code	Function	Result	Description	Action
091	RXE expansion port	Failed	Ping rate failure	Verify that the cables are connected correctly and securely and try again.  If the problem remains, call for service.
			Receive threshold exceeded	
			Transmit threshold exceeded	
			Connection error	
165	Remote Supervisor Adapter	Failed	Remote Supervisor Adapter built-in system test (BIST) indicates failed tests.	Disconnect all server and option power cords from the server, wait 30 seconds, reconnect, and try again.  If problem remains, call for service.
			Unable to restart Remote Supervisor Adapter.	
			I <sup>2</sup> C Bus Error. See System Error log for details from both SERVPROC and DIAGS messages.	
			I <sup>2</sup> C Bus xyz defective or devices on this bus are functioning incorrectly.	
			Remote Supervisor Adapter is temporarily unreachable or not installed.	
166	System management	Failed	Remote Supervisor Adapter may be busy	1. Ensure that you have downloaded and installed the most current level of Remote Supervisor Adapter code, and try again.  2. Ensure that the Remote Supervisor Adapter is fully plugged in and that the internal cable is firmly connected between the adapter and the system board, then try again.  3. Disconnect all server and all option power cords from the server, wait 30 seconds, reconnect the cords, then try again.  If problem remains, call for service.
			ASM communication failed	
			I <sup>2</sup> C bus failure	
			I <sup>2</sup> C cable disconnected	
			Restart ASM error	
			System management failure	
			Remote Supervisor Adapter BIST failed	
			System management hardware on system board failed	
175	System thermal	Failed	Fan # <i>n</i>  (where <i>n</i> is the number of the failing fan)  <b>Note:</b> The fan LED on the diagnostic LED panel may be lit.	Replace the indicated fan.          If one of the fan LEDs on the diagnostic LED panel is on, remove top cover and replace fan whose LED is lit. If the problem remains, call for service.
			Temperature sensed on system board is out of range	

Code	Function	Result	Description	Action
180	Status display	Failed	Diagnostic LED panel	If an LED identifies a failed component, replace the component.  If problem remains, call for service.
			Operator information panel (also known as the front LED panel)	
			LED on hot-swap drive backplane	
			LED on memory board	
			LED on system board	Call for service
			LED on RXE operator panel	
			LED on RXE PCI-X backplane	
			LED on RXE backplane	Replace the fan.
			LED on fan	
			LED on RXE fan	
201	System memory	Aborted	Test setup error: Corrupt BIOS in ROM  Test setup error: Corrupt DMI BIOS, information in BIOS is not as expected	If the server does not have the most current level of BIOS code installed, update the BIOS code to the most current level.  If the problem remains, call for service.
		Failed	DIMM in location <i>n</i>  (where <i>n</i> is the number of the socket that contains the failing DIMM)	<ol style="list-style-type: none"> <li>1. Reseat the failing DIMM.</li> <li>2. If the problem remains, replace the DIMM.</li> <li>3. If the problem remains, call for service.</li> </ol>

Code	Function	Result	Description	Action
202	Microprocessor cache	Aborted	Test setup error: BIOS cannot access VPD information	<ol style="list-style-type: none"> <li>If the server does not have the most current level of BIOS code installed, update the BIOS code to the most current level</li> <li>Run the diagnostic program again.</li> <li>If the problem remains, replace the failing processor.</li> </ol> <p>If the problem remains, call for service.</p>
			Test setup error: Corrupt DMI BIOS. Information in BIOS is not as expected	
			Test setup error: No 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)	<ol style="list-style-type: none"> <li>Reseat the identified microprocessor.</li> <li>If the problem remains, replace the microprocessor.</li> </ol> <p>If the problem remains, call for service.</p>	
Failed	Microprocessor in socket ID xyz  (where xyz identifies the microprocessor that is causing the error message)  <b>Note:</b> The indicated microprocessor LED will be on.			
		Warning	Test setup error: Microprocessor cache is disabled. Use system setup to enable before retrying the test	Use the <b>Cache Control</b> choice from the Advanced Setup menu to enable the microprocessor cache.  If the problem remains, call for service.
206	Diskette drive	Failed	Internal diskette drive bay	Call for service.
215	CD-ROM	Aborted	The CD-ROM drive is not present	Verify that the cables are properly connected to the CD-ROM drive.  If the problem remains, call for service.
		Failed	On system board	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.
301	Keyboard	Failed	On system board keyboard test failed	<ol style="list-style-type: none"> <li>Verify that the keyboard cable is connected.</li> <li>If the problem remains, replace the keyboard cable.</li> </ol> <p>If the problem remains, call for service.</p>
302	Mouse	Failed	On system board pointing device test failed.	Replace the pointing device. If the problem remains, call for service.

Code	Function	Result	Description	Action
305	Video monitor	Not applicable	Any message	Refer to the information that comes with the monitor.
405	Ethernet	Failed	In PCI-X slot <i>n</i> (where <i>n</i> is the PCI-X slot number in which the failing Ethernet adapter is installed)	Replace the Ethernet adapter in slot <i>n</i> . If the problem remains, call for service.
			On system board	Call for service.
415	Analog/digital modem	Not applicable	No modem was detected	1. Verify that the modem is properly attached to the server. 2. If the problem remains, replace the modem.  If the problem remains, call for service.
			PCI modem detected but not enabled	1. Change the configuration to enable the modem. 2. If the problem remains, replace the modem.  If the problem remains, call for service.
		Failed	Modem reset failed	Replace the modem.  If the problem remains, call for service.
			No dial tone detected	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.  If the problem remains, call for service.

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## Recovering the 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 flash ROM page swap jumper (J56) and a BIOS flash diskette.

**Note:** Use one of the following methods to obtain a BIOS flash diskette:

- Use the ServerGuide program to make a BIOS flash diskette.
- Download a BIOS flash diskette from the World Wide Web at <http://www.ibm.com/pc/support>.
- Contact your IBM service representative.

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

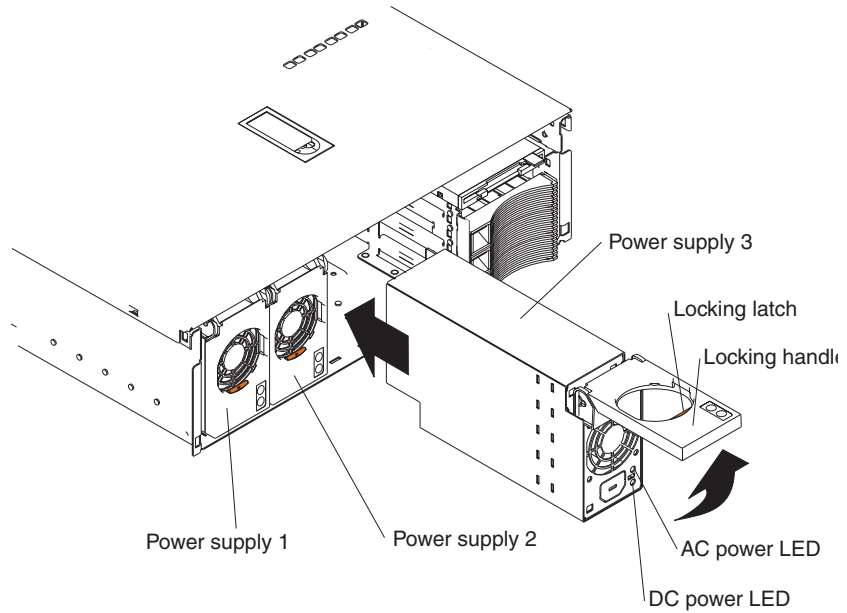
Complete the following steps to recover the BIOS code:

1. Turn off the server and peripheral devices and disconnect all power cords and external cables; then, remove the cover.
2. Locate jumper J56 (flash-ROM page swap) on the system board. See the illustrations of the system board jumper locations starting on page 62.
3. Move the jumper to pins 2 and 3 to enable BIOS recovery mode.
4. Reconnect all external cables and power cords and turn on the peripheral devices.
5. Insert the BIOS flash diskette into the diskette drive and restart the server. The system begins the power-on self-test (POST).
6. The Flash Update Utility program displays the Flash Update Menu. Select **1 - Update POST/BIOS**.
7. When prompted as to whether you want to move the current POST/BIOS image to the backup ROM location, press N.  
**Attention:** If you press Y, the damaged BIOS code will be copied into the secondary page.
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. **Attention:** Do *not* restart the server at this time.  
Remove the flash diskette from the diskette drive.
11. Turn off the server.
12. Move the jumper on J56 to pins 1 and 2 to return to normal startup mode.
13. Replace the cover and start the server.

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## Power supply LEDs

The ac and dc power LEDs on a power supply provide status information about the power supply. The following illustration shows the location of the ac and dc power LEDs.



The following table describes the ac and dc power LEDs on a power supply.

AC power LED	DC power LED	Description and action
On	On	The power supply is on and operating correctly.
On	Off	<p>Either the power-control button on the operator information panel has not been pressed, or there is a dc power problem.</p> <p>Possible causes:</p> <ol style="list-style-type: none"> <li>1. The server is not turned on (the power LED is blinking on the operator information panel). <b>Action:</b> Press the power-control button to start the server.</li> <li>2. The power supply has failed. <b>Action:</b> Replace the power supply.</li> </ol> <p>If the problem remains, call for service.</p>
Off	Off	<p>There is an ac power problem.</p> <p>Possible causes:</p> <ol style="list-style-type: none"> <li>1. There is no ac power to the power supply. <b>Actions:</b> Verify that: <ul style="list-style-type: none"> <li>• The electrical cord is properly connected to the server.</li> <li>• The electrical outlet functions properly.</li> </ul> </li> <li>2. The power supply has failed. <b>Action:</b> Replace the power supply.</li> </ol> <p>If the problem remains, call for service.</p>



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## Light Path Diagnostics

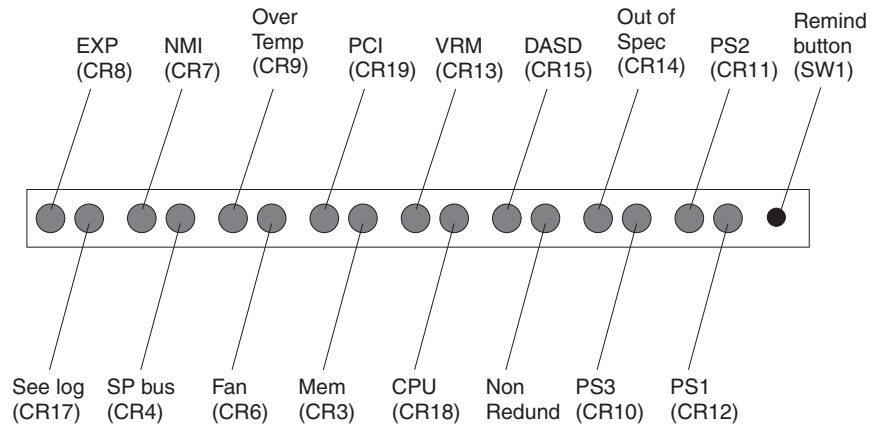
The Light Path Diagnostics LEDs help you to identify problems with server components. By following the light path, you can quickly identify and fix the type of problem that occurred. The light path begins with the LEDs on the operator information panel (also known as the front LED panel). If the server encounters a problem, it lights either the Information LED or the Fault LED.

To isolate the source of the trouble, examine the Level 2 Light Path Diagnostics LEDs through the special cutout on the server top cover (shown at “Level 2 diagnostic panel LEDs” on page 124). These LEDs can indicate a problem with a single component, or a problem with one of several similar components. In the latter case, to isolate the specific failing component, remove the server top cover and look for a lit LED on the system board or on a component.

For example, if the FAN LED is lit, the specific failing fan is indicated by an LED viewable with the top cover removed. If the MEM LED is lit, the specific failing DIMM is indicated by an LED on the memory board.

## Level 2 diagnostic panel LEDs

For the location of the Level 2 diagnostic panel LEDs, visible through a special cutout area on the top cover, see the illustration at “Removing the server top cover and bezel” on page 66. See “Level 2 Light Path Troubleshooting” on page 125 for information about using them to identify problems. The following illustration identifies the diagnostic panel LEDs.



The meanings of these LEDs are as follows:

<b>EXP</b>	Attached expansion I/O failure
<b>NMI</b>	Nonmaskable interrupt
<b>Over Temp</b>	System over temperature condition
<b>PCI</b>	PCI failure
<b>VRM</b>	VRM failure
<b>DASD</b>	Hard disk drive failure
<b>Out of Spec</b>	Power supplies being overdriven
<b>PS2</b>	Power supply number 2 failure
<b>Remind button</b>	Remind to invoke remind mode
<b>PS1</b>	Power supply number 1 failure
<b>PS3</b>	Power supply number 3 failure
<b>Non Redund</b>	Nonredundant power mode
<b>CPU</b>	Microprocessor failure
<b>MEM</b>	Memory failure
<b>FAN</b>	Fan failure
<b>SP Bus</b>	Remote Supervisor Adapter failure
<b>See Log</b>	See event log or Remote Supervisor Adapter log for non-optimal condition information

### Notes:

1. The server supports replaceable voltage regulator modules (VRMs).
2. The server supports a maximum of three power supplies.

### Remind button

You can use the Remind button to place the Fault light on the front panel into the remind mode (blinks every 2 seconds). By pressing the button, you acknowledge the

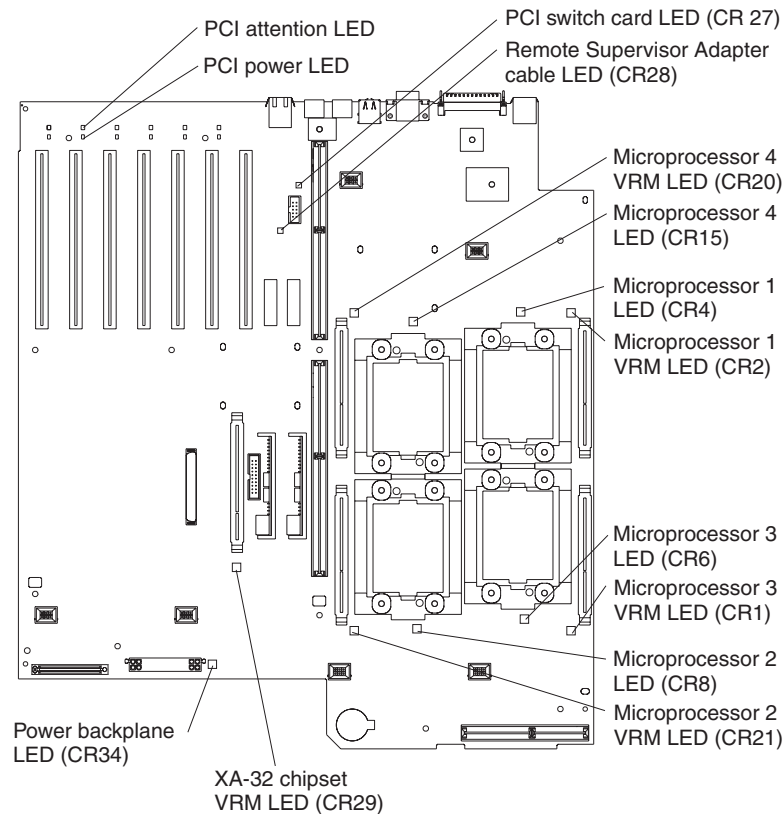
failure but indicate that you will not take immediate action. If a new failure occurs, the Fault light turns on again.

The Fault light stays in Remind mode until one of the following conditions occurs:

- All known problems are resolved
- The system is restarted
- A new problem occurs

You can use the Remind button to delay server maintenance until a later time. Also, resetting the Fault light enables it to indicate any subsequent errors. If the light is still blinking from the first error, cannot do this.

The Light Path Diagnostics feature might direct you to look for an LED on the system board that identifies the specific failing component. The following illustration identifies the LEDs on the system board.



## Level 2 Light Path Troubleshooting

Table 15 on page 126 provides detailed information about the action to take when the Level 2 Light Path Diagnostics indicate a problem. The Level 2 LEDs remain lit even if the server shuts down, provided that the power supplies are operating properly. This feature helps you to isolate the problem if an error causes the server to shut down.

If the Level 2 Light Path Diagnostics indicate a problem that does not require immediate action, you can press the Remind button on the diagnostic LED panel. This causes the LED on the operator information panel to blink, reminding you that you need to take action. The remind function enables normal operations to continue, possibly using redundant components, until reduced server activity allows you to

correct the problem. The LED for the component causing the problem stays lit until you make repairs.

Table 15. Light Path Diagnostics.

Fault LED on the operator information panel (also known as front LED panel)	Level 2 diagnostic panel LED on	Cause	Action
On A system error was detected. Check to see which of the LEDs on the diagnostic panel (viewable through the cutout on the top cover) are on.	None	The system error log is 75% or more full or a Predictive Failure Analysis (PFA) alert was logged.	Check the system error log and correct any problems. See "Choices available from the Configuration/Setup Utility main menu" on page 14 for information about clearing the error log. Disconnecting the server from all power sources for at least 30 seconds will turn off the Fault LED.
On	EXP	A device in the RXE-100 expansion enclosure has failed.	<ol style="list-style-type: none"> <li>1. If the Light Path diagnostics in the enclosure indicate a problem, replace the device.</li> <li>2. Check the server error log for indications of a failure in a device installed in the enclosure or in the enclosure itself. See the problem solving information in the enclosure documentation.</li> </ol> <p>If these steps do not identify the problem, call for service.</p>
On	See Log	A non-optimal condition has occurred.	See the event log or the service processor log for problem indications.
On	NMI	A nonmaskable interrupt occurred. A PCI LED will probably also be on.	<ol style="list-style-type: none"> <li>1. If a PCI LED is on, follow the instructions for that LED.</li> <li>2. If no PCI LED is on, restart the server.</li> </ol> <p>If the problem remains, call for service.</p>
On	SP Bus	The Remote Supervisor Adapter has failed.	Call for service.
On	Over Temp	The system temperature has exceeded the maximum rating.	<ol style="list-style-type: none"> <li>1. If a fan LED is on, replace the fan.</li> <li>2. Make sure the room temperature is not too high. (See "Features and specifications" on page 2.)</li> </ol> <p>If the problem remains, call for service.</p>
On	FAN	One of the fans has failed or is operating too slowly.  <b>Note:</b> A failing fan can also cause the TEMP and DASD LEDs to be on.	Remove the top cover. The LED on the failing fan will be lit. Replace the fan.

Table 15. Light Path Diagnostics.

Fault LED on the operator information panel (also known as front LED panel)	Level 2 diagnostic panel LED on	Cause	Action
On	PCI	An error occurred on a PCI/PCI-X adapter. The failing adapter is indicated by a lit LED.	<ol style="list-style-type: none"> <li>1. Remove the top cover, identify the PCI/PCI-X adapter with the lit LED, and replace the adapter.</li> <li>2. If this does not correct the problem, check the error log for additional information.</li> <li>3. If you cannot correct the problem from the information in the error log, try to determine the failing adapter by removing one adapter at a time and restarting the server after each adapter is removed.</li> </ol> <p>If the problem remains, call for service.</p>
On	MEM	A memory error occurred.	<ol style="list-style-type: none"> <li>1. Remove the top cover, remove the memory board, and check the DIMM error LEDs on the memory board.  <b>Note:</b> If the server had a DIMM failure, an LED on the memory board indicates the failing DIMM. If the LED is not visible with the memory board in its socket, you can remove the memory board and press the button on the board to light the failing DIMM's LED.</li> <li>2. Replace the DIMM indicated by the lit DIMM error LED.</li> </ol>
On	VRM	A voltage regulator module has failed.	<ol style="list-style-type: none"> <li>1. Remove the top cover, and check the VRM error LEDs.</li> <li>2. Replace the VRM indicated by the lit VRM error LED.</li> </ol>

Table 15. Light Path Diagnostics.

Fault LED on the operator information panel (also known as front LED panel)	Level 2 diagnostic panel LED on	Cause	Action
On	CPU	One of the microprocessors has failed, or a microprocessor is installed in the wrong connector.	<ol style="list-style-type: none"> <li>1. Open the top cover and check the microprocessor error LEDs on the system board. If a microprocessor error LED is on for a microprocessor connector that has a terminator card installed instead of a microprocessor, the microprocessors are not installed in the correct order. See "Installing a microprocessor" on page 79 for information about the correct order for installing microprocessors. Otherwise, continue with the next step.</li> <li>2. Turn off the server, reseal the microprocessor indicated by the lit microprocessor error LED, and restart the server.</li> <li>3. If the problem remains, replace the microprocessor.</li> </ol> <p>If the problem remains, call for service.</p>
On	DASD	A hot-swap hard disk drive has failed.	<ol style="list-style-type: none"> <li>1. If the amber hard disk drive status LED on one of the hot-swap hard disk drives is on, replace the drive.</li> <li>2. Check the error log for additional information. If the error log indicates a temperature problem and the fans are working correctly, check for air flow blockage.</li> </ol>
On	Non Redund	The server is operating in nonredundant power mode. Two or more power supplies are installed in the server, and either one power supply has failed or the server has reached a condition in which it is no longer operating in redundant mode.	If a power supply has failed, replace the failing power supply. If not, add a power supply to ensure redundancy.
On	Out of Spec	The server is drawing more power than the power supplies are rated for.	Either add a power supply or remove a device from the server.
On	PS3	The third power supply has failed.	Replace the third power supply.
On	PS2	The second power supply has failed.	Replace the second power supply.
On	PS1	The first power supply has failed.	Replace the first power supply.
Off	None	The Light Path Diagnostics feature has not detected a system error.	None

## Troubleshooting charts

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

If you cannot find the problem in the troubleshooting charts, go to “Starting the diagnostic programs” on page 111 to test the server. If you have run the diagnostic tests or if running the tests does not reveal the problem, call for service.

Look for the symptom in the left column of the chart. Instructions and probable solutions to the problem are in the right column. If you have just added new software or a new option and the 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 programs (see “Starting the diagnostic programs” on page 111) to determine if the server is running correctly. If the diagnostic programs have not identified the problem and the server still does not work, call for service.
3. If the server works correctly, reinstall the new software or new device and continue problem diagnosis using the troubleshooting charts.

Table 16. Troubleshooting charts.

Symptom	Suggested action
<b>General problems</b>	Call for service.
Problems such as broken cover locks or indicator lights not working.	
<b>Intermittent problems</b>	Verify that: <ol style="list-style-type: none"> <li>1. All cables and cords are connected securely to the rear of the server and attached options.</li> <li>2. When the server is turned on, air is flowing from the grill at the rear of the server. If there is no airflow, the fans are not working. This causes the server to overheat and shut down.</li> <li>3. The SCSI bus and devices are configured correctly and that the last external device in each SCSI chain is terminated correctly.</li> </ol> If the problem remains, call for service.
A problem occurs only occasionally and is difficult to diagnose.	
<b>CD-ROM drive problems</b>	Verify that: <ol style="list-style-type: none"> <li>1. The primary IDE channel is enabled in the Configuration/Setup Utility program.</li> <li>2. All cables and jumpers are installed correctly.</li> <li>3. The correct device driver is installed for the CD-ROM drive.</li> </ol> If the problem remains, call for service.
CD-ROM drive is not recognized.	
<b>Diskette drive problems</b>	If there is a diskette in the drive, verify that: <ol style="list-style-type: none"> <li>1. The diskette drive is enabled in the Configuration/Setup Utility program.</li> <li>2. The diskette is good, and not damaged. (Try another diskette if you have one.)</li> <li>3. The diskette contains the necessary files to start the server.</li> <li>4. The software program is working correctly.</li> </ol> If the diskette drive activity LED stays on, or the system continues to bypass the diskette drive, call for service.
Diskette drive activity light stays on, or the system bypasses the diskette drive.	

Table 16. Troubleshooting charts.

Symptom	Suggested action
<p><b>SCSI Expansion enclosure problems</b></p>	<p>Verify that:</p> <ol style="list-style-type: none"> <li>1. The cables for all external SCSI options are connected correctly.</li> <li>2. The last option in each SCSI chain, or the end of the SCSI cable, is terminated correctly.</li> <li>3. Any external SCSI option is turned on. You must turn on an external SCSI option before turning on the server.</li> </ol> <p>For more information, see the SCSI and expansion enclosure documentation. If the problem remains, call for service.</p>
<p>The SCSI expansion enclosure used to work but does not work now.</p>	
<p><b>RXE remote expansion enclosure problems</b></p>	<p>Verify that:</p> <ol style="list-style-type: none"> <li>1. The cables between the server and the enclosure are connected correctly.</li> <li>2. The enclosure is turned on.</li> </ol> <p>For more information, see the RXE-100 Remote Expansion Enclosure documentation and note whether any error LEDs on the enclosure are lit. If the problem remains, call for service.</p>
<p>The RXE remote expansion enclosure used to work but does not work now.</p>	
<p><b>Hard disk drive problems</b></p>	<ol style="list-style-type: none"> <li>1. Remove the first drive not recognized and try the hard disk drive diagnostic test again.</li> <li>2. If the remaining drives are recognized, replace the drive you removed with a new drive.</li> </ol> <p>If the problem remains, call for service.</p>
<p>Not all hard disk drives are recognized by the hard disk drive diagnostic (Fixed Disks) test.</p>	
<p>System stops responding during the hard disk drive diagnostic test.</p>	<ol style="list-style-type: none"> <li>1. Remove the hard disk drive that was being tested when the server stopped responding and try the hard disk drive diagnostic test again.</li> <li>2. If the hard disk drive diagnostic test runs successfully, replace the drive you removed with a new one.</li> </ol> <p>If the problem remains, call for service.</p>
<p><b>Keyboard, mouse, or pointing-device</b></p>	<ol style="list-style-type: none"> <li>1. Make sure that the keyboard cable is properly connected to the server.</li> <li>2. Make sure that the server and the monitor are turned on.</li> <li>3. Try using another keyboard.</li> </ol> <p>If the problem remains, call for service.</p>
<p>All or some keys on the keyboard do not work.</p>	
<p>The mouse or pointing device does not work.</p>	<ol style="list-style-type: none"> <li>1. Verify that the mouse or pointing-device cable is securely connected and the device drivers are installed correctly.</li> <li>2. Try using another mouse or pointing device.</li> </ol> <p>If the problem remains, call for service.</p>



Table 16. Troubleshooting charts.

Symptom	Suggested action
<p><b>Memory problems</b></p> <p>The amount of memory displayed is less than the amount of memory that is installed.</p>	<p>Verify that:</p> <ol style="list-style-type: none"> <li>1. The memory modules are seated properly.</li> <li>2. You have installed the correct type of memory.</li> <li>3. If you changed the memory, you updated the memory configuration with the Configuration/Setup Utility program.</li> <li>4. All banks of memory on the DIMMs are enabled. The server might have automatically disabled a DIMM bank if it detected a problem, or a DIMM bank might have been manually disabled.</li> </ol> <p>If these items are correct, run the memory diagnostic program. The server might have detected a bad memory module and automatically reallocated memory to enable the server to continue to operate. If the memory tests fail, call for service or replace the failing DIMM.</p> <p>Use the Configuration/Setup Utility program to view the POST error log. If POST error message 289 was issued:</p> <ul style="list-style-type: none"> <li>• If the DIMM was disabled by a system-management interrupt (SMI), replace the DIMM.</li> <li>• If the DIMM was disabled by the user or by POST: <ol style="list-style-type: none"> <li>1. Start the Configuration/Setup Utility program.</li> <li>2. Enable the DIMM.</li> <li>3. Save the configuration and restart the server.</li> </ol> </li> <li>• If you continue to get this error, replace the DIMM.</li> </ul> <p>If the problem remains, call for service.</p>
<p><b>Microprocessor problems</b></p> <p>The server emits a continuous tone during POST.</p>	<p>The startup (boot) microprocessor is not working properly.</p> <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>
<p><b>Monitor problems</b></p> <p>Testing the monitor.</p>	<p>Some IBM monitors have their own self-tests. If you suspect a problem with the monitor, refer to the information that comes with the monitor for adjusting and testing instructions.</p> <p>If you still cannot find the problem, call for service.</p>
<p>The screen is blank.</p>	<p>Verify that:</p> <ol style="list-style-type: none"> <li>1. The server power cords are plugged into the server and a working electrical outlet.</li> <li>2. The monitor cables are connected properly.</li> <li>3. The monitor is turned on and the Brightness and Contrast controls are adjusted correctly.</li> </ol> <p>If the screen remains blank, call for service.</p> <p><b>Important:</b> In some memory configurations, the 3-3-3 beep code might sound during POST followed by a blank display screen. If this occurs <i>and</i> the <b>Boot Fail Count</b> feature in the <b>Start Options</b> of the Configuration/Setup Utility is set to <b>Enabled</b> (its default setting), you must restart the server three times to force the system BIOS code to reset the memory connector or bank of connectors from <b>Disabled</b> to <b>Enabled</b>.</p>
<p>Only the cursor appears.</p>	<p>Call for service.</p>

Table 16. Troubleshooting charts.

Symptom	Suggested action
<p>The monitor works when you turn on the server, but goes blank when you start some application programs.</p>	<p>Verify that:</p> <ol style="list-style-type: none"> <li>1. The primary monitor cable is connected to the video port.</li> <li>2. You installed the necessary device drivers for the applications.</li> </ol> <p>If these items are correct and the screen remains blank, call for service.</p>
<p>Wavy, unreadable, rolling, distorted screen, or screen jitter.</p>	<p>If the monitor self-tests show the monitor is working correctly, consider the location of the monitor. Magnetic fields around other devices (such as transformers, appliances, fluorescent lights, and other monitors) can cause screen jitter or wavy, unreadable, rolling, or distorted screen images. If this happens, turn off the monitor. (Moving a color monitor while it is turned on might cause screen discoloration.) Then move the device and the monitor at least 305 mm (12 in.) apart. Turn on the monitor.</p> <p><b>Notes:</b></p> <ol style="list-style-type: none"> <li>1. To prevent diskette drive read/write errors, be sure that the distance between monitors and diskette drives is at least 76 mm (3 in.).</li> <li>2. Non-IBM monitor cables might cause unpredictable problems.</li> <li>3. An enhanced monitor cable with additional shielding is available for the IBM model 9521 and 9527 monitors. For information about the enhanced monitor cable, see your IBM reseller or IBM marketing representative.</li> </ol> <p>If the problem remains, call for service.</p>
<p>Wrong characters appear on the screen.</p>	<p>If the wrong language is displayed, update the BIOS code with the correct language.</p> <p>If the problem remains, call for service.</p>
<p><b>Option problems</b></p>	<p>Verify that:</p>
<p>An IBM option that you just installed does not work.</p>	<ol style="list-style-type: none"> <li>1. The server supports the option. Refer to the "Server Support" flowchart for information about obtaining ServerProven compatibility information from the World Wide Web.</li> <li>2. You followed the installation instructions that come with the option.</li> <li>3. The option is installed correctly.</li> <li>4. You have not loosened any other installed options or cables.</li> <li>5. You updated the configuration information using the Configuration/Setup Utility program. Whenever memory or an option is changed, you must update the configuration.</li> </ol> <p>If the problem remains, call for service.</p>
<p>An IBM option that used to work does not work now.</p>	<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"> <li>1. The cables for all external SCSI options are connected correctly.</li> <li>2. The last option in each SCSI chain, or the end of the SCSI cable, is terminated correctly.</li> <li>3. Any external SCSI option is turned on. You must turn on an external SCSI option before turning on the server.</li> </ol> <p>If the problem remains, call for service.</p>

Table 16. Troubleshooting charts.

Symptom	Suggested action
<b>Power problems</b>	Verify that:
The server does not power on.	<ol style="list-style-type: none"> <li>1. The power cables are properly connected to the server.</li> <li>2. The electrical outlet functions properly.</li> <li>3. The type of installed memory is correct.</li> <li>4. If you just installed an option, remove it, and restart the server. If the server now powers on, you might have installed more options than the power supply supports.</li> <li>5. The LEDs on the power supply are on.</li> <li>6. The microprocessors are installed in the correct sequence.</li> </ol> <p>If the problem remains, call for service.</p>
The server does not power off.	<p>Verify that 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"> <li>1. Press Ctrl+Alt+Delete.</li> <li>2. Turn off the system by pressing the power-control button.</li> </ol> <p>If the problem remains or if you are using an ACPI-aware operating system, call for service.</p>
<b>Printer problems</b>	Verify that:
The printer does not work.	<ol style="list-style-type: none"> <li>1. The printer is turned on and is online.</li> <li>2. The printer signal cable is connected to the correct port on the server.</li> <li>3. You have installed the most current printer drivers.</li> </ol> <p>If the printer still does not work, run the tests described in the documentation that comes with the printer. If the tests show that the printer is working correctly, call for service.</p>
<b>Software problems</b>	To determine if problems are caused by the software, verify that:
Suspected software problem.	<ol style="list-style-type: none"> <li>1. The server has the minimum memory requirements to use the software. For memory requirements, see the information that comes with the software. <b>Note:</b> If you have just installed an adapter or memory, you might have a memory address conflict.</li> <li>2. The software is designed to operate on the server.</li> <li>3. Other software works on the server.</li> <li>4. The software that you are using works on another system.</li> </ol> <p>If you received any error messages when using the software program, see the information that comes with the software for a description of the messages and solutions to the problem.</p> <p>If the problem remains, contact your place of purchase.</p>
<b>Universal Serial Bus (USB) port problems</b>	Verify that:
A USB device does not work.	<ol style="list-style-type: none"> <li>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. <b>Note:</b> If a standard (non-USB) keyboard is attached to the keyboard port, the USB is disabled and no USB device will work during POST.</li> <li>2. The correct USB device driver is installed.</li> <li>3. The operating system supports USB devices.</li> </ol> <p>If the problem remains, call for service.</p>

# Troubleshooting the Ethernet controller

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

## Network connection problems

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

- Make sure that the cable is installed correctly.

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

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

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

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

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

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

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

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

- Check the LAN activity light (if available) on the rear of the server. The LAN activity light is illuminated when data is active on the Ethernet network. If the LAN activity light is off, make sure that the hub and network are operating and that the correct device drivers are loaded.
- Make sure that you are using the correct device drivers, which are supplied with the server.
- Check for operating-system-specific causes for the problem.
- Make sure that the device drivers on the client and server are using the same protocol.
- Test the Ethernet controller.

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

## Ethernet controller troubleshooting chart

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

Table 17. Ethernet troubleshooting chart.

Ethernet controller problems	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"> <li>• Determine if the IRQ setting assigned to the Ethernet controller is also assigned to another device in the Configuration/Setup Utility program.</li> </ul> <p>Although interrupt sharing is allowed for PCI/PCI-X devices, some devices do not function well when they share an interrupt with a dissimilar PCI/PCI-X device. Try changing the IRQ assigned to the Ethernet controller or the other device.</p> <ul style="list-style-type: none"> <li>• Make sure that you are using the most recent device driver available from the World Wide Web.</li> <li>• Run the network diagnostic program.</li> </ul> <p>If the problem remains, call for service.</p>
The Ethernet Link Status light does not illuminate.	<p>Check the following:</p> <ul style="list-style-type: none"> <li>• Make sure that the hub is turned on.</li> <li>• Check all connections at the Ethernet controller and the hub.</li> <li>• Check the cable. A crossover cable is required unless the hub has an X designation.</li> <li>• Use another port on the hub.</li> <li>• If the hub does not support auto-negotiation, manually configure the Ethernet controller to match the hub.</li> <li>• If you manually configured the duplex mode, make sure that you also manually configure the speed.</li> <li>• Run diagnostics on the LEDs.</li> </ul> <p>If the problem remains, call for service.</p>
The Ethernet Transmit/Receive Activity light does not illuminate.	<p>Check the following:</p> <ul style="list-style-type: none"> <li>• Make sure that you have loaded the network device drivers.</li> <li>• The network might be idle. Try sending data from this workstation.</li> <li>• Run diagnostics on the LEDs.</li> </ul>
Data is incorrect or sporadic.	<p>Check the following:</p> <ul style="list-style-type: none"> <li>• Make sure that you are using Category 5 cabling when operating the system at 100 Mbps.</li> <li>• Make sure that the cables are not routed close to noise-inducing sources like fluorescent lights.</li> </ul>
The Ethernet controller stopped working when another adapter was added to the system.	<p>Check the following:</p> <ul style="list-style-type: none"> <li>• Make sure that the cable is connected to the Ethernet controller.</li> <li>• Make sure that the PCI-X system BIOS code is current.</li> <li>• Reseat the adapter.</li> <li>• Determine if the IRQ setting assigned to the Ethernet adapter is also assigned to another device in the Configuration/Setup Utility program.</li> </ul> <p>Although interrupt sharing is allowed for PCI/PCI-X devices, some devices do not function well when they share an interrupt with a dissimilar PCI/PCI-X device. Try changing the IRQ assigned to the Ethernet adapter or the other device.</p> <p>If the problem remains, call for service.</p>

Table 17. Ethernet troubleshooting chart.

Ethernet controller problems	Suggested action
The Ethernet controller stopped working without apparent cause.	<p>Check the following:</p> <ul style="list-style-type: none"> <li>• Run diagnostics for the Ethernet controller.</li> <li>• Try a different connector on the hub.</li> <li>• Reinstall the device drivers. Refer to the operating system documentation and to the ServerGuide information.</li> </ul> <p>If the problem remains, call for service.</p>

## Ethernet controller messages

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

- Novell NetWare or IntraNetWare system open data-link interface (ODI)
- Network driver interface specification (NDIS) adapter for Windows NT or Windows 2000

### Novell NetWare or IntraNetWare system ODI driver messages

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

Table 18. NetWare or IntraNetWare system ODI driver teaming messages for the Ethernet controller.

Message	Description
Couldn't allocate resources.	<p><b>Explanation:</b> An unknown error has occurred when trying to allocate needed resources for the AFT Module.</p> <p><b>Action:</b></p> <ul style="list-style-type: none"> <li>• Check the system configuration. If the problem remains, contact the network supplier.</li> <li>• Verify that the Ethernet controller is enabled. If the Ethernet controller is enabled, run the diagnostic programs.</li> </ul>
AFT group for primary adapter in slot <i>nnn</i> already exists.	<p><b>Explanation:</b> An attempt was made to rebind an adapter already in an AFT group.</p> <p><b>Action:</b> Check the AFT slot numbers for existing AFT teams. If the problem remains, contact the network supplier.</p>
Error locating device control table (DCT) addresses in internal table. Make sure that you have loaded LAN drivers after loading AFT.NLM.	<p><b>Explanation:</b> The bind command was entered prior to loading the device driver. The device driver must be loaded after loading AFT.NLM, but before any bind command can be issued.</p> <p><b>Action:</b> Load the driver for the supported adapter and try loading the AFT module again. If the problem remains, contact the network supplier.</p>
Insufficient number of arguments specified.	<p><b>Explanation:</b> The appropriate or expected number of parameters was not entered in a command.</p> <p><b>Action:</b> Check the parameters required for the given command. If the problem remains, contact the network supplier.</p>

Table 18. NetWare or IntraNetWare system ODI driver teaming messages for the Ethernet controller.

Message	Description
Duplicate slot numbers detected.	<p><b>Explanation:</b> An attempt has been made to bind the same slot number more than once.</p> <p><b>Action:</b> Check the slot numbers entered during the bind. Adapter slot numbers must be valid and unique. If the problem remains, contact the network supplier.</p>
'xxx' is not supported for AFT team.	<p><b>Explanation:</b> A bind command has been issued for adapters not supported by AFT.NLM.</p> <p><b>Action:</b> Make sure that you attempt to bind only adapters supported by AFT.NLM.</p>
Primary and Secondary adapters do not match. AFT group is not created.	<p><b>Explanation:</b> A bind command was entered for an adapter team that is a combination of system and client adapters. An AFT team must be a grouping of the same classification of adapter.</p> <p><b>Action:</b> Verify that all the adapters bound in a team are of the same classification.</p>
Requested number of Secondary cards are not found.	<p><b>Explanation:</b> The number of adapters specified in the bind command could not be located.</p> <p><b>Action:</b> Verify the numbers and slot locations of the adapters to be bound. If the problem remains, contact the network supplier.</p>
Failed to create AFT group. Make sure that the drivers for supported adapters are loaded, primary adapter is bound to protocols, and secondary adapter is not bound to any protocols.	<p><b>Explanation:</b> Binding of protocol failed. Protocol is either not bound to any adapter or is bound to more than one adapter in the group.</p> <p><b>Action:</b> Ensure that the protocol is bound to only one adapter in an AFT team.</p>
Error identifying slot numbers for the specified board names.	<p><b>Explanation:</b> The mapping between the board name entered and the slot number for an adapter could not be established.</p> <p><b>Action:</b> Check the board name for the adapter before issuing the bind command. If the problem remains, contact the network supplier.</p>
Can't unbind specified slot from AFT group. Make sure that the slot you specified is for the primary adapter in an AFT group.	<p><b>Explanation:</b> The number entered in the unbind command was not the primary adapter in an AFT group.</p> <p><b>Action:</b> Reissue the unbind command and specify the slot number for the primary adapter.</p>
LAN adapter at slot <i>nnnn</i> (Port <i>0xaa</i> ) failed to reset. Check the state of the adapter.	<p><b>Explanation:</b> The adapter that you specified could not be initialized.</p> <p><b>Action:</b></p> <ol style="list-style-type: none"> <li>1. Load the driver for the supported adapter.</li> <li>2. Check that the adapter is seated properly in the slot and try loading the AFT module again.</li> </ol> <p>If the problem remains, contact the network supplier.</p>
AFT is not supported on this version of NetWare.	<p><b>Explanation:</b> The NetWare on the server is not a version supported by AFT.</p> <p><b>Action:</b> Load and bind AFT only on supported versions of NetWare (currently version 5.1 and above).</p>
Failed to allocate resources tags.	<p><b>Explanation:</b> An unknown error has occurred when trying to allocate needed resources for the AFT module.</p> <p><b>Action:</b> Check system configuration. If the problem remains, contact the network supplier.</p>

Table 18. NetWare or IntraNetWare system ODI driver teaming messages for the Ethernet controller.

Message	Description
Please unload all LAN drivers before unloading AFT.NLM.	<p><b>Explanation:</b> An attempt was made to unload the AFT.NLM module before unloading the adapter driver.</p> <p><b>Action:</b> Unload the adapter driver before unloading the AFT module.</p>

## NDIS (Windows 2000 or Windows NT) driver messages

This section contains the error messages for the network driver interface specification (NDIS) drivers. The explanation and recommended action are included with each message.

Table 19. NDIS (Windows 2000 or Windows NT) driver messages for the Ethernet controller.

Error code (hex)	Description
0x00	<p><b>Explanation:</b> The driver could not register the specified interrupt.</p> <p><b>Action:</b> Using the Configuration/Setup Utility program, make sure that a PCI interrupt is assigned to the Ethernet card, and that Ethernet is enabled.</p>
0x01	<p><b>Explanation:</b> One of the PCI/PCI-X cards did not get the required resources.</p> <p><b>Action:</b> Using the Configuration/Setup Utility program, make sure that a PCI interrupt is assigned to the Ethernet card, and that Ethernet is enabled.</p>
0x02	<p><b>Explanation:</b> Bad node address (multicast address).</p> <p><b>Action:</b> Make sure the locally administered address is valid, if one is specified. The address cannot be a multicast address.</p>
0x03	<p><b>Explanation:</b> Failed self-test.</p> <p><b>Action:</b> Make sure a cable is attached to the Ethernet connector. If the problem remains, call for service.</p>
0x0D	<p><b>Explanation:</b> Could not allocate enough memory for transmit queues.</p> <p>For Windows NT:</p> <p><b>Action:</b></p> <ol style="list-style-type: none"> <li>1. From the Windows NT desktop, click <b>Start</b> → <b>Control Panel</b> → <b>Networks</b> → <b>Adapters</b>.</li> <li>2. Select an IBM Ethernet adapter from the list.</li> <li>3. Click <b>Properties</b> → <b>Advanced</b>.</li> <li>4. Lower the resource values that apply to the transmit queue.</li> </ol> <p>For Windows 2000:</p> <p><b>Action:</b></p> <ol style="list-style-type: none"> <li>1. From the Windows 2000 desktop, click <b>Start</b> → <b>Settings</b> → <b>Control Panel</b> → <b>Network and Dial-up Connections</b>.</li> <li>2. Right-click an IBM Ethernet adapter in the list and click <b>Properties</b>.</li> <li>3. Select a component and click <b>Configure</b>.</li> <li>4. Click the <b>Advanced</b> tab and lower the resource values that apply to the transmit queue.</li> </ol>



Table 19. NDIS (Windows 2000 or Windows NT) driver messages for the Ethernet controller.

Error code (hex)	Description
0x0E	<p><b>Explanation:</b> Could not allocate enough memory for receive queue.</p> <p>For Windows NT:</p> <p><b>Action:</b></p> <ol style="list-style-type: none"> <li>1. From the Windows NT desktop, click <b>Start</b> → <b>Control Panel</b> → <b>Networks</b> → <b>Adapters</b>.</li> <li>2. Select an IBM Ethernet adapter from the list.</li> <li>3. Click <b>Properties</b> → <b>Advanced</b>.</li> <li>4. Lower the value for the resource named in the message.</li> </ol> <p>For Windows 2000:</p> <p><b>Action:</b></p> <ol style="list-style-type: none"> <li>1. From the Windows 2000 desktop, click <b>Start</b> → <b>Settings</b> → <b>Control Panel</b> → <b>Network and Dial-up Connections</b>.</li> <li>2. Right-click an IBM Ethernet adapter in the list and click <b>Properties</b>.</li> <li>3. Select a component and click <b>Configure</b>.</li> <li>4. Click the <b>Advanced</b> tab and lower the value for the resource named in the message.</li> </ol>
0x0F	<p><b>Explanation:</b> Could not allocate enough memory for other structures.</p> <p>For Windows NT:</p> <p><b>Action:</b></p> <ol style="list-style-type: none"> <li>1. From the Windows NT desktop, click <b>Start</b> → <b>Control Panel</b> → <b>Networks</b> → <b>Adapters</b>.</li> <li>2. Select an IBM Ethernet adapter from the list.</li> <li>3. Click <b>Properties</b> → <b>Advanced</b>.</li> <li>4. Lower the resource values that apply to the transmit queue.</li> </ol> <p>For Windows 2000:</p> <p><b>Action:</b></p> <ol style="list-style-type: none"> <li>1. From the Windows 2000 desktop, click <b>Start</b> → <b>Settings</b> → <b>Control Panel</b> → <b>Network and Dial-up Connections</b>.</li> <li>2. Right-click an IBM Ethernet adapter in the list and click <b>Properties</b>.</li> <li>3. Select a component and click <b>Configure</b>.</li> <li>4. Click the <b>Advanced</b> tab and lower the resource values that apply to the transmit queue.</li> </ol>
0x10	<p><b>Explanation:</b> Did not find any Ethernet controllers.</p> <p><b>Action:</b> Using the Configuration/Setup Utility program, make sure that Ethernet is enabled.</p>
0x11	<p><b>Explanation:</b> Multiple Ethernet controllers found, but none matched the required ID.</p> <p><b>Action:</b> Using the Configuration/Setup Utility program, make sure that Ethernet is enabled.</p>
0x13	<p><b>Explanation:</b> Did not find any Ethernet controllers that matched the required subven/subdev.</p> <p><b>Action:</b> Using the Configuration/Setup Utility program, make sure that Ethernet is enabled.</p>
0x16	<p><b>Explanation:</b> Single adapter found, but multiple instances tried to load.</p> <p><b>Action:</b> Using the Configuration/Setup Utility program, make sure that Ethernet is enabled, and that the integrated 10/100 Ethernet controller or the optional Ethernet PCI adapter are enabled.</p>
0x17	<p><b>Explanation:</b> Slot parameter not specified in the registry.</p> <p><b>Action:</b> Remove the adapter driver and reinstall it. If the problem remains, call for service.</p>

Table 19. NDIS (Windows 2000 or Windows NT) driver messages for the Ethernet controller.

Error code (hex)	Description
All other 4-character hexadecimal codes	<b>Action:</b> Call for service.

## Ethernet Windows NDIS teaming messages

This section displays the messages associated with Ethernet teaming.

Table 20. NDIS Windows driver teaming messages for the Ethernet controller.

Event ID	Type	Description
01	Error	<b>Explanation:</b> Team name and physical adapter name are the same. This is an invalid configuration. <b>Action:</b> Reconfigure the adapter team by double-clicking the <b>PROSet</b> icon in the Control Panel.
02	Error	<b>Explanation:</b> Unable to allocate required resources. <b>Action:</b> Free some memory resources and restart.
03	Error	<b>Explanation:</b> Unable to read required registry parameters. <b>Action:</b> Reconfigure the adapter team by double-clicking the <b>PROSet</b> icon in the Control Panel.
04	Error	<b>Explanation:</b> Unable to bind to physical adapter. <b>Action:</b> Reconfigure the adapter team by double-clicking the <b>PROSet</b> icon in the Control Panel.
05	Error	<b>Explanation:</b> Unable to initialize an adapter team <b>Action:</b> Reconfigure the adapter team by double-clicking the <b>PROSet</b> icon in the Control Panel.
06	Informational	<b>Explanation:</b> Team <i>nn</i> . Primary adapter is initialized. <b>Action:</b> None.
07	Informational	<b>Explanation:</b> Team <i>nn</i> . Secondary adapter is initialized. <b>Action:</b> None.
08	Informational	<b>Explanation:</b> Team <i>nn</i> . Virtual adapter or Team is initialized. <b>Action:</b> None.
09	Informational	<b>Explanation:</b> Team <i>nn</i> . Primary adapter is switching over. <b>Action:</b> None.
10	Warning	<b>Explanation:</b> Team <i>nn</i> . Adapter link down. <b>Action:</b> Make sure the adapter is functioning properly.
11	Informational	<b>Explanation:</b> Team <i>nn</i> . Secondary adapter took over. <b>Action:</b> None.
12	Warning	<b>Explanation:</b> Team <i>nn</i> . Secondary adapter is deactivated from the Team. <b>Action:</b> Make sure the secondary adapter is functioning properly and that the adapter cable is securely connected to the LAN.
13	Informational	<b>Explanation:</b> Team <i>nn</i> . Secondary adapter has rejoined the Team. <b>Action:</b> None.
14	Informational	<b>Explanation:</b> Team <i>nn</i> . Secondary adapter link is up. <b>Action:</b> None.

Table 20. NDIS Windows driver teaming messages for the Ethernet controller.

Event ID	Type	Description
15	Error	<b>Explanation:</b> Team <i>nn</i> . The last adapter has lost its link. Network connection has been lost. <b>Action:</b> Shut down the server and replace the adapters; then, restart the server to reestablish the connection.
16	Informational	<b>Explanation:</b> Team <i>nn</i> . An adapter has reestablished the link. Network connection has been restored. <b>Action:</b> None.
17	Informational	<b>Explanation:</b> Team <i>nn</i> . Preferred primary adapter has been detected. <b>Action:</b> None.
18	Informational	<b>Explanation:</b> Team <i>nn</i> . Preferred secondary adapter has been detected. <b>Action:</b> None.
19	Informational	<b>Explanation:</b> Team <i>nn</i> . Preferred primary adapter took over. <b>Action:</b> None.
20	Informational	<b>Explanation:</b> Team <i>nn</i> . Preferred secondary adapter took over. <b>Action:</b> None.
21	Warning	<b>Explanation:</b> Team <i>nn</i> . Primary adapter does not sense any probes. Possible reason: partitioned Team. <b>Action:</b> Make sure the cables of the adapter team are connected to the same LAN segment. Reconfigure the team if necessary.

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## Replacing the battery

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

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

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

## Statement 2

### CAUTION:



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

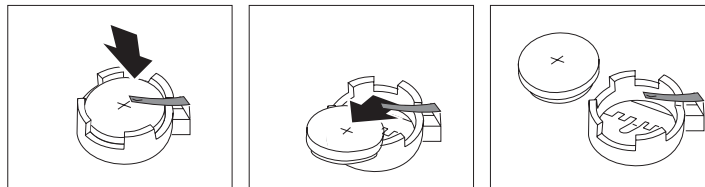
#### Do not:

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

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

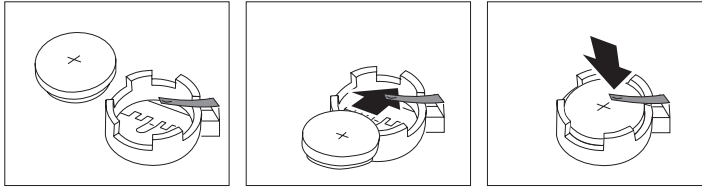
To replace the battery:

1. Read the information in “Before you begin” on page 51 and follow any special handling and installation instructions supplied with the replacement battery.
2. Turn off the server and all attached devices, and disconnect all power cords and external cables (see “Safety” on page vii).
3. Remove the top cover as described at “Removing the server top cover and bezel” on page 66.
4. Using the illustration at “System board component locations” on page 59 as a reference, locate the battery on the system board.
5. Remove the battery, as shown in the following illustration:
  - a. Use one finger to press down slightly on one side of the battery. The other side of the battery will tilt up out of the socket.
  - b. Use your thumb and index finger to pull the battery out from under the battery clip.
  - c. To ensure that the battery clip will hold the replacement battery securely, press gently on the clip so that it touches the base of the battery socket momentarily.



6. Insert the new battery, as shown in the following illustration:
  - a. Tilt the battery so that you can insert it into the front of the socket, under the battery clip.

- b. As you slide it under the battery clip, press the battery down into the socket.



7. Reinstall the top cover as described at “Installing the server top cover and bezel” on page 86.
8. Reconnect the external cables and power cords; then, turn on the peripheral devices and the server.  
**Note:** You must wait approximately 30 seconds after you plug the power cord of the server into an electrical outlet before the power-control button becomes active.
9. Start the Configuration/Setup Utility program and set configuration parameters.
  - Set the system date and time.
  - Set the power-on password.
  - Reconfigure the server.

Refer to “Using the Configuration/Setup Utility program” on page 14.

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## Getting information, help, and service

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

### Getting information

Information about your IBM server product and preinstalled software, if any, is available in the documentation that comes with your server. That documentation includes printed books, online books, README files, and help files. In addition, information about IBM products is available on the World Wide Web and through the IBM Automated Fax System.

#### Using the World Wide Web

On the World Wide Web, the IBM Web site has up-to-date information about IBM products and support. The address for the IBM Personal Computing home page is <http://www.ibm.com/pc/>.

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

If you click **Profile** from the 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 e-mail notifications whenever new information becomes available about your registered products.

You also can order publications through the IBM Publications Ordering System at <http://www.elink.ibm.com/public/applications/publications/cgi-bin/pbi.cgi>.

### **Getting information by fax**

If you have a touch-tone telephone and access to a fax machine, in the U.S. and Canada, you can receive, by fax, marketing and technical information on many topics, including hardware, operating systems, and local area networks (LANs).

You can call the IBM Automated Fax System 24 hours a day, 7 days a week. Follow the recorded instructions, and the requested information will be sent to your fax machine. In the U.S. and Canada, to access the IBM Automated Fax System, call 1-800-426-3395.

## **Getting help and service**

If you have a problem with your server product, you will find a wide variety of sources available to help you.

### **Using the documentation and diagnostic programs**

Many problems can be solved without outside assistance. If you experience a problem with your server product, the first place to start is the troubleshooting information in your IBM documentation. If you suspect a software problem, see the documentation, including README files and online help, that comes with the operating system or application program.

Most IBM server products come with a set of diagnostic programs that you can use to help you identify hardware problems. See the troubleshooting information in your IBM documentation for instructions on 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 most current technical information and download device drivers and updates. To access these pages, go to <http://www.ibm.com/pc/support/> and follow the instructions.

### **Calling for service**

If you have tried to correct the problem yourself and still need help, during the warranty period, you can get help and information by telephone through the IBM HelpCenter®. The following services are available during the warranty period:

- **Problem determination** - Trained personnel are available to assist you with determining if you have a hardware problem and deciding what action is necessary to fix the problem.
- **IBM hardware repair** - If the problem is determined to be caused by IBM hardware under warranty, trained service personnel are available to provide the applicable level of service.
- **Engineering Change management** - Occasionally, there might be changes that are required after a product has been sold. IBM or your reseller, if authorized by IBM, will make selected Engineering Changes (ECs) available that apply to your hardware.

The following items are not covered:

- Replacement or use of non-IBM parts or nonwarranted IBM parts. All warranted parts contain a 7-character identification in the format IBM FRU XXXXXXX.
- Identification of software problem sources.
- Configuration of BIOS as part of an installation or upgrade.
- Changes, modifications, or upgrades to device drivers.

- Installation and maintenance of network operating systems (NOS).
- Installation and maintenance of application programs.

Refer to your IBM Statement of Limited Warranty for a full explanation of IBM warranty terms. Be sure to retain your proof of purchase to obtain warranty service.

In the U.S. and Canada, these services are available 24 hours a day, 7 days a week. In the U.K., these services are available Monday through Friday, from 9:00 a.m. to 6:00 p.m.

**Note:** Response times vary; may exclude some holidays.

In addition, you are eligible for IBM Start Up Support for 90 days after installation. This service provides assistance for:

- Setting up your network operating system
- Installing and configuring interface adapters
- Installing and configuring network adapters

Please have the following information ready when you call:

- Machine type and model
- Serial numbers of your IBM hardware products
- Description of the problem
- Exact wording of any error messages
- Hardware and software configuration information

## Telephone numbers

Phone numbers are subject to change without notice. For the most up-to-date phone numbers, go to <http://www.ibm.com/pc/support/> and click **Support Phone List**.

Country		Telephone number
Austria	Österreich	01-24 592 5901
Belgium - Dutch	Belgie	02-210 9820
Belgium - French	Belgique	02-210 9800
Canada	Toronto only	416-383-3344
Canada	Canada - all other	1-800-565-3344
Denmark	Danmark	45 20 82 00
Finland	Suomi	09-22 931 840
France	France	02 38 55 74 50
Germany	Deutschland	07032-1549 201
Ireland	Ireland	01-815 9202
Italy	Italia	02-7031 6101
Luxembourg	Luxembourg	298-977 5063
Netherlands	Nederland	020-514 5770
Norway	Norge	23 05 32 40
Portugal	Portugal	21-791 51 47
Spain	España	91-662 49 16
Sweden	Sverige	08-477 4420
Switzerland	Schweiz/Suisse/Svizzera	058-333 0900



Country		Telephone number
United Kingdom	United Kingdom	01475-555 055
U.S.A. and Puerto Rico	U.S.A. and Puerto Rico	1-800-772-2227

In all other countries or regions, contact your IBM reseller or IBM marketing representative.

## International Warranty Service

If you travel with your server product or relocate it to a country where your server machine type is sold and serviced by IBM or by IBM resellers who are authorized to perform warranty service, International Warranty Service is available for your server product.

Service methods and procedures vary by country, and some services might not be available in all countries. International Warranty Service is delivered through the method of service (such as depot, carry-in, or on-site service) that is provided in the servicing country. Service centers in certain countries might not be able to service all models of a particular machine type. In some countries, fees and restrictions might apply at the time of service.

To determine whether your server product is eligible for International Warranty Service and to view a list of the countries where service is available, go to <http://www.ibm.com/pc/support/>, and click **Warranty Lookup**. Eligible IBM server products are identified by their four-digit machine types. For more information about International Warranty Service, see Service Announcement 601-034 at <http://www.ibm.com/>. Click **Support & downloads**, click **Announcement letters**, and click **Announcements search**. In the **Search by letter number only** field, type 601-034, and click **Search**.

## Purchasing additional services

During and after the warranty period, you can purchase additional services, such as support for IBM and non-IBM hardware, operating systems, and application programs; network setup and configuration; upgraded or extended hardware repair services; and custom installations. Service availability and service name might vary by country or region.

For more information about these services, contact your IBM marketing representative.



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## Appendix A. Warranty information

This appendix contains the warranty period for your product, information about obtaining warranty service and support, and the IBM Statement of Limited Warranty.

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### Warranty period

Contact your place of purchase for warranty service information. Some IBM Machines are eligible for on-site warranty service depending on the country or region where service is performed.

<b>Machine</b> - IBM @server xSeries 360 Type 8686
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<b>Warranty period</b> - Three years
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### Warranty service and support

With the original purchase of an IBM server product, you have access to extensive support. During the IBM Machine warranty period, you may call IBM or your reseller for problem-determination assistance under the terms of the IBM Statement of Limited Warranty.

The following services are available during the warranty period:

- **Problem determination** - Trained personnel are available to assist you with determining if you have a hardware problem and deciding what action is necessary to fix the problem.
- **IBM hardware repair** - If the problem is determined to be caused by IBM hardware under warranty, trained service personnel are available to provide the applicable level of service, either on-site or at an IBM service center as determined by IBM.
- **Engineering Change management** - Occasionally, there might be changes that are required after a product has been shipped from IBM. In those instances, IBM will make Engineering Changes (ECs) available that apply to your hardware.

The following items are not covered under warranty service:

- Replacement or use of non-IBM parts. All IBM parts contain a 7-character identification in the format IBM FRU XXXXXXX.
- Identification of non-IBM software problem sources.
- Installation of customer replaceable units (CRUs).
- Installation and configuration of machine code or licensed internal code that is designated as customer installable.

If you do not register your server with IBM, you might be required to present proof of purchase to obtain warranty service.

### Before you call for service

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 server and software.

Most computers, operating systems, and application programs come with information that contains troubleshooting procedures and explanations of error messages and error codes. The information that comes with your server also describes the diagnostic tests that you can perform.

If you suspect a software problem, refer to the information for the operating system or application program.

## **Calling for service**

Please have the following information ready:

- Machine type, model, and serial number
- Description of the problem
- Exact wording of any error messages
- Hardware and software configuration information

To find the telephone number for the HelpCenter nearest you, see “Getting information, help, and service” on page 144.

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# IBM Statement of Limited Warranty Z125-4753-06 8/2000

This warranty statement consists of two parts: Part 1 and Part 2. Be sure to read Part 1 and the country-unique terms in Part 2 that apply to your country or region.

## Part 1 - General Terms

This Statement of Limited Warranty includes Part 1 - General Terms and Part 2 - Country-unique Terms. The terms of Part 2 replace or modify those of Part 1. The warranties provided by IBM in this Statement of Limited Warranty apply only to Machines you purchase for your use, and not for resale, from IBM or your reseller. The term "Machine" means an IBM machine, its features, conversions, upgrades, elements, or accessories, or any combination of them. The term "Machine" does not include any software programs, whether pre-loaded with the Machine, installed subsequently or otherwise. Unless IBM specifies otherwise, the following warranties apply only in the country where you acquire the Machine. Nothing in this Statement of Limited Warranty affects any statutory rights of consumers that cannot be waived or limited by contract. If you have any questions, contact IBM or your reseller.

### The IBM Warranty for Machines

IBM warrants that each Machine 1) is free from defects in materials and workmanship and 2) conforms to IBM's Official Published Specifications ("Specifications"). The warranty period for a Machine is a specified, fixed period commencing on its Date of Installation. The date on your sales receipt is the Date of Installation unless IBM or your reseller informs you otherwise.

If a Machine does not function as warranted during the warranty period, and IBM or your reseller are unable to either 1) make it do so or 2) replace it with one that is at least functionally equivalent, you may return it to your place of purchase and your money will be refunded.

### Extent of Warranty

The warranty does not cover the repair or exchange of a Machine resulting from misuse, accident, modification, unsuitable physical or operating environment, improper maintenance by you, or failure caused by a product for which IBM is not responsible. The warranty is voided by removal or alteration of Machine or parts identification labels.

**THESE WARRANTIES ARE YOUR EXCLUSIVE WARRANTIES AND REPLACE ALL OTHER WARRANTIES OR CONDITIONS, EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OR CONDITIONS OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. THESE WARRANTIES GIVE YOU SPECIFIC LEGAL RIGHTS AND YOU MAY ALSO HAVE OTHER RIGHTS WHICH VARY FROM JURISDICTION TO JURISDICTION. SOME JURISDICTIONS DO NOT ALLOW THE EXCLUSION OR LIMITATION OF EXPRESS OR IMPLIED WARRANTIES, SO THE ABOVE EXCLUSION OR LIMITATION MAY NOT APPLY TO YOU. IN THAT EVENT, SUCH WARRANTIES ARE LIMITED IN DURATION TO THE WARRANTY PERIOD. NO WARRANTIES APPLY AFTER THAT PERIOD.**

### Items Not Covered by Warranty

IBM does not warrant uninterrupted or error-free operation of a Machine.

Any technical or other support provided for a Machine under warranty, such as assistance via telephone with "how-to" questions and those regarding Machine set-up and installation, will be provided **WITHOUT WARRANTIES OF ANY KIND**.

### **Warranty Service**

To obtain warranty service for a Machine, contact IBM or your reseller. If you do not register your Machine with IBM, you may be required to present proof of purchase.

During the warranty period, IBM or your reseller, if approved by IBM to provide warranty service, provides without charge certain types of repair and exchange service to keep Machines in, or restore them to, conformance with their Specifications. IBM or your reseller will inform you of the available types of service for a Machine based on its country of installation. At its discretion, IBM or your reseller will 1) either repair or exchange the failing Machine and 2) provide the service either at your location or a service center. IBM or your reseller will also manage and install selected engineering changes that apply to the Machine.

Some parts of IBM Machines are designated as Customer Replaceable Units (called "CRUs"), e.g., keyboards, memory, or hard disk drives. IBM ships CRUs to you for replacement by you. You must return all defective CRUs to IBM within 30 days of your receipt of the replacement CRU. You are responsible for downloading designated Machine Code and Licensed Internal Code updates from an IBM Internet Web site or from other electronic media, and following the instructions that IBM provides.

When warranty service involves the exchange of a Machine or part, the item IBM or your reseller replaces becomes its property and the replacement becomes yours. You represent that all removed items are genuine and unaltered. The replacement may not be new, but will be in good working order and at least functionally equivalent to the item replaced. The replacement assumes the warranty service status of the replaced item. Many features, conversions, or upgrades involve the removal of parts and their return to IBM. A part that replaces a removed part will assume the warranty service status of the removed part.

Before IBM or your reseller exchanges a Machine or part, you agree to remove all features, parts, options, alterations, and attachments not under warranty service.

You also agree to

1. ensure that the Machine is free of any legal obligations or restrictions that prevent its exchange;
2. obtain authorization from the owner to have IBM or your reseller service a Machine that you do not own; and
3. where applicable, before service is provided:
  - a. follow the problem determination, problem analysis, and service request procedures that IBM or your reseller provides;
  - b. secure all programs, data, and funds contained in a Machine;
  - c. provide IBM or your reseller with sufficient, free, and safe access to your facilities to permit them to fulfill their obligations; and
  - d. inform IBM or your reseller of changes in a Machine's location.

IBM is responsible for loss of, or damage to, your Machine while it is 1) in IBM's possession or 2) in transit in those cases where IBM is responsible for the transportation charges.

Neither IBM nor your reseller is responsible for any of your confidential, proprietary or personal information contained in a Machine which you return to IBM or your reseller for any reason. You should remove all such information from the Machine prior to its return.

## Limitation of Liability

Circumstances may arise where, because of a default on IBM's part or other liability, you are entitled to recover damages from IBM. In each such instance, regardless of the basis on which you are entitled to claim damages from IBM (including fundamental breach, negligence, misrepresentation, or other contract or tort claim), except for any liability that cannot be waived or limited by applicable laws, IBM is liable for no more than

1. damages for bodily injury (including death) and damage to real property and tangible personal property; and
2. the amount of any other actual direct damages, up to the charges (if recurring, 12 months' charges apply) for the Machine that is subject of the claim. For purposes of this item, the term "Machine" includes Machine Code and Licensed Internal Code.

This limit also applies to IBM's suppliers and your reseller. It is the maximum for which IBM, its suppliers, and your reseller are collectively responsible.

**UNDER NO CIRCUMSTANCES IS IBM LIABLE FOR ANY OF THE FOLLOWING: 1) THIRD-PARTY CLAIMS AGAINST YOU FOR DAMAGES (OTHER THAN THOSE UNDER THE FIRST ITEM LISTED ABOVE); 2) LOSS OF, OR DAMAGE TO, YOUR RECORDS OR DATA; OR 3) SPECIAL, INCIDENTAL, OR INDIRECT DAMAGES OR FOR ANY ECONOMIC CONSEQUENTIAL DAMAGES, LOST PROFITS OR LOST SAVINGS, EVEN IF IBM, ITS SUPPLIERS OR YOUR RESELLER IS INFORMED OF THEIR POSSIBILITY. SOME JURISDICTIONS DO NOT ALLOW THE EXCLUSION OR LIMITATION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES, SO THE ABOVE LIMITATION OR EXCLUSION MAY NOT APPLY TO YOU.**

## Governing Law

Both you and IBM consent to the application of the laws of the country in which you acquired the Machine to govern, interpret, and enforce all of your and IBM's rights, duties, and obligations arising from, or relating in any manner to, the subject matter of this Agreement, without regard to conflict of law principles.

## Part 2 - Country-unique Terms

### AMERICAS

#### **BRAZIL**

**Governing Law:** *The following is added after the first sentence:*

Any litigation arising from this Agreement will be settled exclusively by the court of Rio de Janeiro.

#### **NORTH AMERICA**

**Warranty Service:** *The following is added to this Section:*

To obtain warranty service from IBM in Canada or the United States, call 1-800-IBM-SERV (426-7378).

#### **CANADA**

**Governing Law:** *The following replaces "laws of the country in which you acquired the Machine" in the first sentence:*

laws in the Province of Ontario.

## UNITED STATES

**Governing Law:** *The following replaces "laws of the country in which you acquired the Machine" in the first sentence:*  
laws of the State of New York.

## ASIA PACIFIC

### AUSTRALIA

**The IBM Warranty for Machines:** *The following paragraph is added to this Section:*  
The warranties specified in this Section are in addition to any rights you may have under the Trade Practices Act 1974 or other similar legislation and are only limited to the extent permitted by the applicable legislation.

**Limitation of Liability:** *The following is added to this Section:*

Where IBM is in breach of a condition or warranty implied by the Trade Practices Act 1974 or other similar legislation, IBM's liability is limited to the repair or replacement of the goods or the supply of equivalent goods. Where that condition or warranty relates to right to sell, quiet possession or clear title, or the goods are of a kind ordinarily acquired for personal, domestic or household use or consumption, then none of the limitations in this paragraph apply.

**Governing Law:** *The following replaces "laws of the country in which you acquired the Machine" in the first sentence:*  
laws of the State or Territory.

### CAMBODIA, LAOS, AND VIETNAM

**Governing Law:** *The following replaces "laws of the country in which you acquired the Machine" in the first sentence:*  
laws of the State of New York.

*The following is added to this Section:*

Disputes and differences arising out of or in connection with this Agreement shall be finally settled by arbitration which shall be held in Singapore in accordance with the rules of the International Chamber of Commerce (ICC). The arbitrator or arbitrators designated in conformity with those rules shall have the power to rule on their own competence and on the validity of the Agreement to submit to arbitration. The arbitration award shall be final and binding for the parties without appeal and the arbitral award shall be in writing and set forth the findings of fact and the conclusions of law.

All proceedings shall be conducted, including all documents presented in such proceedings, in the English language. The number of arbitrators shall be three, with each side to the dispute being entitled to appoint one arbitrator.

The two arbitrators appointed by the parties shall appoint a third arbitrator before proceeding upon the reference. The third arbitrator shall act as chairman of the proceedings. Vacancies in the post of chairman shall be filled by the president of the ICC. Other vacancies shall be filled by the respective nominating party. Proceedings shall continue from the stage they were at when the vacancy occurred.

If one of the parties refuses or otherwise fails to appoint an arbitrator within 30 days of the date the other party appoints its, the first appointed arbitrator shall be the sole arbitrator, provided that the arbitrator was validly and properly appointed.

The English language version of this Agreement prevails over any other language version.



## HONG KONG AND MACAU

**Governing Law:** *The following replaces "laws of the country in which you acquired the Machine" in the first sentence:*

laws of Hong Kong Special Administrative Region.

## INDIA

**Limitation of Liability:** *The following replaces items 1 and 2 of this Section:*

1. liability for bodily injury (including death) or damage to real property and tangible personal property will be limited to that caused by IBM's negligence;
2. as to any other actual damage arising in any situation involving nonperformance by IBM pursuant to, or in any way related to the subject of this Statement of Limited Warranty, IBM's liability will be limited to the charge paid by you for the individual Machine that is the subject of the claim.

## JAPAN

**Governing Law:** *The following sentence is added to this Section:*

Any doubts concerning this Agreement will be initially resolved between us in good faith and in accordance with the principle of mutual trust.

## NEW ZEALAND

**The IBM Warranty for Machines:** *The following paragraph is added to this Section:*

The warranties specified in this Section are in addition to any rights you may have under the Consumer Guarantees Act 1993 or other legislation which cannot be excluded or limited. The Consumer Guarantees Act 1993 will not apply in respect of any goods which IBM provides, if you require the goods for the purposes of a business as defined in that Act.

**Limitation of Liability:** *The following is added to this Section:*

Where Machines are not acquired for the purposes of a business as defined in the Consumer Guarantees Act 1993, the limitations in this Section are subject to the limitations in that Act.

## PEOPLE'S REPUBLIC OF CHINA (PRC)

**Governing Law:** *The following replaces this Section:*

Both you and IBM consent to the application of the laws of the State of New York (except when local law requires otherwise) to govern, interpret, and enforce all your and IBM's rights, duties, and obligations arising from, or relating in any manner to, the subject matter of this Agreement, without regard to conflict of law principles.

Any disputes arising from or in connection with this Agreement will first be resolved by friendly negotiations, failing which either of us has the right to submit the dispute to the China International Economic and Trade Arbitration Commission in Beijing, the PRC, for arbitration in accordance with its arbitration rules in force at the time. The arbitration tribunal will consist of three arbitrators. The language to be used therein will be English and Chinese. An arbitral award will be final and binding on all the parties, and will be enforceable under the Convention on the Recognition and Enforcement of Foreign Arbitral Awards (1958).

The arbitration fee will be borne by the losing party unless otherwise determined by the arbitral award.

During the course of arbitration, this Agreement will continue to be performed except for the part which the parties are disputing and which is undergoing arbitration.

### **EUROPE, MIDDLE EAST, AFRICA (EMEA)**

#### ***THE FOLLOWING TERMS APPLY TO ALL EMEA COUNTRIES:***

The terms of this Statement of Limited Warranty apply to Machines purchased from IBM or an IBM reseller.

#### **Warranty Service:**

If you purchase an IBM Machine in Austria, Belgium, Denmark, Estonia, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland or United Kingdom, you may obtain warranty service for that Machine in any of those countries from either (1) an IBM reseller approved to perform warranty service or (2) from IBM. If you purchase an IBM Personal Computer Machine in Albania, Armenia, Belarus, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Georgia, Hungary, Kazakhstan, Kirghizia, Federal Republic of Yugoslavia, Former Yugoslav Republic of Macedonia (FYROM), Moldova, Poland, Romania, Russia, Slovak Republic, Slovenia, or Ukraine, you may obtain warranty service for that Machine in any of those countries from either (1) an IBM reseller approved to perform warranty service or (2) from IBM.

If you purchase an IBM Machine in a Middle Eastern or African country, you may obtain warranty service for that Machine from the IBM entity within the country of purchase, if that IBM entity provides warranty service in that country, or from an IBM reseller, approved by IBM to perform warranty service on that Machine in that country. Warranty service in Africa is available within 50 kilometers of an IBM authorized service provider. You are responsible for transportation costs for Machines located outside 50 kilometers of an IBM authorized service provider.

#### **Governing Law:**

The applicable laws that govern, interpret and enforce rights, duties, and obligations of each of us arising from, or relating in any manner to, the subject matter of this Statement, without regard to conflict of laws principles, as well as Country-unique terms and competent court for this Statement are those of the country in which the warranty service is being provided, except that in 1) Albania, Bosnia-Herzegovina, Bulgaria, Croatia, Hungary, Former Yugoslav Republic of Macedonia, Romania, Slovakia, Slovenia, Armenia, Azerbaijan, Belarus, Georgia, Kazakhstan, Kyrgyzstan, Moldova, Russia, Tajikistan, Turkmenistan, Ukraine, and Uzbekistan, the laws of Austria apply; 2) Estonia, Latvia, and Lithuania, the laws of Finland apply; 3) Algeria, Benin, Burkina Faso, Cameroon, Cape Verde, Central African Republic, Chad, Congo, Djibouti, Democratic Republic of Congo, Equatorial Guinea, France, Gabon, Gambia, Guinea, Guinea-Bissau, Ivory Coast, Lebanon, Mali, Mauritania, Morocco, Niger, Senegal, Togo, and Tunisia, this Agreement will be construed and the legal relations between the parties will be determined in accordance with the French laws and all disputes arising out of this Agreement or related to its violation or execution, including summary proceedings, will be settled exclusively by the Commercial Court of Paris; 4) Angola, Bahrain, Botswana, Burundi, Egypt, Eritrea, Ethiopia, Ghana, Jordan, Kenya, Kuwait, Liberia, Malawi, Malta, Mozambique, Nigeria, Oman, Pakistan, Qatar, Rwanda, Sao Tome, Saudi Arabia, Sierra Leone, Somalia, Tanzania, Uganda, United Arab Emirates, United Kingdom, West Bank/Gaza, Yemen, Zambia, and Zimbabwe, this Agreement will be governed by English Law and disputes relating to it will be submitted to the exclusive jurisdiction of the English courts; and 5) in Greece, Israel, Italy, Portugal, and Spain any legal claim arising out of this Statement will be brought before, and finally settled by, the competent court of Athens, Tel Aviv, Milan, Lisbon, and Madrid, respectively.

**THE FOLLOWING TERMS APPLY TO THE COUNTRY SPECIFIED:**

**AUSTRIA AND GERMANY**

**The IBM Warranty for Machines:** *The following replaces the first sentence of the first paragraph of this Section:*

The warranty for an IBM Machine covers the functionality of the Machine for its normal use and the Machine's conformity to its Specifications.

*The following paragraphs are added to this Section:*

The minimum warranty period for Machines is six months. In case IBM or your reseller is unable to repair an IBM Machine, you can alternatively ask for a partial refund as far as justified by the reduced value of the unrepaired Machine or ask for a cancellation of the respective agreement for such Machine and get your money refunded.

**Extent of Warranty:** *The second paragraph does not apply.*

**Warranty Service:** *The following is added to this Section:*

During the warranty period, transportation for delivery of the failing Machine to IBM will be at IBM's expense.

**Limitation of Liability:** *The following paragraph is added to this Section:*

The limitations and exclusions specified in the Statement of Limited Warranty will not apply to damages caused by IBM with fraud or gross negligence and for express warranty.

*The following sentence is added to the end of item 2:*

IBM's liability under this item is limited to the violation of essential contractual terms in cases of ordinary negligence.

**EGYPT**

**Limitation of Liability:** *The following replaces item 2 in this Section:*

as to any other actual direct damages, IBM's liability will be limited to the total amount you paid for the Machine that is the subject of the claim. For purposes of this item, the term "Machine" includes Machine Code and Licensed Internal Code.

*Applicability of suppliers and resellers (unchanged).*

**FRANCE**

**Limitation of Liability:** *The following replaces the second sentence of the first paragraph of this Section:*

In such instances, regardless of the basis on which you are entitled to claim damages from IBM, IBM is liable for no more than: *(items 1 and 2 unchanged).*

**IRELAND**

**Extent of Warranty:** *The following is added to this Section:*

Except as expressly provided in these terms and conditions, all statutory conditions, including all warranties implied, but without prejudice to the generality of the foregoing all warranties implied by the Sale of Goods Act 1893 or the Sale of Goods and Supply of Services Act 1980 are hereby excluded.

**Limitation of Liability:** *The following replaces items one and two of the first paragraph of this Section:*

1. death or personal injury or physical damage to your real property solely caused by IBM's negligence; and

2. the amount of any other actual direct damages, up to 125 percent of the charges (if recurring, the 12 months' charges apply) for the Machine that is the subject of the claim or which otherwise gives rise to the claim.

*Applicability of suppliers and resellers (unchanged).*

*The following paragraph is added at the end of this Section:*

IBM's entire liability and your sole remedy, whether in contract or in tort, in respect of any default shall be limited to damages.

## **ITALY**

**Limitation of Liability:** *The following replaces the second sentence in the first paragraph:*

In each such instance unless otherwise provided by mandatory law, IBM is liable for no more than:

1. *(unchanged)*

2. as to any other actual damage arising in all situations involving nonperformance by IBM pursuant to, or in any way related to the subject matter of this Statement of Warranty, IBM's liability, will be limited to the total amount you paid for the Machine that is the subject of the claim.

*Applicability of suppliers and resellers (unchanged).*

*The following replaces the third paragraph of this Section:*

Unless otherwise provided by mandatory law, IBM and your reseller are not liable for any of the following: *(items 1 and 2 unchanged)* 3) indirect damages, even if IBM or your reseller is informed of their possibility.

## **SOUTH AFRICA, NAMIBIA, BOTSWANA, LESOTHO AND SWAZILAND**

**Limitation of Liability:** *The following is added to this Section:*

IBM's entire liability to you for actual damages arising in all situations involving nonperformance by IBM in respect of the subject matter of this Statement of Warranty will be limited to the charge paid by you for the individual Machine that is the subject of your claim from IBM.

## **UNITED KINGDOM**

**Limitation of Liability:** *The following replaces items 1 and 2 of the first paragraph of this Section:*

1. death or personal injury or physical damage to your real property solely caused by IBM's negligence;
2. the amount of any other actual direct damages or loss, up to 125 percent of the charges (if recurring, the 12 months' charges apply) for the Machine that is the subject of the claim or which otherwise gives rise to the claim;

*The following item is added to this paragraph:*

3. breach of IBM's obligations implied by Section 12 of the Sale of Goods Act 1979 or Section 2 of the Supply of Goods and Services Act 1982.

*Applicability of suppliers and resellers (unchanged).*

*The following is added to the end of this Section:*

IBM's entire liability and your sole remedy, whether in contract or in tort, in respect of any default shall be limited to damages.

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## Appendix B. Notices

This publication was developed for products and services offered in the U.S.A.

IBM may not offer the products, services, or features discussed in this document in other countries. Consult your local IBM representative for information on the products and services currently available in your area. Any reference to an IBM product, program, or service is not intended to state or imply that only that IBM product, program, or service may be used. Any functionally equivalent product, program, or service that does not infringe any IBM intellectual property right may be used instead. However, it is the user's responsibility to evaluate and verify the operation of any non-IBM product, program, or service.

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HelpWare	Wake on LAN
IBM	xSeries
Light Path Diagnostics	X-Architecture
Predictive Failure Analysis	XA-32

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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 1000000 bytes, and GB stands for approximately 1000000000 bytes.

When referring to hard disk drive capacity or communications volume, MB stands for 1 000 000 bytes, and GB stands for 1 000 000 000 bytes. Total user-accessible capacity may vary depending on operating environments.

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

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

IBM makes no representation or warranties regarding non-IBM products and services that are ServerProven, including but not limited to the implied warranties of merchantability and fitness for a particular purpose. These products are offered and warranted solely by third parties.

Unless otherwise stated, IBM makes no representations or warranties with respect to non-IBM products. Support (if any) for the non-IBM products is provided by the third party, not IBM.

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

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## Electronic emission notices

### Federal Communications Commission (FCC) statement

**Note:** This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense.

Properly shielded and grounded cables and connectors must be used in order to meet FCC emission limits. IBM is not responsible for any radio or television interference caused by using other than recommended cables and connectors or by unauthorized changes or modifications to this equipment. Unauthorized changes or modifications could void the user's authority to operate the equipment.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

### Industry Canada Class A emission compliance statement

This Class A digital apparatus complies with Canadian ICES-003.

#### Avis de conformité à la réglementation d'Industrie Canada

Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.

## Australia and New Zealand Class A statement

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

## United Kingdom telecommunications safety requirement

### Notice to Customers

This apparatus is approved under approval number NS/G/1234/J/100003 for indirect connection to public telecommunication systems in the United Kingdom.

## European Union EMC Directive conformance statement

This product is in conformity with the protection requirements of EU Council Directive 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.

## Taiwan electrical emission statement

警告使用者：  
這是甲類的資訊產品，在居住的環境中使用時，可能會造成射頻干擾，在這種情況下，使用者會被要求採取某些適當的對策。

## Japanese Voluntary Control Council for Interference (VCCI) statement

この装置は、情報処理装置等電波障害自主規制協議会（VCCI）の基準に基づくクラスA情報技術装置です。この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。



## 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
14F0051	Liechtenstein, Switzerland
14F0069	Chile, Ethiopia, Italy, Libya, Somalia
14F0087	Israel
1838574	Thailand

IBM power cord part number	Used in these countries and regions
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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