



xSeries 360 Type 8686

Installation Guide

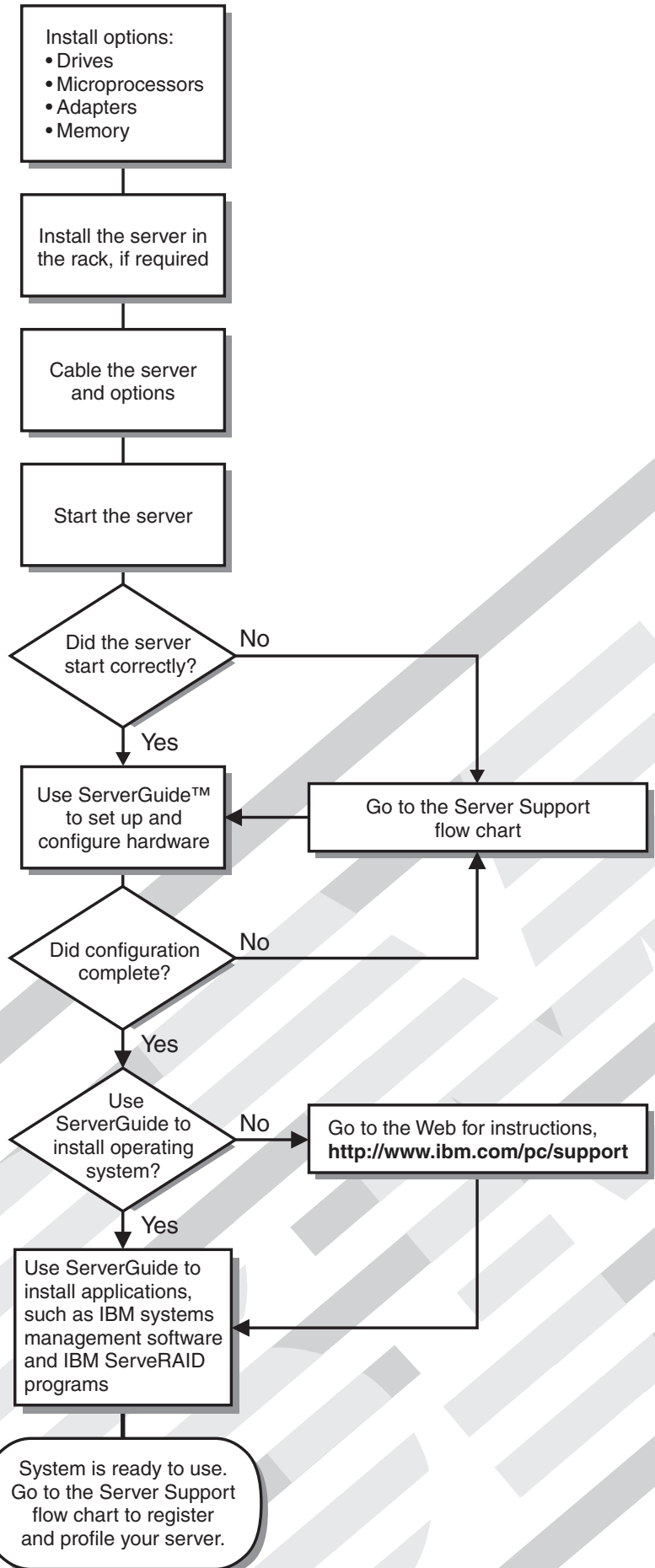
Welcome...

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

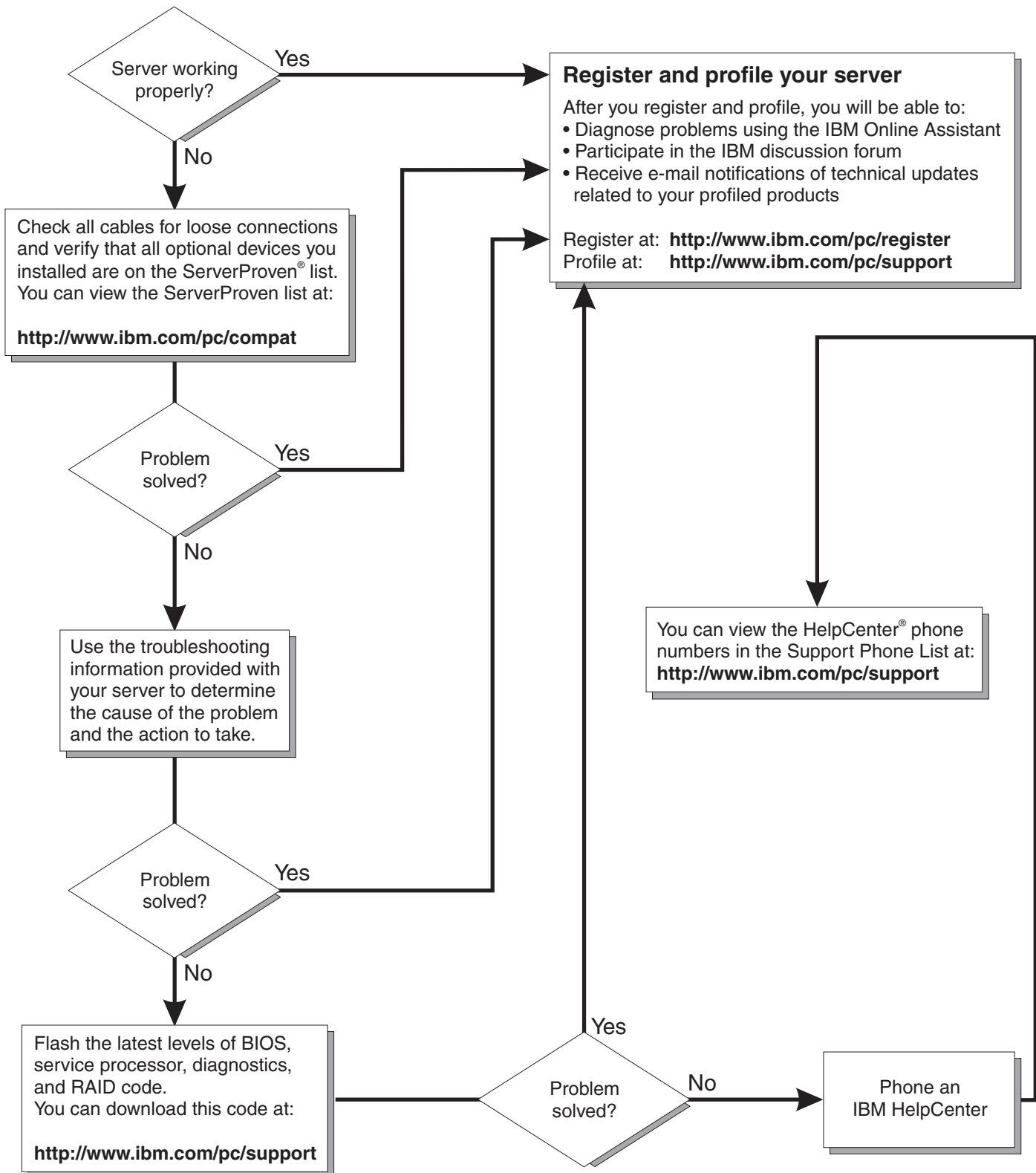
This server *Installation Guide* contains information for setting up and configuring your server.

For detailed information about your server, view the *User's Reference* on the Documentation CD.

You can also find the most current information about your server on the IBM Web site at: <http://www.ibm.com/pc/support>



Server Support



IBM® xSeries 360



Installation Guide

Note:

Before using this information and the product it supports, read the general information in Appendix A, "Warranty information," on page 47 and Appendix B, "Notices," on page 57.

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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 přečtěte příručku bezpečnostních instrukcí.

Læs sikkerhedsforskrifterne, før du installerer dette produkt.

Lees voordat u dit product installeert eerst de veiligheidsvoorschriften.

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

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

Vor der Installation dieses Produkts die Sicherheitshinweise lesen.

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

לפני שתתקינו מוצר זה, קראו את הוראות הבטיחות.

A termék telepítése előtt olvassa el a Biztonsági előírásokat!

Prima di installare questo prodotto, leggere le Informazioni sulla Sicurezza

製品の設置の前に、安全情報をお読みください。

본 제품을 설치하기 전에 안전 정보를 읽으십시오.

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

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

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

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

Перед установкой продукта прочтите инструкции по технике безопасности.

Pred inštaláciou tohto zariadenia si pečítajte Bezpečnostné predpisy.

Pred namestitvijo tega proizvoda preberite Varnostne informacije.

Antes de instalar este producto lea la información de seguridad.

Läs säkerhetsinformationen innan du installerar den här produkten.

Statement 1



DANGER

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

To avoid a shock hazard:

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

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.



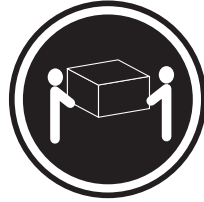
DANGER

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

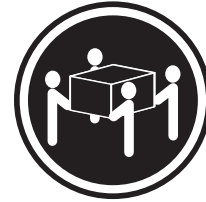
Statement 4



≥ 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. Introduction

Thank you for purchasing an IBM® eServer xSeries 360. This *Installation Guide* provides the information needed to:

- Set up and cable the server
- Start and configure the server
- Install the network operating system (NOS)

The xSeries 360 server features X-Architecture™ technology. This 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>.

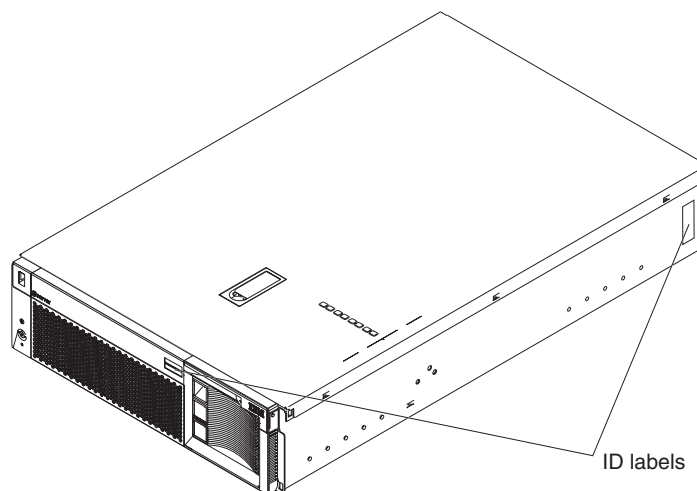
Packaged with this *Installation Guide* are software CDs that help you configure hardware, install device drivers, and install the network operating system (NOS). Also included is an *IBM xSeries 360 Documentation CD*, which provides detailed information about this server. For complete rack installation and removal instructions, see the *Rack Installation Instructions* provided with your server.

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/>.

Record your product information in this table.	
Product name	_____
Machine type	_____
Model number	_____
Serial number	_____

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.



Specifications and features

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

<p>Microprocessor:</p> <ul style="list-style-type: none"> Intel® Xeon™ Processor MP (frequency varies with server model, each MP processor functions as two logical processors) <ul style="list-style-type: none"> Minimum: One Maximum: Four Level-3 cache size varies with model 100 MHz front-side bus (FSB) <p>Chipset:</p> <p>IBM XA-32™ Chipset with integrated memory, I/O controller, and remote I/O controller.</p> <p>Memory:</p> <ul style="list-style-type: none"> DDR registered SDRAM DIMMs with ECC and Chipkill™ memory <ul style="list-style-type: none"> Minimum: 512 MB Maximum: 8 GB Slots: Interleaved, 8 slots <p>Drives standard:</p> <ul style="list-style-type: none"> Slim diskette: 1.44 MB Slim CD-ROM: 24X-10X IDE <p>Hard disk drives:</p> <ul style="list-style-type: none"> Slim-high hot-swap drives (number of drives and drive capacity vary with model) Maximum: Three <p>Active™ PCI-X expansion slots:</p> <ul style="list-style-type: none"> Two 100 MHz/64-bit PCI-X Four 66 MHz/64-bit PCI-X <p>Hot-swap power supplies:</p> <p>370 W (115-230 V ac)</p> <ul style="list-style-type: none"> Minimum: One Maximum: Three 	<p>Hot-swap cooling:</p> <p>Six hot-swap fans</p> <p>Video:</p> <ul style="list-style-type: none"> S3 video controller Compatible with SVGA 4 8 MB SDRAM video memory <p>Size (3 U)</p> <ul style="list-style-type: none"> Height: 134 mm (5.28 in.) Depth: 720 mm (28.35 in.) Width: 440 mm (17.32 in.) Weight: 25 kg (55.1 lb) to 31.7 kg (70 lb) depending upon configuration <p>Integrated functions:</p> <ul style="list-style-type: none"> Light Path Diagnostics™ Ultra160 SCSI controller One 10BASE-T/100BASE-TX Intel Ethernet controller Remote Supervisor Adapter (service processor) <ul style="list-style-type: none"> ASM interconnect (peer-to-peer) port RXE expansion port RXE management port Ethernet port Serial port Three universal serial bus ports Keyboard port Mouse port Video port <p>Acoustical noise emissions:</p> <ul style="list-style-type: none"> Sound power, idling: 6.3 bel maximum Sound power, operating: 6.3 bel maximum Sound pressure, operating: 47 dBa maximum 	<p>Environment:</p> <ul style="list-style-type: none"> Air temperature: <ul style="list-style-type: none"> Server on: 10° to 35°C (50° to 95°F). Altitude: 0 to 914 m (3000 ft) Server on: 10° to 32°C (50° to 89.6°F). Altitude: 914 m (3000 ft) to 2133 m (7000 ft) Server off: 10° to 43°C (50° to 110°F). Maximum altitude: 2133 m (7000 ft) Humidity: <ul style="list-style-type: none"> Server on: 8% to 80% Server off: 8% to 80% <p>Heat output:</p> <p>Approximate heat output in British thermal units (Btu) per hour</p> <ul style="list-style-type: none"> Minimum configuration: 1232 Btu (0.36 kilowatts) Maximum configuration: 3566 Btu (1.045 kilowatts) <p>Electrical input:</p> <ul style="list-style-type: none"> Sine-wave input (50-60 Hz) required Input voltage low range: <ul style="list-style-type: none"> Minimum: 100 V ac Maximum: 127 V ac Input voltage high range: <ul style="list-style-type: none"> Minimum: 200 V ac Maximum: 240 V ac Input kilovolt-amperes (kVA) approximately: <ul style="list-style-type: none"> Minimum: 0.08 kVA (ac power connected, server off) Minimum: 0.38 kVA (dc power on, server idle) Maximum: 1.1 kVA
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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.

Before you begin

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

- Become familiar with the information provided in "Safety" beginning on page v, and "Handling static-sensitive devices". These guidelines will help you work safely while working with your server or options.
- 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.

Handling static-sensitive devices

Attention: Static electricity can damage electronic devices and the system. 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 as heating reduces indoor humidity and increases static electricity.

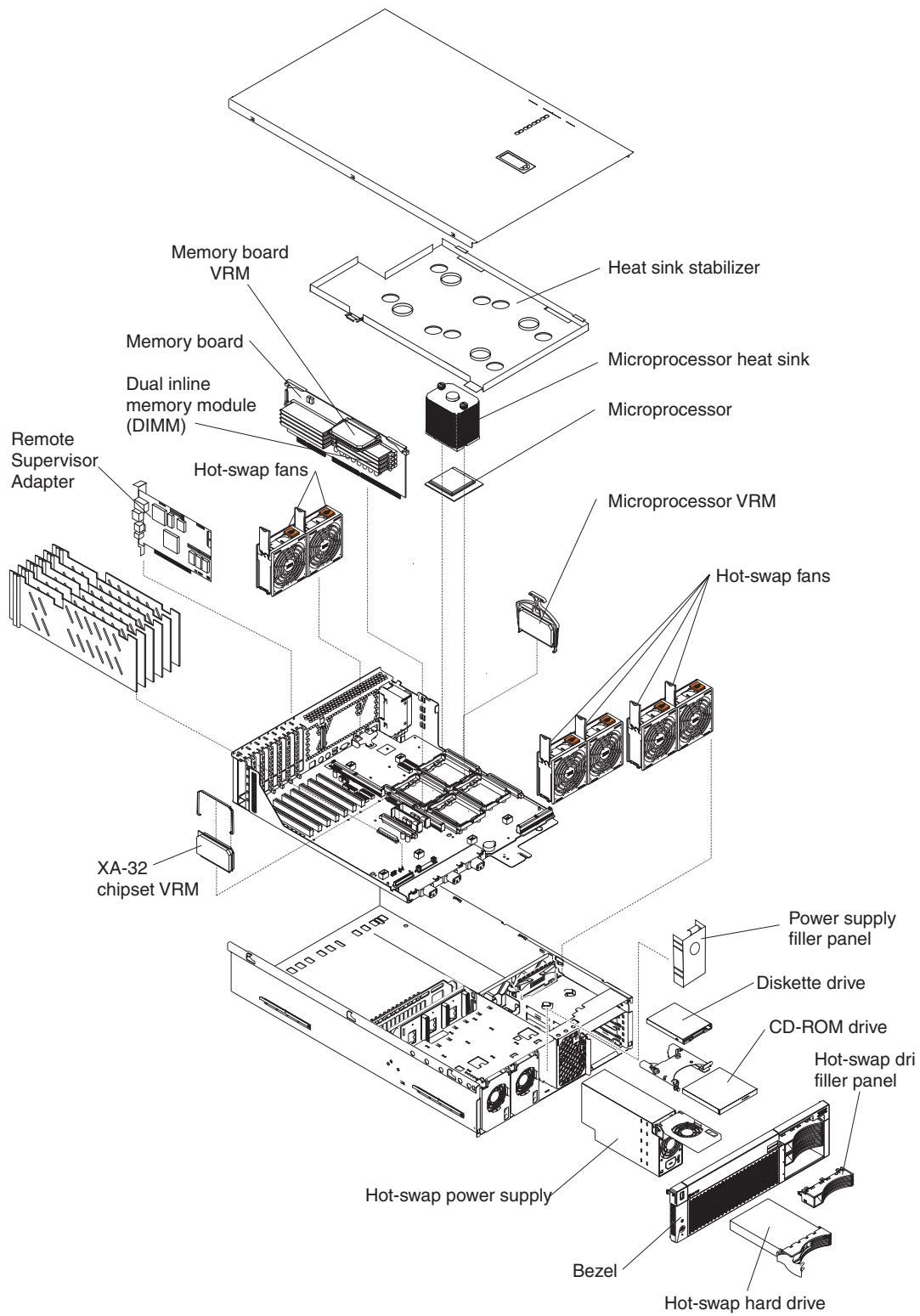
Major components of the xSeries 360

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 system is configured to support this function.

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.

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



Chapter 2. Installing options

This chapter provides the basic information needed to install options in the server. It is for all users, but is written with the experienced user in mind. If you need more detailed installation information, see the *User's Reference* on the *xSeries 360 Documentation CD*.

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 3.

Working inside a server with 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:

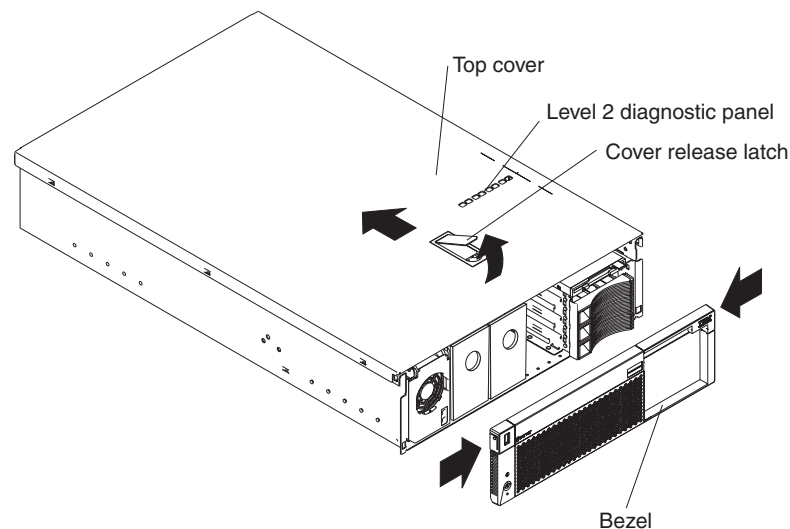
Note: Operating the server for more than 30 minutes with the top cover removed might damage server components.

- Avoid loose-fitting clothing on your forearms. Button long-sleeved shirts before working inside the server; do not wear cufflinks 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.

Removing the server top cover and bezel

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

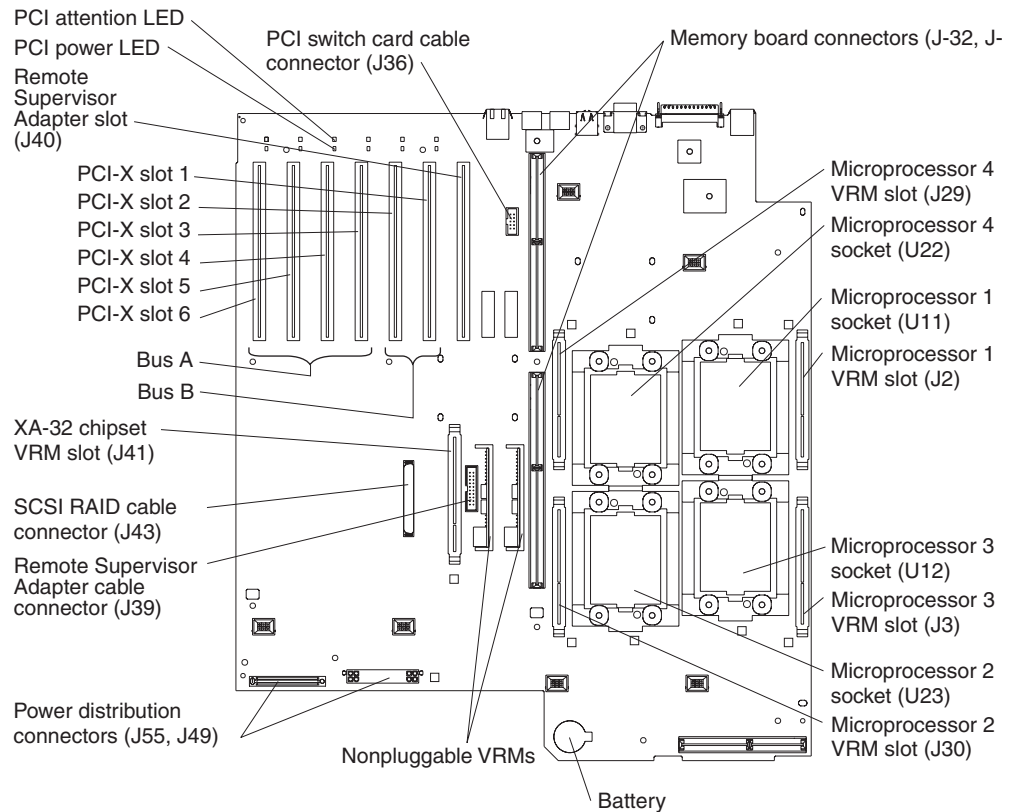
1. Review the safety precautions beginning on page v.



2. Lift the plastic cover-release latch on the top cover, as shown in the illustration. Slide the top cover toward the rear of the server approximately one inch, 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 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.

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.



Adapter considerations

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.

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 hot-plug PCI/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.

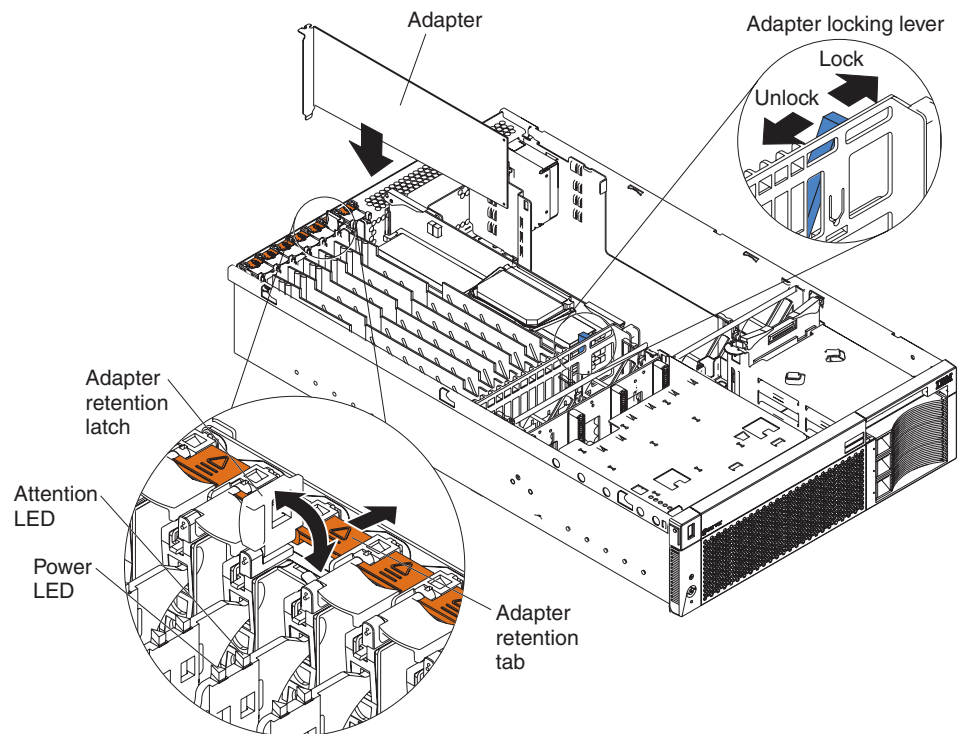
Note: Ensure that the PCI hot-plug device driver is installed. For details, see the documentation that came with the adapter. For more detailed instructions and information about installing PCI/PCI-X adapters, see the section on installing options in the *User's Reference* on the *xSeries 360 Documentation CD*.

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

1. Review the safety precautions beginning on page v and “Handling static-sensitive devices” on page 3.

2. Remove the top cover (see “Removing the server top cover and bezel” on page 7) 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.



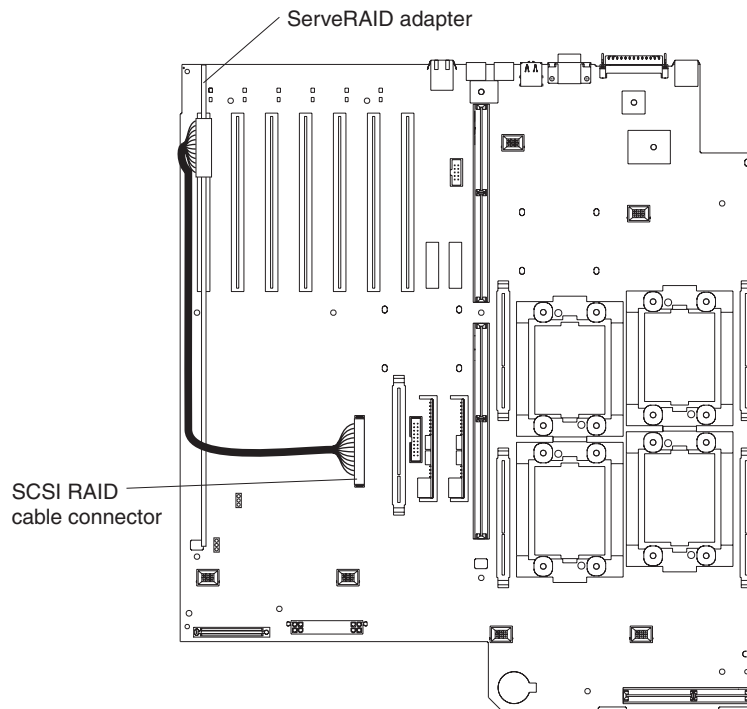
3. Slide the orange adapter-retention tab toward the rear of the server. Lift the adapter-retention latch. The power LED turns off for the appropriate slot.
4. Slide the expansion-slot cover up and out of the server; then, move the blue PCI-adapter locking lever to the right (as viewed from the front)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

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. If you are installing a ServeRAID adapter, continue with step 8. Otherwise, go to step 9.
8. If you are installing a ServeRAID adapter:
 - a. For ServeRAID internal hard disk drive connections:
 - 1) 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.



- 2) 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; then plug it into the SCSI RAID cable connector (J43) on the system board.

Notes:

- a) You cannot install a full-length, wide adapter in PCI-X slot 1 if the SCSI RAID adapter cable connector is in use.
 - b) You might need to remove adapters or plastic dividers to access the SCSI RAID adapter cable connector.
 - b. For ServeRAID external hard drive connections:
 - 1) Plug in one end of the ServeRAID external channel cable (separately orderable) to an external channel connector on the edge of the ServeRAID adapter that is accessible from the rear of the server.
 - 2) Route the cable to the external SCSI device and plug it into the appropriate connector.
 - c. Install the latest ServeRAID drivers, using the ServerGuide™ CDs.
 - d. Configure ServeRAID, using the ServeRAID adapter documentation on the *xSeries 360 Documentation CD*.
9. If you have other options to install or remove, do so now; otherwise, go to “Completing the installation” on page 19.

Installing a hot-swap hard disk drive

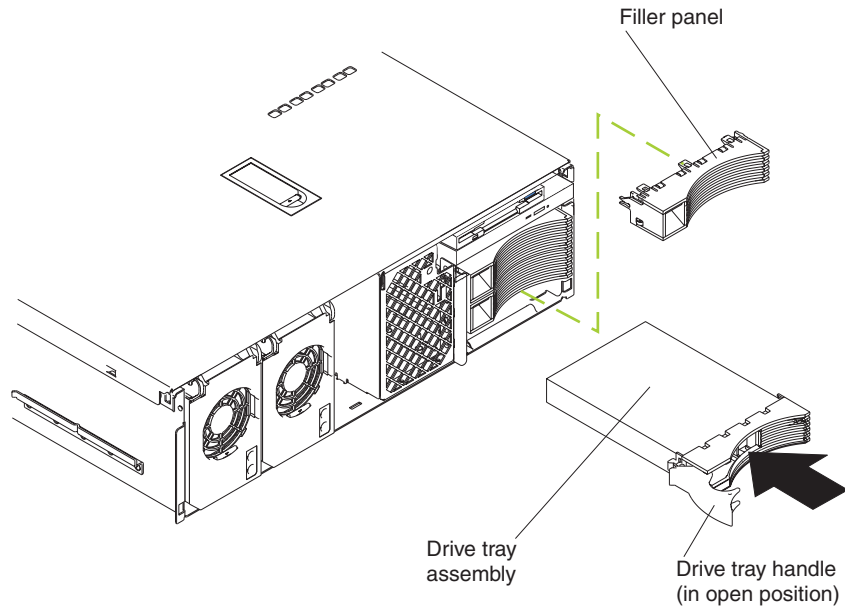
The server supports up to three 26 mm (1-inch), 3.5-inch, hot-swap hard disk drives in the hot-swap bays. The bays are located at the right front of the server. The hot-swap

bays are connected to a hot-swap drive backplane. The backplane is a printed circuit board behind the bays.

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

1. Review the safety precautions beginning on page v.
2. 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 filler panel installed in each bay.



3. 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.
4. If you have other options to install or remove, do so now; otherwise, go to “Completing the installation” on page 19.

Note: If the server has a ServeRAID controller or adapter installed, you might need to reconfigure the disk arrays after installing hard disk drives. See the ServeRAID documentation on the *xSeries 360 Documentation* CD for more information.

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:

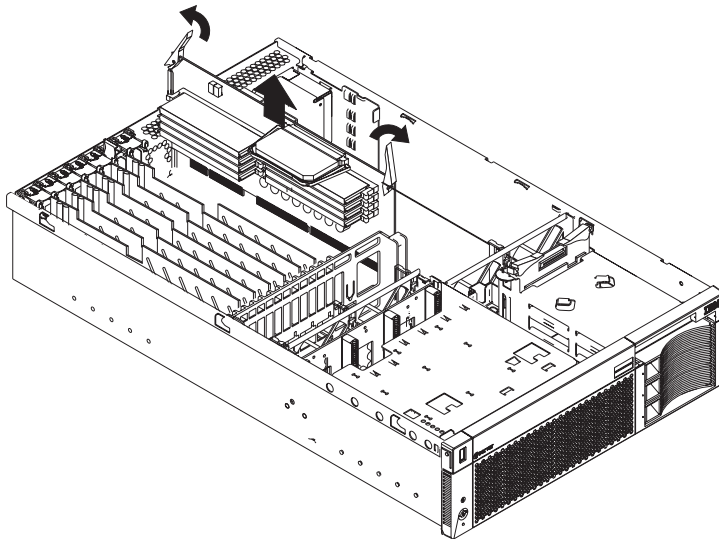
1. The server supports a minimum of 512 MB of system memory and a maximum of 8 GB of system memory. The DIMM slots are arranged in two columns of four rows each. The server supports DIMMs of 256 MB, 512 MB, and 1 GB capacities.
2. Each pair of DIMMs must be the same type, capacity, and speed. However, 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 4, “Configuring the server,” on page 29 for more information.

Complete the following steps to install DIMMs:

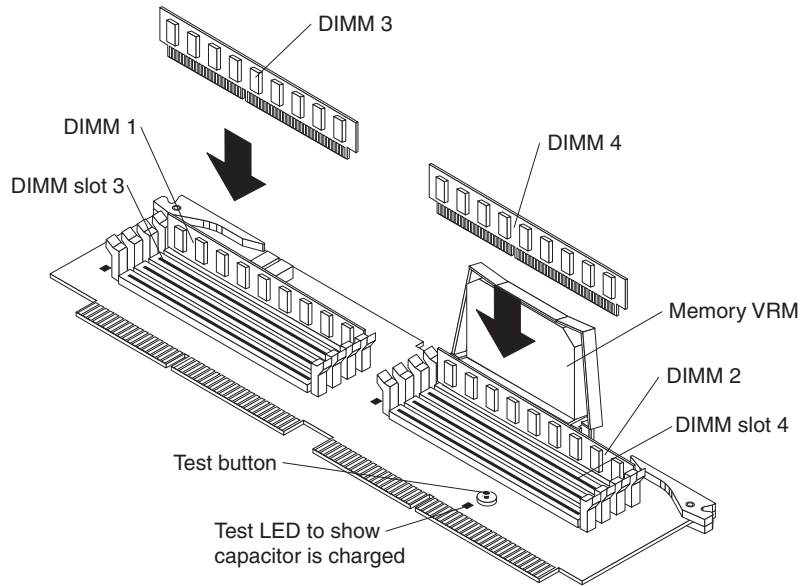
1. Review the safety precautions beginning on page v, “Handling static-sensitive devices” on page 3, and the documentation that comes with the DIMMs.
2. Turn off the server, disconnect all power cords and external cables, and remove the top cover (see “Removing the server top cover and bezel” on page 7).
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 3.

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

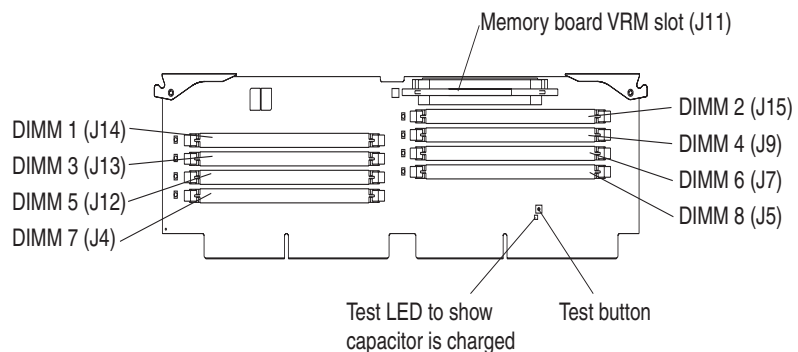


4. When installing additional DIMMs, determine the DIMM slots into which you will install them. You must populate the slots in pairs, one DIMM in each column, proceeding from top to bottom. Use only 2.5 V, 184-pin, PC1600, DDR registered synchronous dynamic random-access memory (SDRAM) with error correcting 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 3 through 7 for each additional DIMM that you install.

9. Install the memory board:
 - a. Align the board in the guides over the memory 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 19.

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 the 3-3-3 beep code sounds during POST, the memory board may 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.

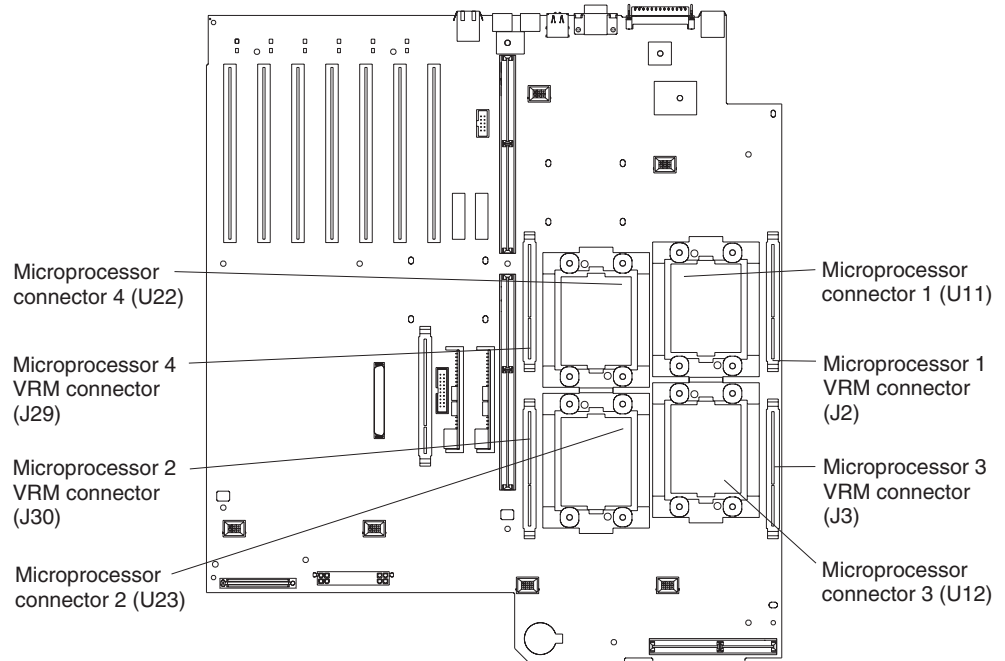
Attention: To avoid damage and ensure proper server operation when you install a microprocessor, use a microprocessor that has the same cache size and type, clock speed, and internal and external clock frequencies as the microprocessor already installed.

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.

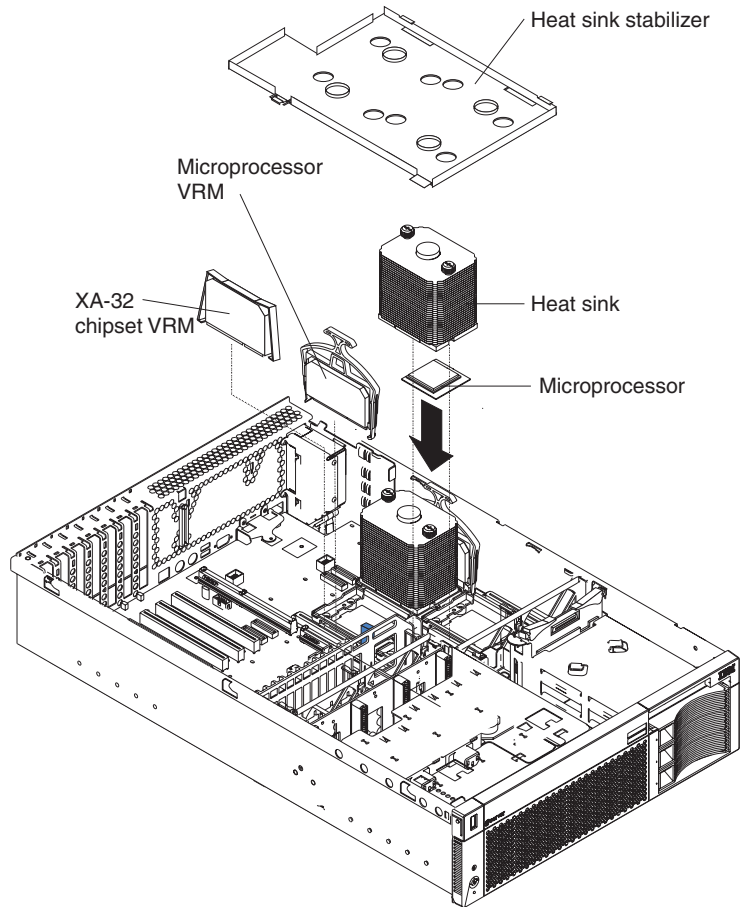


Complete the following steps to install a microprocessor:

1. Review the safety precautions beginning on page v and “Handling static-sensitive devices” on page 3.
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 7).

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 3.

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. Remove the microprocessor heat sink (two thumbscrews).
- 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. Lift the locking lever on the socket 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.

6. 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.
7. Install the heat-sink stabilizer.
8. If you have other options to install or remove, do so now; otherwise, go to “Completing the installation” on page 19.

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:

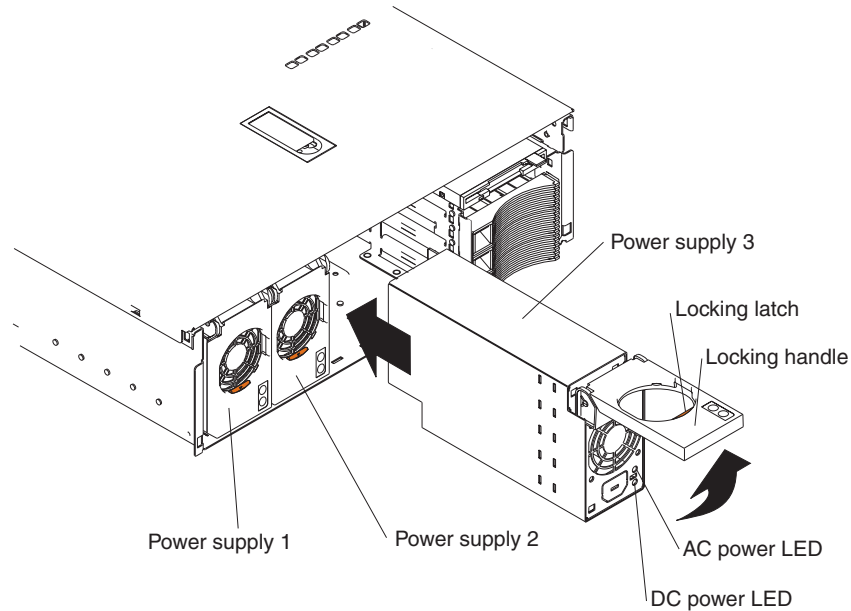
Never remove the cover on a power supply or any part that has the following label attached.



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. Review the safety precautions beginning on page v.
2. Remove the bezel. See “Removing the server top cover and bezel” on page 7.
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, as shown in the illustration.
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, as illustrated at “Cabling the server” on page 21). 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. Continue with “Completing the installation”.

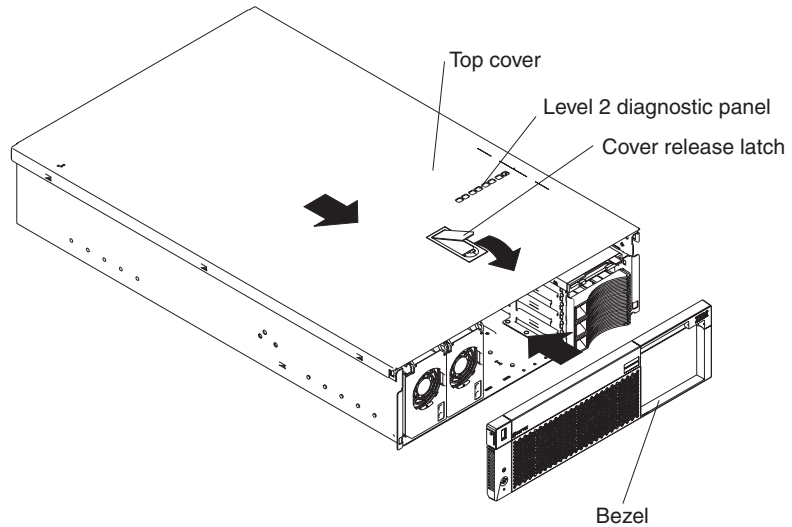
Completing the installation

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. Continue with “Installing the server in the rack”.

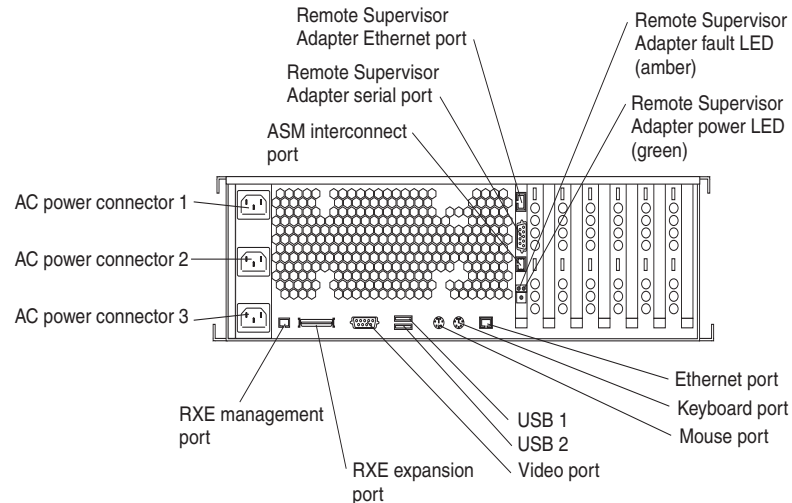
Installing the server in the rack

Install the server in the rack cabinet. For complete rack installation and removal instructions, see the *Rack Installation Instructions* provided with your server.

After you have installed the server in the rack, see “Cabling the server” on page 21 for details about connecting external cables and power cords to the server and routing the cables through the cable management arm.

Cabling the server

The following illustration shows the I/O ports on the rear of the server. Use this illustration to connect the external cables to the rear of the server.

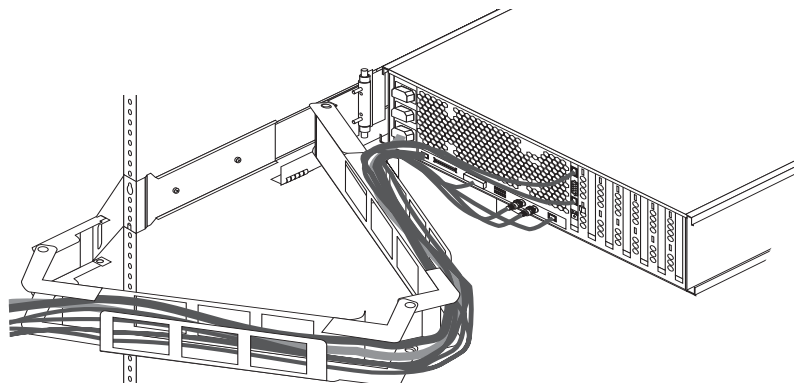


The following illustration shows the cable routing for a typical server configuration. Detailed cabling instructions, including the use of the cable management arm (shipped with the server) are in the *Rack Installation Instructions* provided with the server.

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.

For information about configuring and cabling the Remote Supervisor Adapter to manage the server remotely or to interconnect to another device, see the *xSeries 360 User's Reference*. For information about using the Remote Supervisor Adapter, see the *Remote Supervisor Adapter User's Guide*. Both documents are on the *xSeries 360 Documentation CD*.



After you have installed the server in the rack and connected all the needed cables, go to “Turning on the server” on page 23.

Chapter 3. Server power, controls, and indicators

This chapter explains how to turn on and turn off the server and describes the controls and indicators.

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. For more details, see the introduction in the *User's Reference* on the *xSeries 360 Documentation CD*.

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. 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 4, "Configuring the server," on page 29 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 "Using the ServerGuide CDs" on page 31 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.

Note: Each operating system is different. Some allow an immediate shutdown; others require an orderly shutdown procedure.

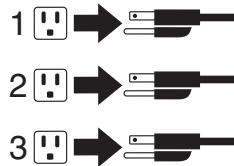
See the operating system documentation for the proper procedure to shut down the operating system.

Statement 5



CAUTION:

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



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

- 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.
- You can disconnect the server power cords from the power source to shut off all power immediately without damaging the server.
Note: Wait approximately 15 seconds after disconnecting the power cords for the server to stop running. Watch for the power LED on the operator information panel to 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.

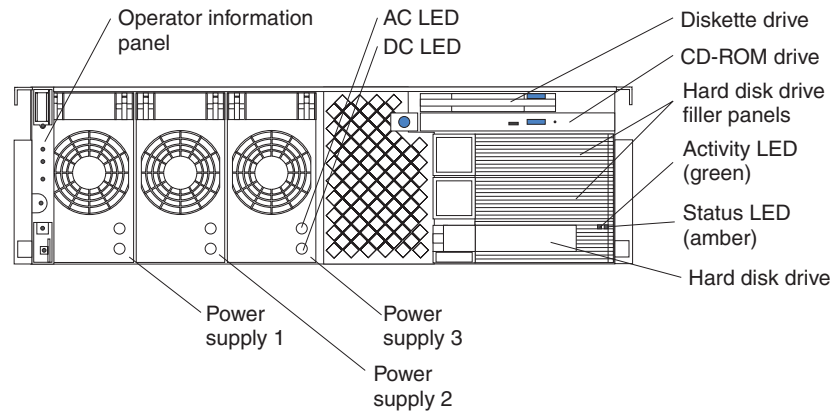
Complete the following steps to put the server into standby mode:

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.

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 27 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-inch diskette drive with an LED to indicate when it is active.

CD-ROM drive: The server contains one standard IDE CD-ROM 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.

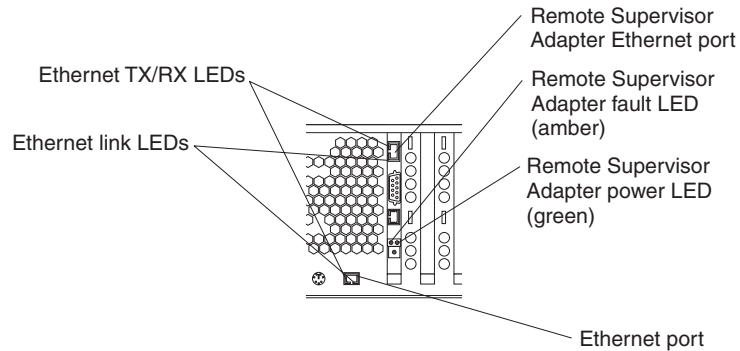
Activity LED: Each hot-swap hard disk drive has an activity LED, which flashes if the drive is being accessed.

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 supports a maximum of three hot-swap power supplies.

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.

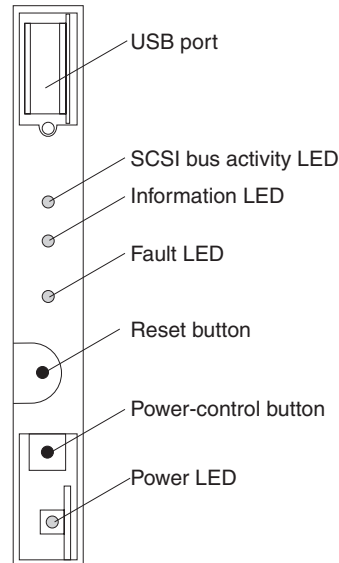
Remote Supervisor Adapter fault LED: This LED indicates that the Remote Supervisor Adapter has failed.

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 LED 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 the *User's Reference* on the *xSeries 360 Documentation CD*.

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 the *User's Reference* on the *xSeries 360 Documentation CD*.

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 23 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 LED has failed.

Note: If this LED is off, it does not mean there is no electrical current 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.

Chapter 4. Configuring the server

This chapter provides the instructions for using the utility programs. For more detailed information about these utility programs, see the *User's Reference* on the *xSeries 360 Documentation CD*.

You can use the following configuration programs to customize 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 30.

- **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, resolve configuration conflicts, and perform a low-level format on a SCSI hard disk drive. For information about using this utility, see "Using the SCSISelect utility program" on page 30.

- **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 31.

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 "Using the ServerGuide CDs" on page 31 for more information. The ServerGuide CDs also contain a collection of application programs, which you can install after the server is up and running.

- **Remote Supervisor Adapter configuration process**

Configuration activities are also required for the Remote Supervisor Adapter. See "Using the Remote Supervisor Adapter" on page 32 for a description of Remote Supervisor Adapter features. For 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*.

- **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 information about using the ServeRAID configuration program, see "Using the ServeRAID configuration programs" on page 32 and also the ServeRAID documentation that comes on the *xSeries 360 Documentation CD*.

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

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.

For more information about using the Configuration/Setup Utility program, see the section on the Configuration/Setup Utility program in the *User's Reference* on the *xSeries 360 Documentation CD*.

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.

Complete the following steps to start the SCSISelect utility program:

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

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

3. When the Would you like to configure the host adapter or run the SCSI disk utility? question appears, make a selection and press Enter.
4. 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).
5. Follow the instructions on the screen to change the settings of the selected items; then, press Enter.

For more information about using the SCSISelect utility program, see the section on the SCSISelect utility program in the *User's Reference* on the *xSeries 360 Documentation CD*.

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.

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.

Using the ServerGuide CDs

The ServerGuide CDs provide state-of-the-art programs to detect the server model and hardware options that are installed, configure the server hardware, provide device drivers, and install your network operating system (NOS).

Note: If the ServerGuide CD does not start, see “ServerGuide problems” on page 37.

1. Insert the *Setup and Installation* CD, and restart the server.
2. Follow the instructions on the screen to:
 - a. Select your language.
 - b. Select your country and keyboard layout.
 - c. View the Overview to learn about ServerGuide features.
 - d. View the README file to review installation tips about your NOS and adapter.
 - e. Start the setup and hardware configuration programs.
 - f. Start the NOS installation. You will need your copy of the NOS CD.

Note: For information on the supported NOS versions, refer to the *Setup and Installation* CD label.

Using the Remote Supervisor Adapter

The Remote Supervisor Adapter is one of the products in the Advanced System Management (ASM) family. It provides around-the-clock remote access and system management of your server and supports the following:

- Remote management regardless of the status of the server
- Remote control of hardware and operating systems
- Web-based management with standard Web browsers (no other software is required)
- Text-based user interface terminal access

The Remote Supervisor Adapter provides the following specific features:

- Continuous health monitoring and control
- Advanced Predictive Failure Analysis™ (PFA)
- Configurable automatic notification and alerts
- Remote access through Ethernet, point-to-point protocol (PPP) connection, serial port, and ASM interconnect peer-to-peer network
- Simple Network management Protocol (SNMP)
- Domain Name system (DNS) and Dynamic Host Configuration Protocol (DHCP) support
- Remote power control
- Remote firmware update and access to critical server settings
- Microsoft Windows NT and Windows 2000 blue screen capture
- Independent power, which enables around-the-clock access to the server even when the server power is off
- E-mail alerts
- Event logs that are timestamped, saved by a battery power unit, and can be attached to e-mail alerts
- Redirection of the server graphical or text console
- Access to Vital Product Data (VPD)
- Alphameric or numeric pager alerts

For 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*.

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.

Chapter 5. 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 the section on solving problems in the *User's Reference on the xSeries 360 Documentation CD* and the "Server Support" flowchart in the front of this booklet.

Diagnostic tools overview

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

- **POST beep codes and error messages**

The power-on self-test (POST) generates beep codes and messages to indicate successful test completion or the detection of a problem. See "POST beep code descriptions" on page 34 and "POST error messages" on page 35 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 the solving problems section in the *User's Reference on the xSeries 360 Documentation CD* 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. See "Light Path Diagnostics" on page 37 for further information.
- **Troubleshooting charts**

These charts list problem symptoms and suggested steps to correct the problems. See "Troubleshooting charts" on page 38 for an abbreviated chart. See the solving problems section in the *User's Reference on the xSeries 360 Documentation CD* for a complete chart.
- **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 World Wide Web:

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

POST beep code descriptions

POST emits one beep to signal successful completion. If POST detects a problem during startup, other beep codes might occur. You can use the following abbreviated list of beep code descriptions to help identify and resolve problems that are detected during startup.

Note: See the solving problems section in the *User's Reference* on the *xSeries 360 Documentation* CD for a complete list of POST beep codes.

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; have the system serviced.

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 35 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 persists, 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 on the video adapter. 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.

All other beep codes

1. Verify that the system memory modules (DIMMs) are installed correctly and fully seated.
2. Turn off the server and unplug all power cords; then, reconnect all power cords and restart the server. If the problem remains, call for service.

POST error messages

The following table provides an abbreviated list of the error messages that might appear during POST.

Note: See the solving problems section in the *User's Reference* on the *xSeries 360 Documentation* CD for a complete list of POST error messages.

Table 1. Abbreviated list of POST error messages.

POST message	Description
162	A change in configuration occurred. Verify that any optional devices are turned on and installed correctly.
163	The time of day has not been set. Set the correct date and time.
164	A change in the memory configuration has occurred. Verify that the memory is installed properly; then, restart the server and run the Configuration/Setup Utility program.
201	An error occurred during the memory controller test. Verify that the memory board is fully seated and installed properly.
289	An error occurred during the memory test and a DIMM was disabled. Verify that the memory is correct for the server and that it is installed and seated correctly.
301 303	An error occurred during the keyboard and keyboard controller test. These errors might be accompanied by continuous beeping. Ensure that the keyboard cable is connected and nothing is resting on the keyboard keys.
11xx	An error occurred during the system board serial port test. Verify that the serial cable is connected correctly.
1600	The Remote Supervisor Adapter is not functioning. Verify that the Remote Supervisor Adapter is correctly installed.
1162	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.
1800	A PCI/PCI-X adapter has requested a hardware interrupt that is not available. Start the Configuration/Setup Utility program and verify that the interrupt resource settings are correct.
2400 2462	An error occurred in either the video controller or the video memory. Verify that the monitor is connected correctly.
00019x0y	Processor y is not functioning or failed the built-in test. Verify that it is installed correctly. If the problem remains, have the system serviced.
00180x00	A PCI/PCI-X adapter requested a resource that is not available. Start the Configuration/Setup Utility program and ensure that the resources needed by the PCI/PCI-X adapter are available.
0129800x 0129810x	No update data or incorrect update data for processor x. Download and install the most current system BIOS code level.
01298200	Microprocessor speed mismatch. Install microprocessors with identical speeds.
I9990305	POST could not find an operating system. Install an operating system.

ServerGuide problems

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

Setup and Installation CD

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

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.

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. 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. 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 Level 2 FAN LED is lit, the specific failing fan is indicated by an LED viewable with the top cover removed. If the Level 2 MEM LED is lit, the specific failing DIMM is indicated by an LED on the memory board. See the solving problems section in the *User's Reference* on the *xSeries 360 Documentation* CD for more information.

Troubleshooting charts

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

Look for the symptom in the left column of the chart. Instructions and probable solutions to the problem are in the right column. 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 to determine if the server is running correctly.
3. If the server works correctly, reinstall the new software or new device and continue problem diagnosis using the troubleshooting charts.

Table 2. Troubleshooting charts.

Symptom	Suggested action
General problems	Call for service.
Problems such as broken cover locks or indicator lights not working.	
Intermittent problems	Verify that: <ol style="list-style-type: none"> 1. All cables and cords are connected securely to the rear of the server and attached options. 2. When the server is turned on, air is flowing from the 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. 3. The SCSI bus and devices are configured correctly and that the last external device in each SCSI chain is terminated correctly. If the problem remains, call for service.
A problem occurs only occasionally and is difficult to detect.	
CD-ROM drive problems	Verify that: <ol style="list-style-type: none"> 1. The primary IDE channel is enabled in the Configuration/Setup Utility program. 2. All cables and jumpers are installed correctly. 3. The correct device driver is installed for the CD-ROM drive. If the problem remains, call for service.
CD-ROM drive is not recognized.	
Diskette drive problems	If there is a diskette in the drive, verify that: <ol style="list-style-type: none"> 1. The diskette drive is enabled in the Configuration/Setup Utility program. 2. The diskette is good, and not damaged. (Try another diskette if you have one.) 3. The diskette contains the necessary files to start the server. 4. The software program is working correctly. If the diskette drive activity light 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 2. Troubleshooting charts.

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

Table 2. Troubleshooting charts.

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

Table 2. Troubleshooting charts.

Symptom	Suggested action
The monitor works when you turn on the server, but goes blank when you start some application programs.	<p>Verify that:</p> <ol style="list-style-type: none"> 1. The primary monitor cable is connected to the video port. 2. You installed the necessary device drivers for the applications. <p>If these items are correct and the screen remains blank, call for service.</p>
Wavy, unreadable, rolling, distorted screen, or screen jitter.	<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>Notes:</p> <ol style="list-style-type: none"> 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.). 2. Non-IBM monitor cables might cause unpredictable problems. 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. <p>If the problem remains, call for service.</p>
Wrong characters appear on the screen.	<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>
Option problems	<p>Verify that:</p>
An IBM option that you just installed does not work.	<ol style="list-style-type: none"> 1. The server supports the option. See the "Server Support" flowchart for information about obtaining ServerProven compatibility information from the World Wide Web. 2. You followed the installation instructions that come with the option. 3. The option is installed correctly. 4. You have not loosened any other installed options or cables. 5. You updated the configuration information using the Configuration/Setup Utility program. Whenever memory or an option is changed, you must update the configuration. <p>If the problem remains, call for service.</p>
An IBM option that used to work does not work now.	<p>Verify that all of the option hardware and cable connections are secure.</p> <p>If the option comes with its own test instructions, use those instructions to test the option.</p> <p>If the failing option is a SCSI option, verify that:</p> <ol style="list-style-type: none"> 1. The cables for all external SCSI options are connected correctly. 2. The last option in each SCSI chain, or the end of the SCSI cable, is terminated correctly. 3. Any external SCSI option is turned on. You must turn on an external SCSI option before turning on the server. <p>If the problem remains, call for service.</p>

Table 2. Troubleshooting charts.

Symptom	Suggested action
Power problems	Verify that:
The server does not power on.	<ol style="list-style-type: none"> 1. The power cables are properly connected to the server. 2. The electrical outlet functions properly. 3. The type of installed memory is correct. 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. 5. The LEDs on the power supply are on. 6. The microprocessors are installed in the correct sequence. <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"> 1. Press Ctrl+Alt+Delete. 2. Turn off the system by pressing the power-control button. <p>If the problem remains or if you are using an ACPI-aware operating system, call for service.</p>
Printer problems	Verify that:
The printer does not work.	<ol style="list-style-type: none"> 1. The printer is turned on and is online. 2. The printer signal cable is connected to the correct port on the server. 3. You have installed the latest printer device drivers. <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>
Software problems	To determine if problems are caused by the software, verify that:
Suspected software problem.	<ol style="list-style-type: none"> 1. The server has the minimum memory requirements to use the software. For memory requirements, see the information that comes with the software. Note: If you have just installed an adapter or memory, you might have a memory address conflict. 2. The software is designed to operate on the server. 3. Other software works on the server. 4. The software that you are using works on another system. <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>
Universal Serial Bus (USB) port problems	Verify that:
A USB device does not work.	<ol style="list-style-type: none"> 1. You are not trying to use a USB device during POST if you have a standard (non-USB) keyboard attached to the keyboard port. Note: If a standard (non-USB) keyboard is attached to the keyboard port, the USB is disabled and no USB device will work during POST. 2. The correct USB device driver is installed. 3. The operating system supports USB devices. <p>If the problem remains, call for service.</p>

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/cgibin/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
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.

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.

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.

Machine - IBM @server xSeries 360 Type 8686
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Warranty period - Three years

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 43.

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.

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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.

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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Predictive Failure Analysis	

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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 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 is less.

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.

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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