IBM

@server

xSeries 370

User's Reference

IBM

xSeries 370

User's Reference

```
┌─ Note ──────────────────────────────────────────────────────────────────────┐
│                                                                               │
│  Before using this information and the product it supports, be sure to read the general information in Appendix A, │
│  "Product warranties and notices" on page 173.                                │
│                                                                               │
└───────────────────────────────────────────────────────────────────────────────┘
```

First Edition (March 2001)

Contents

Safety

⚠

Before installing this product, read the Safety Information.

قد انة 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)。

Prije instalacije ovog produkta obavezno pročitajte Sigurnosne Upute.

Před instalací tohoto produktu si přečtěte příručku bezpečnostních instrukcí.

Læs sikkerhedsforskrifterne, før du installerer dette produkt.

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.

Lees voordat u dit product installeert eerst de veiligheidsvoorschriften.

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 pečítaje 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.

安裝本產品之前，請先閱讀「安全資訊」。

1

DANGER

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

To Connect:	To Disconnect:
1. Turn everything OFF.	1. Turn everything OFF.
2. First, attach all cables to devices.	2. First, remove power cords from outlet.
3. Attach signal cables to connectors.	3. Remove signal cables from connectors.
4. Attach power cords to outlet.	4. Remove all cables from devices.
5. Turn device ON.	

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.

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.**

4

≥18 kg (39.7 lbs)   ≥32 kg (70.5 lbs)   ≥55 kg (121.2 lbs)

CAUTION:
Use safe practices when lifting.

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.

Handling static-sensitive devices

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

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

- Limit your movement. Movement can cause static electricity to build up around you.

- Handle the device carefully, holding it by its edges or its frame.

- Do not touch solder joints, pins, or exposed printed circuitry.

- Do not leave the device where others can handle and 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 two seconds. (This drains static electricity from the package and from your body.)

- Remove the device from its package and install it directly into your system unit without setting it down. If it is necessary to set the device down, place it on its static-protective package. (If your device is an adapter, place it component side up.) Do not place the device on your system unit cover or on a metal table.

- Take additional care when handling devices during cold weather because heating reduces indoor humidity and increases static electricity.

About this book

This book provides instructions on how to configure your IBM xSeries 370 server and how to install and remove options. This book also provides information to help you solve many simple problems that might occur.

How this book is organized

Chapter 1, "Introducing the IBM xSeries 370," provides detailed information about the features of your server. This chapter also provides a general introduction to using your server.

Chapter 2, "Arranging your workspace," contains instructions for arranging your workspace.

Chapter 3, "Configuring your server," describes how to use the Configuration/Setup Utility program to configure your server. This chapter also provides instructions for using various utility programs and resolving configuration conflicts.

Chapter 4, "Installing options," contains instructions for installing and removing options, such as processors, memory, adapters, and internal drives. Instructions for connecting external options are also included in this chapter.

Chapter 5, "Board and adapter components," identifies the components on the boards and adapters that come with your server, and contains information about the jumper locations.

Chapter 6, "Solving problems," includes an overview of the diagnostic tools, instructions for testing the server, error codes and messages, and troubleshooting charts.

Chapter 7, "Getting help, service, and information," provides the telephone number and World Wide Web listings that you can use to obtain product updates, help, or service.

Appendix A, "Product warranties and notices," contains warranty and emission notices. This chapter also contains trademarks and general-information notices.

An index follows the appendix.

Notices used in this book

This book contains information notices that relate to a specific topic. The Caution and Danger notices also appear in a multilingual *Safety Information* book provided on the *IBM xSeries Documentation* CD. Each notice is numbered for easy reference to the corresponding notices in the multilingual book.

The notice definitions are as follows:

- **Notes**

  These notices provide important tips, guidance, or advice.

- **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 notices indicate situations that can be potentially hazardous to you. A caution notice is placed just *before* a description of a potentially hazardous procedure step or situation.

- **Danger**

   These notices indicate situations that can be potentially lethal or extremely hazardous to you. A danger notice is placed just *before* a description of a potentially lethal or extremely hazardous procedure step or situation.

Chapter 1. Introducing the IBM xSeries 370

Your IBM® @server xSeries 370 is a high-performance, symmetric multiprocessing (SMP) serve r. It is ideally suited for networking environments that require superior processor performance, efficient memory management, flexibility, and large amounts of reliable data storage.

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

Your server comes with a three-year limited warranty and IBM Server Start Up Support. You can obtain up-to-date information about your xSeries 370 and other IBM server products at http://www.ibm.com/eserver/xseries on the World Wide Web.

Your server serial number and model number are located near the bottom of the front bezel and on the front panel. Write these numbers in the spaces provided in your *Installation Guide* You will need these numbers when you register your server with IBM. After you register your server, you can receive information about updates, performance tips, and compatibility. To register your server, go to http://www.ibm.com/pc/register on the World Wide Web.

Features and specifications

The following table summarizes the features of the xSeries 370 server.

Processors	Expansion-slot connectors	Power supplies

• Intel® Pentium® III Xeon™ processor with Streaming SIMD Extensions
• Expandable to eight processors
• 100 MHz Front Side Bus (FSB)
• 16 KB of level-1 cache memory
• 512 KB, 1 MB, or 2 MB of level-2 cache with error checking and correction (ECC) memory integrated into processor
• Upgradable processor speeds
 	
Memory
 	
• One memory board standard
  – Sixteen 168-pin, dual inline memory-module (DIMM) connectors
  – Supports up to 16 GB[1]
• Expandable to 32 GB
• 100 MHz, PC100, registered synchronous dynamic random-access memory (SDRAM) with error checking and correction (ECC)
• Support for 128 MB, 256 MB, 512 MB, and 1 GB DIMMs
• Support for a second memory board (optional)
 	
Diskette drive
 	
• Supports one diskette drive
• Standard: One 3.5-inch, 1.44 MB
 	
Hard disk drives
 	
• Two half-high, 3.5-inch drive bays
• Supports up to two internal hard disk drives
 	
CD-ROM drive
 	
• Supports one CD-ROM drive
• Standard: Integrated drive electronics (IDE)
	Supports up to 14 adapters:
	
	• 12 available PCI slot connectors
	  – Eight 64-bit, 33 MHz, hot-plug PCI slot connectors
	  – Four 64-bit, 66 MHz, hot-plug PCI slot connectors
	• Standard: I/O integrated function card
	• Standard: Advanced System Management PCI adapter
	
	Upgradable features
	
	• Advanced System Management PCI adapter upgrades (when available)
	• Diagnostics upgrades (when available)
	• Memory upgrades (when available)
	• POST/BIOS upgrades (when available) to update electrically erasable programmable read-only memory (EEPROM) on the I/O integrated function card
	
	Security features
	
	• Chassis-intrusion detector (tower option only)
	• Power-on and administrator passwords
	• Security-error indicator (tower option only)
	• Selectable drive-startup sequence
	• Side cover lock (tower option only)
	• Unattended start mode
	
	SCSI features
	
	• Wide Ultra-2 SCSI (LVD) controller[2]
	  – One external connector
	  – One internal connector
	• Two bays available for internal SCSI hard disk drives
		• Standard: Three hot-swap power supplies
		• 750 Watts each
		• Auto-sensing function
		• Built-in overload and surge protection
		• Automatic restart after a loss of power
		• Redundant power available
		
		Predictive Failure Analysis™ (PFA) alerts
		
		• Fans
		• Power supplies
		• Memory
		• Hard disk drives
		• Processors
		• Voltage regulator modules (VRMs)
		
		Integrated functions
		
		• I/O integrated function card
		• Two serial ports
		• Two Universal Serial Bus (USB) ports
		• One parallel port
		• Mouse port
		• Keyboard port
		• Video port
		• Wake on LAN™ capability
		• Alert on LAN™ capability
		• Advanced System Management PCI adapter
		  – Full-duplex 10/100 Mbps Ethernet controller for system management use
		  – Advanced System Management Interconnect port
		  – Two serial ports
		• Built-in programmable read-only memory (PROM) based diagnostics

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[1] GB equals approximately 1 000 000 000 bytes.

[2] LVD = low-voltage differential

The following tables provide the specifications for the xSeries 370 server.

Table 1. System specifications

Size	Environment	Acoustical noise emission values

Size
 	
• Depth: 747 mm (29.4 in.)
• Height: 356 mm (14 in.) (8 U)
• Width: 440 mm (17.3 in.)
 	
Weight
 	
• Unpacked, minimum configuration: 67 kg (147 lb.)
• Unpacked, maximum configuration: 77.5 kg (170 lb.)
 	
Electrical input
 	
• Sine-wave input (50± or 60± Hz) is required
• Input voltage
  – Low range
    - Minimum: 90 V ac
    - Maximum: 137 V ac
  – High range
    - Minimum: 180 V ac
    - Maximum: 265 V ac
  – Input kilovolt-amperes (KVA) approximately
    - Minimum configuration as shipped: 0.5 KVA
    - Maximum configuration: 2.1 KVA
	Environment
	
	• Air temperature
	  – System on: 10° to 35° C (50° to 95° F)
	    Altitude: 0 to 914 m (3000 ft.)
	  – System on: 10° to 32° C (50° to 89.6° F)
	    Altitude: 0 to 2133 m (7000 ft.)
	  – System off: 10° to 43° C (50° to 110° F)
	• Humidity
	  – System on:
	    8% to 80%; maximum wet-bulb 23° C (73.4° F)
	  – System off:
	    8% to 80%; maximum wet-bulb 27° C (80.6° F)
	
	Electrostatic discharge
	
	Tested to 20 KV
	
	Immunity
	
	Verified to comply with EN 50082-2
		Acoustical noise emission values
		
		See Table 2.
		
		Heat output
		
		Approximate heat output in British thermal units (Btu) per hour:
		
		• Minimum configuration: 1700 Btu/hr.
		• Maximum configuration: 7000 Btu/hr.
		
		Safety standards
		
		• UL 1950, Third Edition
		• CSA C22.2 No. 950-95
		• EN 60950 and countries deviations
		• IEC 950
		• NOM-019

Table 2. Acoustical noise emission values

Declared (upper limit) sound power levels	Mean value of the A-weighted sound pressure levels at the operator position (if any)	Mean value of the A-weighted sound pressure levels at the bystander (1 meter) position

• Rack server
  – 6.1 bels operating
  – 6.1 bels idle
• Tower server
  – 6.2 bels operating
  – 6.2 bels idle
	• Rack server
	  – dB operating — Not applicable
	  – dB idle — Not applicable
	• Tower server
	  – dB operating — Not applicable
	  – dB idle — Not applicable
		• Rack server
		  – 45.0 dB operating
		  – 45.0 dB idle
		• Tower server
		  – 43.5 dB operating
		  – 43.0 dB idle

Notes:

1. These levels are measured in controlled acoustical environments according to ISO 7779, and are reported in accordance with ISO 9296. The declared sound power levels indicate an upper limit, below which a large portion of machines operate.

2. These values apply to a random sample of machines.

3. There is no impulsive noise, and there are no prominent tones.

4. For additional information on the server tower model, refer to *IBM 8Ux28D Rack-to-Tower Conversion Kit Installation Instructions*.

What your server offers

The unique design of your xSeries 370 takes advantage of advancements in data storage, networking, and memory management. Your server offers:

- Impressive performance processing

  Your xSeries 370 server supports up to eight Intel Pentium III Xeon processors. You can install multiple processors in your server to enhance performance and provide SMP capability.

- 100 MHz Front Side Bus (FSB)

  The FSB is the processor external bus. This bus is the interface between the processors and the processor controller board. The FSB is also known as the processor/host bus.

- Large system memory

  The memory bus in your server supports up to 32 GB of system memory. The memory controller provides support for 100 MHz, synchronous dynamic random-access memory (SDRAM) with error checking and correction (ECC). The memory controller provides ECC support for up to 32 industry-standard, 168-pin, single connector, 8-byte, dual inline memory modules (DIMMs).

  Note: To verify the correct amount of memory installed in your server, review the information on the Logo screen during system startup. The operating system might not reflect the correct amount of memory.

- Advanced System Management support

  With the Advanced System Management service, you can configure system management events, such as power-on self-test (POST), loader, and operating-system timeouts or critical temperature, voltage, and tamper alerts.

  The Advanced System Management PCI adapter generates all alerts, timeouts, and other system management information. The adapter then forwards this information to other systems on the Ethernet or Token-Ring network (or uses its modem to forward this data using a serial connector).

  For more information on the features and functions of the Advanced System Management PCI adapter, refer to the documentation provided with your system-management software.

  For an illustration of the Advanced System Management PCI adapter, see "Advanced System Management PCI adapter component locations" on page 101.

- IBM ServerGuide™

  The ServerGuide™ CDs included with your server provide programs to help you set up your server and install the network operating system (NOS). The ServerGuide program detects the hardware options installed and provides the correct configuration program and device drivers. For more information, see the ServerGuide topic provided on the *IBM xSeries Documentation* CD.

- Diagnostic programs

  Your server comes with built-in read-only memory (ROM) based diagnostic programs that test the standard features of your server. You can also use these programs to test some external devices. For more information, see "Diagnostic programs" on page 119.

Reliability, availability, and serviceability features

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

The following is an abbreviated list of the RAS features on the IBM xSeries 370 server. Many of these features are explained in the following chapters of this book.

- Reliability features
  - Cooling fans with speed-sensing capability
  - ECC FSBs
  - ECC L2 cache
  - ECC memory
  - Parity checking on the SCSI bus and PCI buses
  - Power Managed - Advanced Configuration and Power Interface (ACPI) level
  - Power-on self-test (POST)
- System management monitoring via Intra-Integrated Circuit (I^2C) bus

- Availability features
  - Advanced Desktop Management Interface (DMI) features
  - Automatic error retry/recovery
  - Automatic server restart
  - Automatic restart after power failure
  - Built-in, menu-driven configuration programs
  - Built-in, menu-driven small computer system interface (SCSI) configuration programs
  - Built-in, menu-driven setup programs
  - Hot-swap hard disk drives
  - Hot-plug PCI
  - Hot-plug USB keyboard and mouse
  - Menu-driven diagnostic programs on diskette
  - Predictive Failure Analysis™ (PFA) alerts
  - Programmable read-only memory (PROM) based diagnostics
  - Redundant and hot-plug cooling
  - Redundant and hot-plug power
  - ServeRAID™ adapter support
  - Standard Advanced System Management PCI Adapter provides control for remote system management
  - Upgradable POST, BIOS, diagnostics, and Advanced System Management PCI Adapter microcode
  - Wake on LAN capability

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[3] Response time will vary, depending on the number and nature of calls received.

- Serviceability features
    - Alert on LAN™ capability
    - Built-in, menu-driven EEPROM-based diagnostics
    - Customer support center 24 hours per day[3]
    - Error codes and messages
    - Front panel messages
    - LED card diagnostics
    - Processor serial number access
    - Standard cables present detection
    - Standby voltage for system management features and monitoring
    - System error logging (POST and Advanced System Management PCI Adapter)
    - Vital product data (VPD), including serial number information and replacement part numbers, stored in nonvolatile memory, for easier remote maintenance of your server.

Controls and indicators

The most commonly used controls and status indicators are on the front of your server. See "System component status indicators" on page 157 for additional information on status indicators.
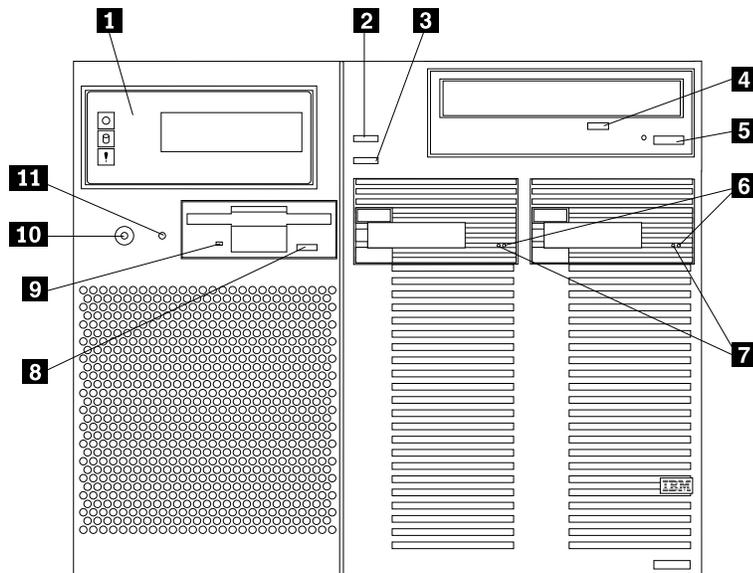
1 **Front panel:** The lights and messages on this panel give status information for your server. See "Front panel" on page 10 for more information.

2 **Scroll button:** Press this button to select an action to perform on a system-monitoring message; then, press the Enter button to perform the action. You can select:

- **Keep** to retain the message on the front panel and enable the system error light to continue to flash

- **Remind** to retain the message on the front panel and enable the system error light to flash slowly

- **Clear** to clear the message from the front panel and enable the system error light to stop flashing

3 **Enter button:** Press this button to perform an action on system-monitoring messages that appear on the front panel.

4 **CD-ROM drive in-use light:** When this light is on, the CD-ROM drive is being accessed.

5 **CD-ROM eject/load button:** Press this button to eject or retract the CD-ROM tray so that you can insert or remove a CD.

6 **Hard disk drive status light:** This light operates only in a ServeRAID environment. Each of the hot-swap drives has a Hard Disk Drive Status light. When the amber light for a hard disk drive is on continuously, the drive has failed. When the light flashes slowly (one flash per second), the drive is being

rebuilt. When the light flashes rapidly (three flashes per second), the ServeRAID controller is identifying the drive.

7 **Hard disk drive in-use light:** Each hot-swap hard disk drive has a Hard Disk Drive In-Use light. When the green light for a hard disk drive is on, the drive is being accessed.

8 **Diskette-eject button:** Press this button to eject a diskette from the drive.

9 **Diskette drive in-use light:** When this light is lit, the diskette drive is being accessed.

10 **Power control button:** Press this button to manually turn the server on or off. See "Turning on the server" and "Turning off the server" on page 9 for more information.

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

Turning on the server

Use the following instructions to turn on the server.

13

DANGER

> **Overloading an electrical circuit breaker is potentially a fire hazard and a shock hazard under certain conditions. To avoid these hazards, adhere to the instructions in the following statements.**
>
> 1. **If you are connecting to a 100–127 V ac power source, connect each power cord to a separate branch circuit.**
>
> 2. **If you are connecting to a 200–240 V ac power source and the branch circuit breaker rating is:**
>
>   a. **13 amps or less, connect each power cord to a separate branch circuit.**
>
>   b. **14 amps to 19 amps, do not connect more than two power cords to the same branch circuit.**
>
>   c. **20 amps or greater, you may connect up to three power cords to the same branch circuit.**

- You can turn the server on by pressing the Power Control button on the front of the server.

- The server can also be powered on by the Advanced System Management PCI adapter, Wake on LAN, Wake on Real-Time Clock Alarm, or Wake on Ring.

Note: To enable the wakeup features, you must install the appropriate software and hardware in your server. For complete details, refer to the documentation that comes with your Ethernet adapter.

Turning off the server

Use the following instructions to turn off the server.

5

CAUTION:
The Power Control button on the front of the server does not turn off the electrical current supplied to the server. The server also might have more than one power cord. To remove all electrical current from the server, ensure that all power cords are disconnected from the power source.
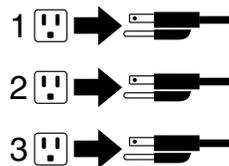
- Pressing the Power Control button causes an immediate shutdown of the server, and places the server in standby mode. This feature can be used if the operating system hangs.

  Note: After turning off the server, wait at least five seconds before pressing the Power Control button to power on the server again.

- Disconnecting all of the server power cords from the electrical outlet will shut off all power to the server.

  Note: Wait about 15 seconds after disconnecting the power cords for your system to stop running. Watch for the System Power light on the front panel to stop flashing or illuminating.

- The server can also be powered off by the Advanced System Management PCI adapter.

Front panel

The front panel on the server contains status lights and system messages.
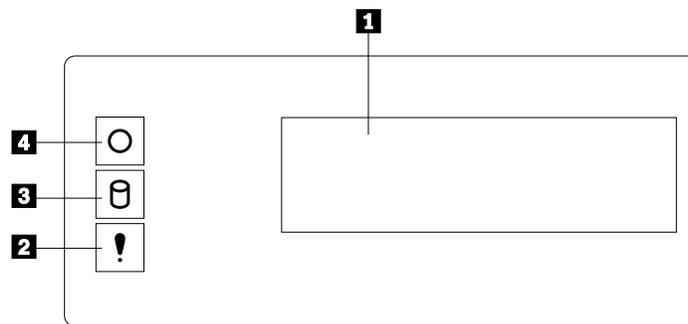
1 **Information message panel:** System monitor information appears on this display. The Advanced System Management PCI adapter monitors system functions and generates the messages. See "System-monitoring messages" on page 146 for more information.

When the server is in standby mode (the system power supply is turned off and ac current is present), the information message panel can display system monitor information.

2 **System error light:** This amber light is on when a system error occurs. Information about the condition displays on the information message panel.

3 **SCSI hard disk drive in-use light:** This green light is on when there is activity on a hard disk drive.

Attention: If the System Power Light is off, it does not mean there is no electrical current present in the server. To remove all electrical current from the server, you must unplug the server power cords.

4 **System Power Light:** When this green light is on, system power is present in the server. When this light flashes, the server is in standby mode (ac current is present). When this light is off, it indicates either power supply failure or an ac power failure, or the power cords have been disconnected.

Input/output connectors and expansion slots

Input/output (I/O) connectors provide ports for transferring information into and out of your server. You can connect a variety of I/O devices to your server, including a monitor, keyboard, mouse, and printer. For more information on the ports and their specific technologies, see "Connecting external options" on page 94.

At the rear of your server is an I/O function card that provides access to some I/O connectors. Adapters installed in expansion slots might also provide I/O connectors. The following illustration shows the expansion slots and the I/O connectors (ports) on the I/O function card, chassis, and the Advanced System Management PCI adapter.
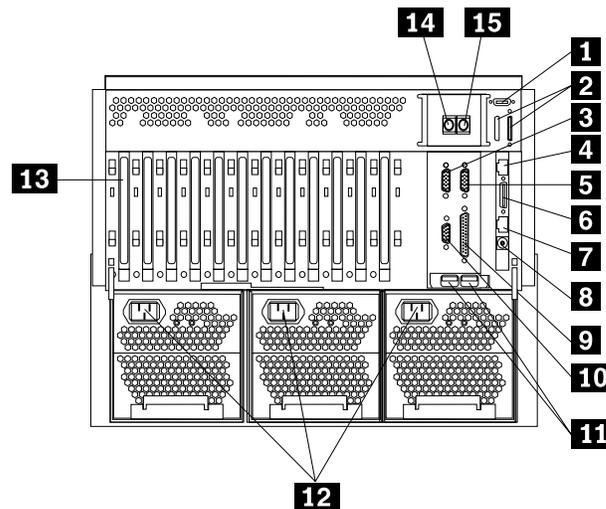
1 **External connector knockouts for Advanced System Management PCI adapter token-ring option:** The chassis has an external connector knockout that can be used when you install the Advanced System Management PCI adapter token-ring option.

2 **External SCSI device connector:** External SCSI devices attach here. The knockout for a second external SCSI connector is not used.

3 **Serial port A connector:** Serial signal cables for modems and other serial devices connect here to the 9-pin serial port A connector. See "Devices and I/O ports" on page 23 for port assignment information. If you are using a 25-pin signal cable, you need a 9-pin-to-25-pin adapter cable.

4 **Advanced System Management PCI adapter 10/100 Mbps Ethernet port connector:** This connector attaches the Advanced System Management PCI adapter to a network hub for remote communication.

> **Note:** The Advanced System Management PCI adapter 10/100 Mbps Ethernet connector cannot be accessed from the network operating system. The connector is dedicated to connecting your Advanced System Management PCI adapter to an Ethernet network through a service-processor interface, such as the system management software that comes with your server.

5 **Serial port B connector:** Serial signal cables for modems and other serial devices connect here to the 9-pin serial port B connector. See "Devices and I/O ports" on page 23 for port assignment information. If you are using a 25-pin signal cable, you need a 9-pin-to-25-pin adapter cable.

6 **Advanced System Management PCI adapter dual serial port connector:** This connector can be used to attach to a *Y-cable* that is shipped with your server. This Y-cable can be used to attach to a modem that is dedicated to communication with the Advanced System Management PCI adapter.

7 **Advanced System Management Interconnect port connector:** This connector is used to attach other compatible service processors for remote access.

8 **Advanced System Management external power connector:** This connector is not used.

9 **Parallel port connector:** A signal cable for a parallel device, such as a printer connects here.

10 **Video port connector:** The monitor signal cable connects here.

11 **Universal Serial Bus connectors:** You can attach I/O devices to these two Universal Serial Bus (USB) connectors. You need a 4-pin cable to connect devices to USB 1 or 2. A hot-plug keyboard-and-mouse option can be cabled or uncabled from the USB connectors without error or loss of service. Review your operating-system documentation to determine whether your operating system supports USB devices.

> **Note:** If a standard (non-USB) keyboard is attached to the keyboard port, the USB ports are disabled while the power-on self-test (POST) is running, and no USB devices will work during POST.

12 **Power supply connectors:** The three system power cords connect here.

13 **PCI expansion slots:** Your server has twelve 64-bit, PCI expansion slots. All PCI slots support hot-plug PCI adapters.

Your server has assigned PCI slots 10, 11, and 12 as PCI priority slots. The system BIOS scans the PCI priority slots for startable (bootable) devices before scanning the I/O function card.

> **Note:** If you install additional storage adapters and external hard disk drives, and you do not want to change the startup hard disk drive, you must install the adapters in PCI slots 1 through 9.

14 **Keyboard port connector:** The keyboard cable connects here.

15 **Mouse port connector:** The mouse cable connects here. This port sometimes is called an auxiliary-device or pointing-device port.

> **Note:** For pin assignments and other details about these connectors, see "Connecting external options" on page 94.

Power supplies

Your server comes with three hot-swap power supplies. The power supplies can provide up to 550 watts each at 110 V ac input power, and 750 watts each at 220 V ac input power.

13

DANGER

> **Overloading an electrical circuit breaker is potentially a fire hazard and a shock hazard under certain conditions. To avoid these hazards, adhere to the instructions in the following statements.**
>
> 1. **If you are connecting to a 100–127 V ac power source, connect each power cord to a separate branch circuit.**
>
> 2. **If you are connecting to a 200–240 V ac power source and the branch circuit breaker rating is:**
>
>   a. **13 amps or less, connect each power cord to a separate branch circuit.**
>
>   b. **14 amps to 19 amps, do not connect more than two power cords to the same branch circuit.**
>
>   c. **20 amps or greater, you may connect up to three power cords to the same branch circuit.**

In addition to the power supplies, your server comes with three 220 V ac power cords, and three 110 V ac power cords (U.S. only). Be sure to select the appropriate power cord voltage for your server environment. All three power cords must have the same voltage.

If you connect all three power cords of the same voltage to the power supplies, the three power supplies support redundancy and hot-swap capability.

For servers with redundant power, the loss of a single power supply will not affect the server operation. Replace a power supply that has failed as soon as convenient to help maintain the redundant power and cooling capability. When a power supply has failed and the Power Good light is on, the dc power LED on the power supply is off. See "Power supply LEDs" on page 156 for more information on the dc power LEDs. See "Replacing a hot-swap power supply" on page 84 for complete details on the power supplies.

Attention: To ensure proper server operation, be sure to connect all three 220 V ac power cords or all three 110 V ac power cords to the power supplies.

Notes:

1. Your server also comes with three 220 V ac power cords for connection to the server rack power distribution unit (PDU). Refer to the documentation that comes with your PDU option for additional information on installing a PDU. Refer to the *Rack Mounting Instructions* provided on the *IBM xSeries Documentation* CD or that comes with your server for additional information on installing a server in a rack.

2. Power cords vary by country. For details about power cords for use in your country or region, see "Power cords" on page 15 or go to http://www.ibm.com/pc/support on the World Wide Web.

The following illustration shows the power supplies in your server. Your server might differ slightly from this illustration.
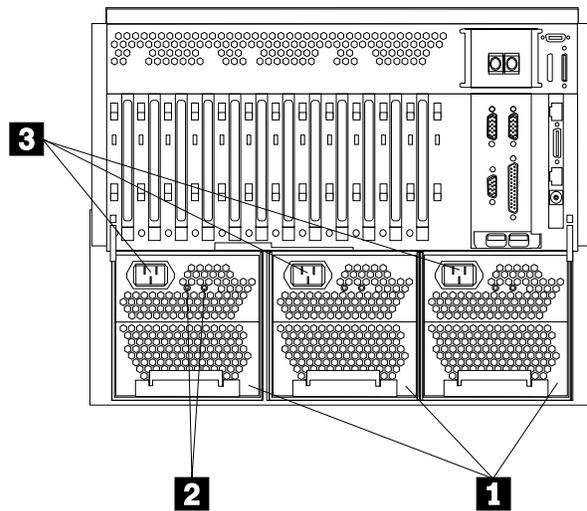
1   **Power supplies:** See "Replacing a hot-swap power supply" on page 84 for information on power supply requirements and for instructions on installing additional power supplies.

2   **AC and DC power lights:** These lights provide status information about the power supplies. These adjacent lights are located on the power supplies; the ac power light is located closest to the power supply connector. During normal operation, both the ac and dc power lights are on. For any other combination of lights, see "Power supply LEDs" on page 156.

3   **Power supply connectors:** The three system power cords connect here.

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
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

Chapter 2. Arranging your workspace

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

Comfort

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

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

When using the keyboard, keep your forearms parallel to the floor and your wrists in a neutral, comfortable position. Try to keep a light touch on the keyboard and your hands and fingers relaxed. You can change the angle of the keyboard for maximum comfort by adjusting the position of the keyboard feet.
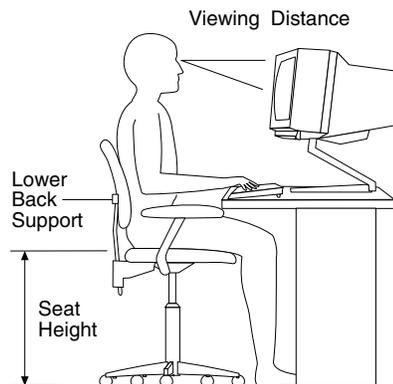
Adjust the monitor so the top of the screen is at, or slightly below, eye level. Place the monitor at a comfortable viewing distance, usually 51 to 61 cm (20 to 24 in.), and position it so you can view it without having to twist your body. Also position other equipment you use regularly, such as the telephone or a mouse, within easy reach.

Glare and lighting

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

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

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

Air circulation

Your server and monitor produce heat. Your server has one or more fans that pull in fresh air and force out hot air. The monitor lets hot air escape through vents. Blocking the air vents can cause overheating, which might result in a malfunction or damage. Place the server and monitor so that nothing blocks the air vents. In a rack enclosure, be sure to maintain a minimum clearance of 203.2 mm (8 in.) between the rear of the chassis and the surface of the rear door when the door is closed.

Note: To accommodate the xSeries 370 server, a *Rack Extension Option* can be installed on the IBM rack enclosure.

Electrical outlets and cable lengths

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

When arranging your workspace:

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

For more information about power cords, see "Power cords" on page 15.

Chapter 3. Configuring your server

This chapter provides information on the Configuration/Setup Utility program that comes with your server. In addition, this chapter provides information on the SCSISelect Utility program.

The Configuration/Setup Utility program is part of the *basic input/output system* (*BIOS*) that comes with your server. Using these programs, you can set the system date and time, define input and output device parameters, and define system security.

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

Accessing server programs

After you start the server, several prompts appear on the IBM logo screen.

- To access the Configuration/Setup Utility program, press F1 when the prompt `Press F1 for Configuration/Setup` appears. See "The Configuration/Setup Utility program" on page 20 and "Using the Configuration/Setup Utility main menu" on page 21 for additional information.

- To access the Diagnostic Utility program, press F2 when the prompt `Press F2 for Diagnostics` appears. For information on running the diagnostics programs, see "Diagnostic programs" on page 119.

- To access the utility programs in the System Partition, press Alt+F1 when the prompt `Press Alt+F1 for System Partition Boot` appears. Refer to the ServerGuide topic on the IBM xSeries *Documentation* CD that comes with your server for information about using ServerGuide to create a System Partition.

Configuration overview

You play a key role in how your server allocates resources to organize and interconnect hardware devices and software programs. This allocation process is referred to as *configuration.* The steps required to configure your server depend on the number and types of devices and programs that you install.

Your server supports PCI adapters and SCSI devices. Because of this flexibility, you can choose from among many adapters and devices.

In general, the greater the number and variety of hardware devices and software programs that you install in your server, the more you will have to interact with your server and your devices to correctly configure your system.

Your server comes with the following hardware configuration programs:

- Configuration/Setup Utility

  With the built-in Configuration/Setup Utility program, you can configure I/O functions, such as serial and parallel port assignments; change interrupt request (IRQ) settings; and change the startup sequence for drives that you install. You also can use this program to set passwords for starting up the server and accessing the Configuration/Setup Utility program.

- SCSISelect Utility

  With the built-in SCSISelect Utility program, you can configure the SCSI devices that you attach to the SCSI controller. You can use SCSISelect to change default values, resolve configuration conflicts, and perform a low-level format on a SCSI hard disk drive.

Before installing a new device or program, read the documentation that comes with it. Reading the instructions helps you to determine the steps required for installation and configuration. The following actions are typically, but not always, required to configure your server.

1. Run the Configuration/Setup Utility program and record the current configuration settings.

2. Set jumpers or switches on server components.

   See "Changing jumper settings" on page 111 and "I/O function card jumpers" on page 104.

3. Set jumpers or switches on the device.

   See the device installation instructions.

4. Install the device in the server.

   See Chapter 4, "Installing options" on page 37.

5. Install software programs.

   See the installation instructions that come with the software.

6. Resolve configuration conflicts.

   See "Resolving configuration conflicts" on page 32.

The Configuration/Setup Utility program

For most configurations, the server will operate using the default system settings. You need to change the settings only to resolve configuration conflicts or to enable or change device functions (for example, defining diskette types, and so on).

When you want or need to change the default settings, the Configuration/Setup Utility program provides a convenient way to display and change the settings.

After you run and exit from the Configuration/Setup Utility program, configuration information is stored in electrically erasable programmable read-only memory (EEPROM). While the server is off, the configuration information remains available for the next system startup.

Always run the Configuration/Setup Utility program if you add, remove, or relocate any hardware option, or if you receive an error message instructing you to do so.

Review this chapter and the information that comes with the option before making changes. Also, record the current settings before making any changes.

Attention: Maintaining a record of your configuration information is especially important if you need to move the Clear CMOS register contents jumper, which erases all configuration information (see "I/O function card jumpers" on page 104 for details).

To start the Configuration/Setup Utility program:

1. Ensure that there is no diskette in the diskette drive. If the diskette drive contains a diskette, remove it.

2. Turn on the server and watch for the IBM logo screen.

   If the server is turned on already, shut down your operating system and restart the server.

3. After you start the server, several prompts appear on the IBM logo screen. When the prompt `Press F1 for Configuration/Setup` appears, press F1.

   The Configuration/Setup Utility main menu appears. For information on the menu, see "Using the Configuration/Setup Utility main menu."

   Note: If you enter the power-on password and an administrator (supervisor-level) password is also set, a limited version of the menu appears. To see the full menu, you must restart the server and enter the administrator password when you are prompted to enter a password. See "System security" on page 24 for additional information.

Using the Configuration/Setup Utility main menu

From the Configuration/Setup Utility main menu, you can select settings that you want to change. The Configuration/Setup Utility main menu is similar to the following screen.

Note: The choices on some menus might differ slightly, depending on the BIOS version that comes with your server.

```
┌────────────────────────────────────────────────────────────────────┐
│          IBM Server Setup - © Copyright IBM Corporation 2001         │
│          ┌──────────────────────────────────────────┐               │
│          │  Configuration/Setup Utility             │               │
│          │    • System Summary                      │               │
│          │    • System Information                  │               │
│          │    • Devices and I/O Ports               │               │
│          │    • Date and Time                       │               │
│          │    • System Security                     │               │
│          │    • Start Options                       │               │
│          │    • Advanced Setup                      │               │
│          │    • Error Logs                          │               │
│          │      Save Settings                       │               │
│          │      Restore Settings                    │               │
│          │      Load Default Settings               │               │
│          │                                          │               │
│          │      Exit Setup                          │               │
│          └──────────────────────────────────────────┘               │
│                                                                      │
│      <F1>   Help                    <↑> <↓>  Move                    │
│      <Esc> Exit                       <Enter> Select                 │
└────────────────────────────────────────────────────────────────────┘
```
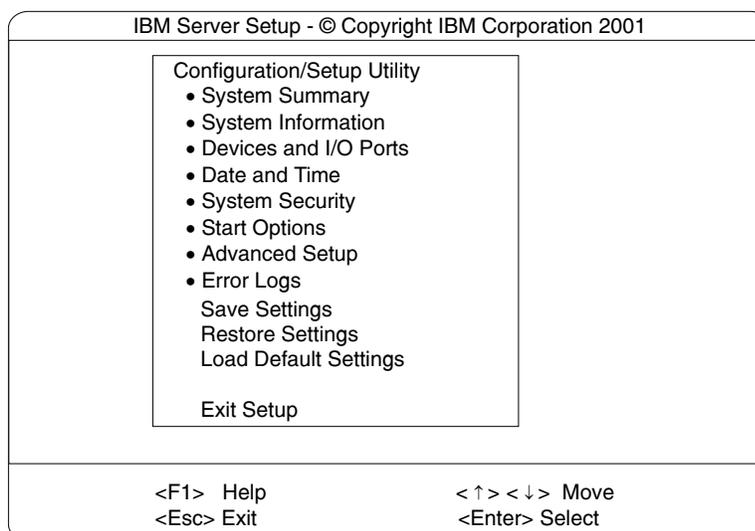
Pressing F1 displays Help information for a selected menu item.

To change configuration settings:

1. Use the Up Arrow (↑) or Down Arrow (↓) key to highlight the menu item for the configuration setting that you want to change; then, press Enter.

2. Use the Up Arrow (↑) or Down Arrow (↓) key to choose the appropriate setting for the selected menu item; then, press Enter.

3. Repeat steps 1 through step 2 for each setting that you want to change. Press Esc to return to the Configuration/Setup Utility main menu.

4. After making changes, you can select:

   • **Save Settings** to save the selected changes.

   • **Restore Settings** to delete the changes and restore the previous settings.

   • **Load Default Settings** to cancel the changes and restore the factory settings.

   Note: The Configuration/Setup Utility main menu selections do not save settings, restore settings, or load default settings for the PCI Slot/Device Information choice. To save settings, or restore settings for the PCI Slot/Device Information choice, you *must* use the menu selections available from the PCI Slot/Device Information choice.

5. To exit from the Configuration/Setup Utility main menu, select **Exit Setup.** If you made any changes and did not save them with the **Save Settings** choice, the system prompts you to save or discard the changes when you attempt to exit from the Configuration/Setup Utility main menu.

System summary

Select this choice to display configuration information, including the type and speed of the processors and amount of memory.

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

The **System Summary** choice appears on the full Configuration/Setup Utility main menu and on the limited Configuration/Setup Utility main menu.

System information

Select this choice to display information on your xSeries 370 server. Changes that you make on other menus might appear on this summary screen. You cannot edit any fields. The System Information choice appears only on the full Configuration/Setup Utility main menu.

Product data

Select this choice to view system information, such as the machine type and model, the system serial number, and the revision level or issue date of the BIOS stored on the flash EEPROM.

System card data

Select this choice to view vital product data (VPD) for some xSeries 370 server components.

Devices and I/O ports

Software recognizes ports through their port assignments. Each port must have a unique port assignment. The Configuration/Setup Utility program normally handles this, but you might have special hardware or software that requires you to change these assignments.

Select the **Devices and I/O Ports** choice to view or change the assignments for devices and input/output ports.

You can add serial ports by installing a serial adapter in an expansion slot. See the documentation that comes with the serial adapter for information on port assignments.

You can configure the parallel port as *bidirectional*; that is, so that data can be both read from and written to a device. In bidirectional mode, the server supports Extended Capabilities Port (ECP) and Enhanced Parallel Port (EPP).

To display or change the assignments for devices, the serial ports, or parallel port:

1. Select **Devices and I/O Ports.**

2. Select a device or port; use the Left Arrow (←) or Right Arrow (→) key to advance through the settings.

   The Devices and I/O Ports choice appears only on the full Configuration/Setup Utility main menu.

Notes:

1. When you configure the parallel port as bidirectional, use an Institute of Electrical and Electronics Engineers (IEEE) 1284-compliant cable. The maximum length of the cable must not exceed 3 meters (9.8 feet).

2. If you install a Universal Serial Bus (USB) keyboard that has a mouse port, the USB keyboard emulates a mouse and you will not be able to disable the mouse settings in the Configuration/Setup Utility program.

3. Check your operating system documentation to see if your operating system supports USB devices.

4. If your operating system supports USB devices, the USB is configured automatically.

Date and time

Select this choice to set the system date and time.

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

The system date is in the standard format for your country. For example, in the United States, the format is **MM/DD/YYYY** (Month/Day/Year).

Select **Date and Time**; then, use the Left Arrow (←) or Right Arrow (→) key to advance through each data field. Type the new information; the system saves the information as you type it.

The **Date and Time** choice appears only on the full Configuration/Setup Utility main menu.

System security

To control access to the information in your server databases, you can implement two levels of password protection. Implementing these security measures helps you to ensure the integrity of the data and programs that are stored in your server.

After you set a power-on password, you can enable the unattended-start mode. This locks the keyboard and mouse, but allows the system to start the operating system. The keyboard and mouse remain locked until you enter the correct password.

The **System Security** choice appears only on the full Configuration/Setup Utility main menu.

After you set a power-on or administrator password, you must enter the password when you turn on the server. (The passwords do not appear on the screen as you type them.)

Type of Password	Results
No password set	• No password is required to start the system. • You can access all choices on the Configuration/Setup Utility main menu.
Power-on password only	• You must enter the password to complete the system startup. • You can access all choices on the Configuration/Setup Utility main menu.
Administrator password only	• You must enter the password to complete the system startup. • The Administrator password provides access to all choices on the Configuration/Setup Utility main menu. • If you need to run the flash update program and the administrator password has been set, you must enter the administrator password when you run the flash update program. • If an administrative password is set and then forgotten, it cannot be overridden or removed. You must contact your IBM service technician.

Type of Password	Results
Administrator *and* power-on password	You can enter either password to complete the system startup. • The administrator password provides access to all choices on the Configuration/Setup Utility main menu. You can set, change, or delete both the administrator and power-on passwords, and allow a power-on password to be changed by the user. • The power-on password provides access to a limited set of choices on the Configuration/Setup Utility main menu. This limited access might include changing or deleting the power-on password. • If you forget the power-on password, and the administrator password has been set, use the administrator password at the power-on password prompt; then, start the Configuration/Setup Utility program and change the power-on password. • If you need to run the flash update program and the administrator password has been set, you must enter the administrator password when you run the flash update program. • If an administrative password is set and then forgotten, it cannot be overridden or removed. You must contact your IBM service technician.

Using the power-on password menu

When a power-on password is set, you must enter a password each time that you start the system.

When a power-on password is set, POST does not complete until you enter the password. If you forget the power-on password, you can regain access to the server through one of the following methods:

• If an administrator password has been set, enter the administrator password at the power-on prompt. (If necessary, see "Using the administrator password menu" on page 26 for details.) Start the Configuration/Setup Utility program and change the power-on password as described in this section (see steps 1 through 4 on page 26).

• You can change the position of the Password override jumper, as described in "Changing jumper settings" on page 111.

• You can remove the battery as described in "Replacing the battery" on page 159 and then install the battery.

To set a power-on password:

1. Select **Power-on Password** from the System Security menu; then, press Enter.

   The Power-on Password menu appears.

2. Type the password in the **Enter Power-on Password** data field.

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

3. Move the cursor to the **Enter Power-on Password Again** data field and type the password again.

Note: A message appears if the two passwords do not match. If this happens, press Esc to cancel the request and return to the System Security menu.

4. Select **Change Power-on Password** to save the new password; then, press Enter.

To delete a power-on password:

1. Select **Power-on Password** from the System Security menu; then, press Enter.

   The Power-on Password menu appears.

2. Select **Delete Power-on Password**; then, press Enter.

3. A confirmation window appears. Press Enter to delete the power-on password. Press Esc to cancel the request and return to the System Security menu.

To allow the system to start in unattended-start mode when a power-on password is set:

1. Select **Power-on Password** from the System Security menu; then, press Enter.

   The Power-on Password screen appears.

2. Select **Allow for unattended boot with password.**

   Press the Left Arrow (←) key or Right Arrow (→) key to toggle the entry to **On**.

   Note: The **Allow for unattended boot with password** data field must be set to **On** for the system to support locally or remotely scheduled system shutdowns or restarts in unattended-start mode.

Using the administrator password menu

The administrator password (sometimes called a supervisor-level password) controls access to some features of the server, including the Configuration/Setup Utility program.

> **Attention:**
>
> If an administrator password is set and then forgotten, it cannot be overridden or removed. You must contact your IBM service technician.

To set an administrator password:

1. Select **Administrator Password** from the System Security menu: then, press Enter.

   The Administrator Password menu appears.

2. Type the password in the **Enter Administrator Password** data field.

   A password can contain any combination of up to seven alphanumeric characters (A–Z, a–z, and 0–9). Keep a record of your password in a secure place.

3. Move the cursor to the **Enter Administrator Password Again** data field and type the password again.

   Note: A message appears if the two passwords do not match. If this happens, press Esc to cancel the request and return to the System Security menu.

4. Select **Change Administrator Password** to save the new password; then, press Enter. The password becomes effective immediately.

To delete an administrator password:

1. Select **Administrator Password** from the System Security menu; then, press Enter.

   The Administrator Password menu appears.

2. Select **Delete Administrator Password**; then, press Enter.

3. A confirmation window appears. Press Enter to delete the administrator password. Press Esc to return to the System Security menu.

To enable a user to change the power-on password:

1. Select **Administrator Password** from the System Security menu; then, press Enter.

   The Administrator Password screen appears.

2. Select **Power-on password changeable by user.** Press the Left Arrow (←) or Right Arrow (→) key to toggle the entry to **Yes.**

When this choice is enabled, **System Security** appears on the limited Configuration/Setup Utility main menu. The System Security menu contains the **Power-on Password** choice.

Note: If you need to run the flash update program and the administrator password has been set, you must enter the administrator password when you run the flash update program.

Start options

Start options take effect when you start your server.

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

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

Attention: If the CD-ROM drive contains a startable CD, you must remove the CD if you want to use a startup sequence that begins with a startable diskette.

You can enable a virus-detection test that checks for changes in the master boot record at startup. You also can choose to run POST in the enhanced mode or the quick mode.

Select **Start Options**; then, use the Left Arrow (←) or Right Arrow (→) key to advance through each data field.

The **Start Options** choice appears only on the full Configuration/Setup Utility main menu.

Advanced setup

Select **Advanced Setup** to change values for advanced hardware features, such as cache control, PCI configuration, and processor serial number access.

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

Use the Left Arrow (←) or Right Arrow (→) key to scroll through each data field after you select one of the setup options.

The **Advanced Setup** choice appears only on the full Configuration/Setup Utility main menu.

Processor serial number access

Select this choice to enable or disable the processor serial-number security feature. This feature has a variety of uses. Review the information that comes with your processor to determine the best use for your organization. In addition, you can check the following Web site for details on the processor serial number access feature:

`http://www.intel.com`

The default value is **Disabled**. To change this value, select **Processor Serial Number Access** from the Advanced Setup menu; then, use the Up Arrow (↑) or Down Arrow (↓) key to highlight the **Processor Serial Number Access** choice. Use the Left Arrow (←) or Right Arrow (→) key to select **Enabled**. Enabling the processor serial number access feature changes the server configuration. Therefore, after you enable this feature, save the new configuration information in the Configuration/Setup Utility program. Start the Configuration/Setup Utility program and select **Save Settings.** See "Using the Configuration/Setup Utility main menu" on page 21 for more information. You must shut down and restart the server to implement this change. When you restart the server, the system displays a message indicating that the configuration has changed.

Modify front panel text

Select this choice to modify the text that appears on the server front panel. For an illustration of the front panel, see "Front panel" on page 10.

To delete text, backspace to the left; then, press the Del or Delete key.

The default value is **IBM Server 8681**. To change this value, select **Modify Front Panel Text** from the Advanced Setup menu; then, use the Up Arrow (↑) or Down Arrow (↓) key to highlight the **Modify Front Panel Text** choice. When the **Modify Front Panel Text** menu appears, use the Up Arrow (↑) or Down Arrow (↓) key to highlight one of the following choices:

- First line of text

  Currently, the *First line of text* value is **IBM Server**. You may change this value to one with a maximum of 16 characters. You may use any valid combination of alphanumeric characters.

- Second line of text

  Currently, the *Second line of text* value is **8681**. You may change this value to one with a maximum of 16 characters. You may use any valid combination of alphanumeric characters.

- Save front panel text changes

  Select this choice if you want to save the changes that you made to the front-panel text.

- Set front panel text to default

  Select this choice if you want to change the front-panel text to its default value of **IBM Server 8681**.

PCI slot/device information

Select this choice to view and identify system resources used by PCI devices. PCI devices automatically communicate with the server configuration information. This usually results in automatic configuration of a PCI device. If a conflict does occur, see "Resolving configuration conflicts" on page 32.

Use the Up Arrow (↑) or Down Arrow (↓) key to highlight the assignment that you want to change and press Enter. Use the Left Arrow (←) or Right Arrow (→) key to select from the list of available choices. An asterisk (*) indicates that more than one device shares a slot. After making changes, you can select:

- **Save Settings** to save the selected changes.
- **Restore Settings** to delete the changes and restore the previous settings.

Note: You can use the menu selections to save settings or restore settings for the PCI Slot/Device Information choice only. The Configuration/Setup Utility main menu selections save settings, restore settings, or load default settings for all other choices, but not the PCI Slot/Device Information choice.

Your server uses a rotational interrupt technique to configure PCI devices. Because of this technique, you can install a variety of PCI devices that currently do not support sharing of PCI interrupts (IRQs). Multiple-function PCI devices use more than one interrupt.

Cache control

Select this choice to enable or disable the processor cache. In addition, you can define the processor cache type as write-back (WB) or write-through (WT). Selecting write-back mode will provide the maximum system performance.

The default values are **Write back** and **Enabled**. For proper server operation, do not change the values in this field.

Note: You cannot enable or disable the cache for individual processors.

Memory settings

Select this choice to manually disable or enable a dual inline memory module (DIMM) slot.

- If you replaced a defective DIMM, you must manually enable the DIMM slot in the Configuration/Setup Utility program. In this case, the system does not automatically access the Configuration/Setup Utility program to enable the DIMM slot.

- If a memory error is detected during POST or memory configuration, the server can automatically disable the failing DIMM slot and continue operating with reduced memory capacity. If this occurs, you must manually enable the DIMM slot after the problem is corrected.

   You can diagnose to just one DIMM.

To manually enable a DIMM slot:

1. Select **Memory Settings** from the Advanced Setup menu.

2. Use the Up Arrow (↑) or Down Arrow (↓) key to highlight the DIMM slot that you want to enable.

3. Use the Left Arrow (←) or Right Arrow (→) key to select **Enable**.

For additional information on DIMMs, see "Installing DIMMs and memory boards" on page 52.

Processor settings

Select this choice to manually enable a processor slot.

- If you replaced a defective processor, you must manually enable the processor slot in the Configuration/Setup Utility program. In this case, the system does not automatically access the Configuration/Setup Utility program to enable the processor slot.

- If a processor error is detected during POST or runtime, the server can automatically disable the failing processors and restart the system to reconfigure without the defective processors. If this occurs, you must manually enable the processor slots after the problem is corrected.

To manually enable a processor slot:

1. Select **Processor Settings** from the Advanced Setup menu.

2. Use the Up Arrow (↑) or Down Arrow (↓) key to highlight the processor slot that you want to enable.

3. Use the Left Arrow (←) or Right Arrow (→) key to select **Enable**.

For additional information on processors, see "Installing a processor" on page 56.

MPS version control

Select this choice to view and identify the multiprocessor specification (MPS) level. The default value is 1.4. Refer to the documentation that comes with your operating system for more information.

Error logs

Select **Error Logs** to choose to view either the POST error log or the system error log.

POST error log

Select **POST Error Log** to view up to three error codes and messages that the system generated during POST. You can clear the error log by selecting **Clear error logs**.

System error log

Select **System Error Log** to view the system error log. The system error log contains all the system, error, and warning messages that the system has generated. You can use the Up Arrow (↑) or Down Arrow (↓) keys to move between pages in the system error log.

Save settings

After you make configuration changes, review them to be sure that they contain the correct information. If the information is correct, select **Save Settings** to save the selected changes.

Restore settings

After you make configuration changes, review them to be sure that they contain the correct information. If the information is incorrect, or if you do not want to save these changes, select **Restore Settings** to delete the changes and restore the previous settings.

Load default settings

If you make configuration changes and then decide that you want to use default values instead, select **Load Default Settings** to cancel the changes and restore the factory settings.

Exit setup

To exit from the Configuration/Setup Utility main menu, select **Exit Setup.** If you made changes and did not save them with the **Save Settings** choice, the system prompts you to either save the changes or exit without saving the changes. Follow the instructions on the menu.

Configuring options

Before installing a new device or program, read the documentation that comes with it. Reading the instructions helps you to determine the steps that are required for installation and configuration. The following list provides a preview of the actions that might be required to configure your server.

1. Run the Configuration/Setup Utility program and record the current configuration settings.

   See "The Configuration/Setup Utility program" on page 20.

2. Set jumpers or switches on the server components.

   See "Changing jumper settings" on page 111 and "I/O function card jumpers" on page 104.

3. Set jumpers or switches on the device.

   See the instructions that come with the adapter.

4. Install the adapter in the server.

   See "Working with adapters" on page 68.

5. Install software programs.

   See the installation instructions that come with the software.

6. Resolve configuration conflicts.

   See "Resolving configuration conflicts."

Resolving configuration conflicts

The resources used by your server consist of interrupt requests, direct memory access (DMA), I/O ports addresses, and memory. This information is useful when a resource configuration conflict occurs.

Conflicts in the configuration occur if:

- A device is installed that requires the same resource as another device. (For example, a conflict occurs when two adapters try to write to the same address space.)
- A device resource is changed (for example, changing jumper settings).
- A device function is changed (for example, assigning *COM1* to two serial ports).
- A software program is installed that requires the same resource as a hardware device.

The steps required to resolve a configuration error are determined by the number and variety of hardware devices and software programs that you install. If a hardware configuration error is detected, a *configuration error* message appears after the server completes POST and before the operating system is loaded. You can bypass the error by pressing **Esc** while the error message is displayed.

The Configuration/Setup Utility program configures the system hardware and PCI IRQs. The program does not consider the requirements of the operating system or the application programs. See "Resolving software configuration conflicts" on page 33 for additional information.

Resolving hardware configuration conflicts

Use the following information to help resolve hardware configuration conflicts:

1. Run the Configuration/Setup Utility program to view and change resources used by the system functions and the installed options. Record the current settings before making any changes. (See "The Configuration/Setup Utility program" on page 20 for instructions.)

2. Determine which adapter or device is causing the conflict. (See Chapter 6, "Solving problems" for instructions.)

3. Change adapter jumpers or switches. Some devices use jumpers and switches to define the system resources that the devices need. If the settings are incorrect or set to use a resource that cannot be shared, a conflict occurs and the device will remain deactivated by the configuration program.

4. Change system jumpers or switches. See "Changing jumper settings" on page 111.

5. Remove the device or adapter. Some configurations are not supported. If you must remove an adapter, see "Working with adapters" on page 68.

Resolving software configuration conflicts

The memory-address space and IRQs used by some hardware options might conflict with addresses defined for use through application programs or the expanded memory specification (EMS). (EMS is used only with DOS.)

If a conflict exists, one or more of the following conditions might exist:

- The system cannot load the operating system.
- The system does not work.
- An application program does not operate, or it returns an error.
- Screen messages indicate a conflict exists.

To resolve conflicts, you can change the software or hardware configuration.

Note: Start the Configuration/Setup Utility program to view the addresses used by your server functions. (See "The Configuration/Setup Utility program" on page 20 for instructions.)

The best way to resolve memory-address conflicts is to change the addresses used by the application program or the device driver. You can use the Configuration/Setup Utility program to change addresses.

If a device driver is causing a memory-address conflict, refer to your operating-system documentation or the documentation that comes with the device drivers.

Using the SCSISelect Utility program

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

Your server comes with a menu-driven configuration utility, called SCSISelect, that allows you to view and change SCSI settings.

You can use the SCSISelect Utility program to:

- View and change the default SCSI IDs
- Verify and change configuration conflicts
- Perform a low-level format on a SCSI hard disk

Starting the SCSISelect Utility program

You can access this program when you start the server. The SCSISelect prompt appears after the IBM logo appears. Press Ctrl+A immediately after the SCSISelect prompt appears:

```
<<< Press <CTRL><A> for SCSISelect™ Utility! >>>
```

Use the Up Arrow (↑) or Down Arrow (↓) key to move the highlight bar to the various menu choices. Press Esc to return to the previous menu. Also, you can

press the F5 key to switch between color and monochrome modes (if your monitor permits). To change the settings of the displayed items, follow the directions on the screen. Then, press Enter.

SCSISelect Utility program choices

The following choices appear on the SCSISelect Utility program menu:

- Configure/View Host Adapter Settings
- SCSI Disk Utilities

Configure/view host adapter settings

To view or change the SCSI controller settings, select **Configure/View Host Adapter Settings** and follow the directions on the screen.

Note: On the SCSISelect Utility program menu, the SCSI controller is referred to as the *Host Adapter*.

This menu has the following choices:

- Host Adapter SCSI ID

  The default SCSI ID of the SCSI controller is 7. Do not change this value.

- SCSI Parity Checking

  The default value is *Enabled*. Do not change this value.

- Host Adapter SCSI Termination

  The default value is *Automatic*. Do not change this value.

- Boot Device Configuration

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

- SCSI Device Configuration

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

  Note: For external SCSI tape drives, set **Send Start Unit Command** to Off for that SCSI ID. This ensures proper server operation. When the **Maximum Sync Transfer Rate** is set to 40.0, this value represents the transfer rate for UltraSCSI devices. When the **Maximum Sync Transfer Rate** is set to 20.0, this value represents the transfer rate for Fast SCSI devices.

- Advanced Configuration Options

  Select this choice to view or change the settings for advanced configuration options. These options include enabling support for large hard disk drives and support for drives with UltraSCSI speed.

- BIOS Information

  The BIOS information appears on the **Configure/View Host Adapter Settings** main menu screen. The BIOS information is displayed in a pop-up window, below the selectable menu items. This window contains:

    1. Interrupt (IRQ) Channel

2. I/O Port Address

These values vary according to the current BIOS settings for your server; however, you cannot change the settings for the BIOS information.

To reset the SCSI controller defaults, press F6; then, follow the directions on the screen.

SCSI disk utilities

To see the IDs that are assigned to each SCSI device or to format a SCSI device, select **SCSI Disk Utilities** from the SCSISelect Utility program menu.

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

Note: If the following screen appears, you might have pressed Ctrl+A before the selected drives were ready. Restart the server and watch for the SCSISelect messages as each drive spins up. After the drive that you want to view or format spins up, press Ctrl+A.

```
              Unexpected SCSI Command Failure


Target SCSI ID:          4

SCSI CDB Sent:           03 00 00 00 0E 00 07 00 02 00

Host Adapter Status:     00h - No host adapter error

Target Status:           02h - Check condition

Sense Key:               02h - Not ready

+Sense Code:             04h

+Sense Code Qualifier:   02h




              Press 'Esc' to continue.


```

Performing a low-level disk format

You can use the *Format Disk* feature of the SCSISelect Utility program to perform a low-level format on a hard disk drive.

The amount of processing time that the low-level format program requires will vary according to the hard disk drive capacity.

When to use the low-level format program

Use the Low-Level Format program:

- When you are installing software that requires a low-level format

- When you get recurring messages from the diagnostic tests directing you to run the Low-Level Format program on the hard disk drive

- As a last resort before replacing a failing hard disk drive

Note: For information on backing up all of your files, see your operating-system documentation.

Starting the low-level format program

Attention: The low-level format program erases *all* data and programs.

Note: If your server has a RAID adapter installed, refer to the RAID adapter documentation for instructions for performing a low-level format on a hard disk drive attached to the PCI RAID adapter.

1. If the hard disk is working, make a backup copy of all the files and programs on the hard disk drive

2. Select **Format Disk**; then, follow the instructions on the screen.

   Note: Hard disks normally contain more tracks than their stated capacity (to allow for defective tracks). A message appears on the screen if the defect limit is reached. If this happens, have the system serviced.

3. To install an operating system after the hard disk drive is formatted, refer to the documentation provided with your system-management software.

Chapter 4. Installing options

This chapter provides instructions to help you add options to your server. Some option-removal instructions are provided, in case you need to remove one option to install another.

Before you begin

Before you install any optional hardware in your server, thoroughly review the information in this section. Also, review the power supply requirements described in "Replacing a hot-swap power supply" on page 84.

- Become familiar with the safety and handling guidelines specified under "Safety information" on page 39 through "Handling static-sensitive devices" on page 43 and "Working inside a server with power on" on page 44.

- If you upgrade your server by installing a RAID adapter, you must configure your disk arrays after you install hard disk drives, as described in "Installing internal drives" on page 79. Follow the instructions in the RAID adapter documentation after installing the drives. Then, return here to install your remaining options, if applicable. See Chapter 3, "Configuring your server" on page 19 for additional details about configuration and for a description of your server utility programs.

- You do not need to turn off the server to install or replace hot-swap power supplies, hot-swap fans, hot-swap drives, or hot-plug PCI adapters.

  - *Hot-swap* means that you can install or remove certain components, such as power supplies, fans, and hard disk drives, without turning off the server, provided that your server contains hardware and an operating system that support the installation or removal of these components. These components are known as *hot-swappable* components, and more commonly referred to as *hot-swap* components.

  - *Hot-plug* means that you can install or remove certain components without turning off the server, after you perform an intervening action, provided that your server contains hardware and an operating system that support the installation or removal of these components. For example, before you can install or remove hot-plug PCI adapters, you must enable or disable the hot-plug PCI slots that contain or will contain these adapters. To do this, you must perform your operating-system-defined procedures for enabling or disabling the affected hot-plug PCI slots. Failure to do so might cause your system to lock up. Refer to your operating-system documentation for additional information. *Hot-plug* components are also known as *hot-pluggable* components.

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

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

- For a list of supported options for the xSeries 370 server, refer to http://www.ibm.com/pc/us/compat/ on the World Wide Web.
- Several types of connectors, such as those designed for adapters, processors, DIMMs, and other components, contain keys (dividers) to ensure that these components can only be installed in the correct position.

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

Before you begin installing options, be sure to do the following:

- Become familiar with the safety and handling guidelines specified in "Safety information" on page 39 through "Handling static-sensitive devices" on page 43 and "Working inside a server with power on" on page 44. These guidelines will help you work safely while working with your server or options.
- Read the information in "System reliability considerations."
- Make sure that you have an adequate number of properly grounded electrical outlets for your server, monitor, and any other options that you intend to install.
- Place your server in a location that is dry. Rain or spilled liquids might damage your server.
- Leave sufficient space around the server to allow the server cooling system to work properly. Refer to your server rack documentation for additional information.
- Back up all important data before you make changes to disk drives.
- Have a small, flat-blade screwdriver available.

System reliability considerations

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

- Each drive bay has either a drive or a filler panel installed. If a slim-high drive is installed, make sure that the slim filler bezel is installed.
- Each power supply bay has a power supply installed.
- The top cover is in place during normal operation. If the server is on, do not leave the top cover off for more than 30 minutes at a time.
- The memory-access panel is in place during normal operation.
- To leave sufficient space around the server to allow the server cooling system to work properly. Refer to your server rack documentation for additional information.
- Cables for optional adapters are routed according to the instructions that come with the adapters.
- A fan that has failed (indicated by a lit amber LED) is replaced as soon as convenient to help maintain the redundant cooling capability.
- Additional processors are installed on the processor daughterboards in the correct order. See "Installing a processor" on page 56 for installation instructions.
- Additional DIMMs are installed on the memory boards in the correct order. See "Installing DIMMs and memory boards" on page 52 for installation instructions.

Safety information

⚠️

Before installing this product, read the Safety Information.

مج، 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)。

Prije instalacije ovog produkta obavezno pročitajte Sigurnosne Upute.

Před instalací tohoto produktu si přečtěte příručku bezpečnostních instrukcí.

Læs sikkerhedsforskrifterne, før du installerer dette produkt.

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.

Lees voordat u dit product installeert eerst de veiligheidsvoorschriften.

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 pečítaje 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.

安裝本產品之前，請先閱讀「安全資訊」。

1

DANGER

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

To avoid a shock hazard:

– **Do not connect or disconnect any cables or perform
installation, maintenance, or reconfiguration of this product
during an electrical storm.**

– **Connect all power cords to a properly wired and grounded
electrical outlet.**

– **Connect to properly wired outlets any equipment that will be
attached to this product.**

– **When possible, use one hand only to connect or disconnect
signal cables.**

– **Never turn on any equipment when there is evidence of fire,
water, or structural damage.**

– **Disconnect the attached power cords, telecommunications
systems, networks, and modems before you open the
device covers, unless instructed otherwise in the installation
and configuration procedures.**

– **Connect and disconnect cables as described in the
following table when installing, moving, or opening covers
on this product or attached devices.**

To Connect:	To Disconnect:
1. Turn everything OFF.	1. Turn everything OFF.
2. First, attach all cables to devices.	2. First, remove power cords from outlet.
3. Attach signal cables to connectors.	3. Remove signal cables from connectors.
4. Attach power cords to outlet.	4. Remove all cables from devices.
5. Turn device ON.	

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.

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.**

4

≥18 kg (39.7 lbs)   ≥32 kg (70.5 lbs)   ≥55 kg (121.2 lbs)

CAUTION:
Use safe practices when lifting.

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.

1
2
3

Handling static-sensitive devices

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

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

- Limit your movement. Movement can cause static electricity to build up around
  you.

- Handle the device carefully, holding it by its edges or its frame.

- Do not touch solder joints, pins, or exposed printed circuitry.

- Do not leave the device where others can handle and 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 two seconds. (This drains static electricity from the package and from your body.)

- Remove the device from its package and install it directly into your system unit without setting it down. If it is necessary to set the device down, place it on its static-protective package. (If your device is an adapter, place it component side up.) Do not place the device on your system unit cover or on a metal table.

- Take additional care when handling devices during cold weather because heating reduces indoor humidity and increases static electricity.

Working inside a server with power on

Your server is designed to operate safely while powered on with the top cover removed. The server is designed to protect you and the server. Follow these guidelines when you work inside your server while the server is on:

- Avoid loose-fitting clothing on your forearms. (Button the cuffs on long-sleeved shirts before working inside the server; do not wear cuff links while you are working inside the server.)

- Do not allow any clothing (such as neckties or scarves) to hang inside the server.

- Remove all jewelry, such as necklaces, bracelets, and loose-fitting wrist watches.

- Remove items from your shirt pocket (such as pens and pencils) that could fall into the server as you lean over it.

- Avoid dropping any metallic objects, such as paper clips, hair pins, or screws, into the server.

- If the server is on, do not leave the top cover off for more than 30 minutes at a time.

Understanding the xSeries 370 server design

The xSeries 370 server incorporates new design features and components.

In the xSeries 370 server design, the system has an I/O board, an I/O integrated function card (commonly referred to as an I/O function card), a midplane, a processor controller board, at least one processor daughterboard, and at least one memory board. This modular design improves serviceability and provides for a compact design.

Note: See Chapter 5, "Board and adapter components" on page 101 for exploded views of the major assemblies in the server.

I/O board

The I/O board houses the connectors for the PCI adapters and primary server boards, and houses other I/O devices that you can install to expand the capabilities of your server.

The I/O board contains the connectors for the midplane, I/O function card, Advanced System Management PCI adapter, two USB ports, the PCI switch card, twelve hot-plug PCI adapters, and two voltage regulator modules (VRMs).

Note: The I/O board is also known as the I/O planar.

See "I/O board component locations" on page 102 for a layout of the I/O board.

Several features, such as the Wake on LAN feature, are built into the server I/O board. To enable the Wake on LAN feature, you must install the appropriate software and hardware in your server. For complete details, refer to the documentation that comes with your Ethernet adapter.

I/O function card

The I/O function card houses the battery, I/O ports, and other I/O devices that you can install to expand the capabilities of your server.

The I/O function card contains the connectors for the I/O board, Advanced System Management PCI adapter, CD-ROM drive, diskette drive, front panel, keyboard, mouse, SCSI and other I/O ports, jumpers, battery, and other devices.

See "I/O function card component locations" on page 103 for a layout of the I/O function card.

Midplane

The midplane provides all of the interconnects for all of the major server components.

The midplane contains the connectors for the I/O board, the processor controller board, the standard memory board (A), the optional memory board (B), three memory I/O cooling fans, three power supplies, a media power device (through cabling), and a power control card.

See "I/O board component locations" on page 102, "Memory board component locations" on page 105, and "Processor-controller board component locations" on

page 107 for the location of the midplane connector on the I/O board, the memory board, and the processor controller board, respectively.

Note: The midplane is not a user-removable component. If the midplane requires service, contact your IBM service technician, IBM reseller, or IBM marketing representative.

Processor controller board

The processor controller board manages the server processors on the processor daughterboards.

The processor controller board contains the connectors for the standard processor daughterboard, the optional processor daughterboard, the cache coherency filter card A, the cache coherency filter card B, and the LED card.

See "Processor-controller board component locations" on page 107 for a layout of the processor controller board.

Processor daughterboard

The processor daughterboard houses the server processors and is connected to the processor controller board.

Your server supports two *processor daughterboards*. Each processor daughterboard contains the connectors for four processors.

See "Installing a processor" on page 56 for instructions on installing a processor on a processor daughterboard. See "Processor-daughterboard component locations" on page 109 for a layout of the processor daughterboard.

Memory board

The memory board houses the dual inline memory modules (DIMMs). The DIMMs contain the system memory.

Your server supports two memory boards. Each memory board contains the connectors for 16 DIMMs.

See "Installing DIMMs and memory boards" on page 52 for instructions on installing a DIMM on a memory board, and installing a memory board in the server. See "Memory board component locations" on page 105 for a layout of the memory board.

Advanced System Management PCI adapter

With a Advanced System Management PCI adapter, in conjunction with the system management software that comes with your server, you can locally and remotely configure and monitor many features of your server.

Attention

The server must have the Advanced System Management PCI adapter installed for proper server operation and to use the system-management functions that the adapter provides.

The Advanced System Management PCI adapter contains the connectors for the 10/100 Mbps Ethernet port, dual serial port, Advanced System Management Interconnect bus, Personal Computer Memory Card International Association (PCMCIA) token-ring, and the I/O function card.

For more information:

- See "What your server offers" on page 4 for an overview of the functions and features.
- See "Connecting external options" on page 94 for a detailed description of the connectors.
- See "Advanced System Management PCI adapter component locations" on page 101 for a layout that shows the component locations.
- Refer to the documentation provided with your system-management software for installation, startup, and operating instructions.

Preparing to install options

> **Before you begin:**
>
> Read the safety and handling guidelines specified in "Before you begin" on page 37.

Note: You do not need to turn off the server to install or replace hot-swap power supplies, hot-swap fans, hot-swap drives, or hot-plug PCI adapters.

If you are:

- Installing or removing a hot-plug PCI adapter, continue with "Removing the top cover" on page 49; then, go to "Working with adapters" on page 68.

- Installing or replacing a hot-swap hard disk drive, continue with "Installing internal drives" on page 79.

- Replacing a power supply, continue with "Replacing a hot-swap power supply" on page 84.

- Replacing a processor fan, continue with "Removing the front bezel" on page 50; then, go to "Replacing a hot-swap fan" on page 88.

- Replacing an I/O fan, continue with "Removing the top cover" on page 49; then, go to "Replacing a hot-swap fan" on page 88.

- Installing or removing an option not listed in the preceding list, continue with the following steps.

5

CAUTION:
The Power Control button on the front of the server does not turn off the electrical current supplied to the server. The server also might have more than one power cord. To remove all electrical current from the server, ensure that all power cords are disconnected from the power source.
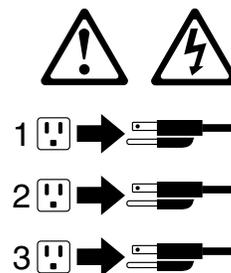
1. Remove all media (diskettes or CDs) from the drives; then, turn off the server and all attached options.

2. If you have a modem or fax machine attached to the server, disconnect the telephone line from the wall outlet.

3. Unplug all power cords (cables) from electrical outlets.

4. Note the location of the remaining cables and cords; then, disconnect them from the back of the server.

Removing the top cover

Refer to the following illustration while you perform the steps in this procedure.

Attention: If the server is on, do not leave the top cover off for more than 30 minutes at a time.
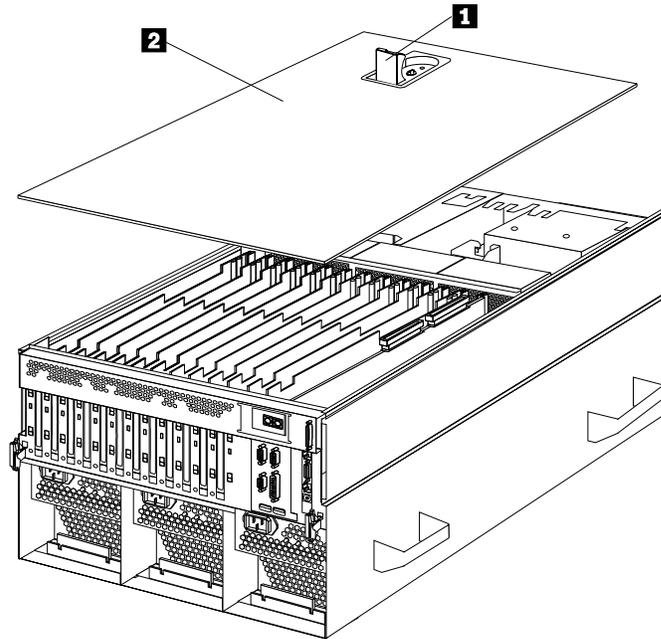
To remove the server top cover:

1. Read "Safety information" on page 39 through "Handling static-sensitive devices" on page 43.

2. Unless you are installing or removing a hot-swap or hot-plug component, run the shutdown procedure for the operating system, turn off the server and all attached devices, and disconnect all external cables and power cords (see "Preparing to install options" on page 48).

3. Lift the plastic cover-release latch **1** near the edge of the top cover **2** .

4. Lift the top cover off the server and set the cover aside.

Removing the front bezel

Refer to the following illustration while you perform the steps in this procedure.
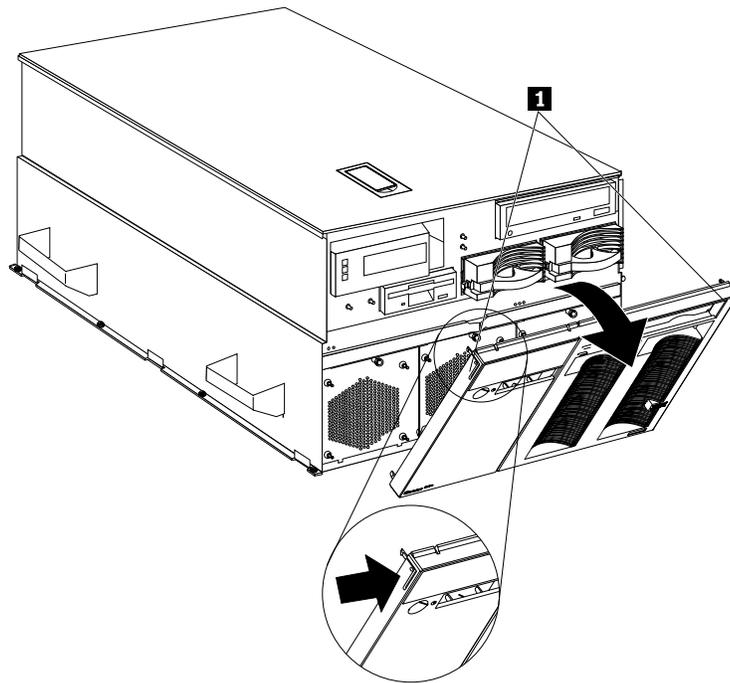
To remove the front bezel:

1. Read "Safety information" on page 39.

2. Press on the tabs at the top edge of the bezel **1** .

3. Pivot the top of the bezel slightly away from the server and remove the bezel from the server.

4. Set the bezel aside.

Removing the memory-access panel

Refer to the following illustration while you perform the steps in this procedure.
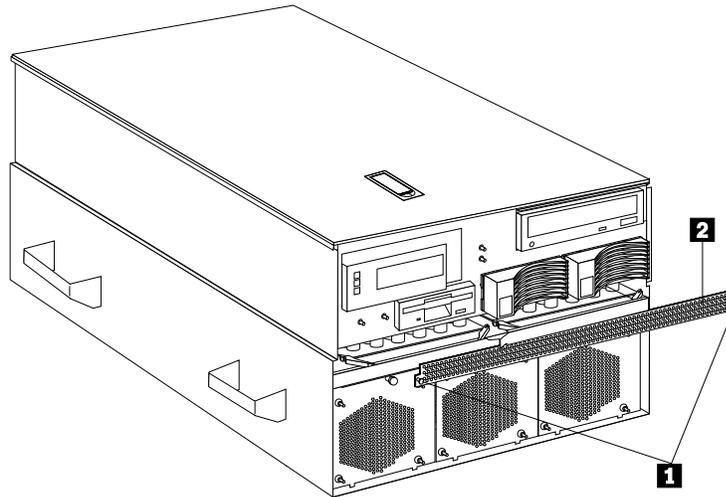
To remove the server memory-access panel:

1. Read "Safety information" on page 39 through "Handling static-sensitive devices" on page 43.

2. If you are installing a DIMM in an empty connector, go to step 3. If you are replacing a failed DIMM, verify that you have selected the correct DIMM for replacement. To do this, remove the front bezel (see "Removing the front bezel" on page 50) and check the LEDs at the front of the processor housing assembly, above the processor fans, to see which one is lit.

3. Run the shutdown procedure for the operating system. Turn off the server and peripheral devices, and disconnect all external cables and power cords (see "Preparing to install options" on page 48); then, if you have not already, remove the front bezel (see "Removing the front bezel" on page 50).

4. Pull out the two plastic fasteners **1** on the memory-access panel **2** to the unlocked position and remove the memory-access panel.

   Note: Do not remove the plastic fasteners from the memory-access panel.

5. To install or remove DIMMs, see "Installing DIMMs and memory boards" on page 52.

   Attention: To ensure proper EMC containment and cooling for your server, reinstall the memory-access panel before turning on the server.

Installing DIMMs and memory boards

You can increase the amount of memory in your server by installing additional *dual inline memory modules (DIMMs)*. Your server uses 100 MHz, 168-pin, PC100 registered synchronous dynamic random-access memory (SDRAM), industry-standard DIMMs with error checking and correction (ECC). You can add extra DIMMs or replace existing DIMMs.

Notes:

1. You can install an optional memory board that contains an additional 16 DIMM connectors and supports cache-line interleaving. To obtain an optional memory board, contact an IBM reseller or IBM marketing representative.

2. The connector identifiers on both the standard and the optional memory boards are J1–J16. To distinguish the two memory boards, use the labels provided on the processor housing assembly. These labels refer to the connector identifiers as A1–A16 on the standard memory board (A), and B1–B16 on the optional memory board (B).

3. Your server comes with a system label on the server cover. The numbers located to the right of the memory boards on the system label do not indicate DIMM connector identifiers. These numbers indicate the DIMMs; for example, **1** means the first DIMM that you install, **9** means the ninth DIMM that you install, and so on.

4. *Cache-line interleaving* can occur only if two memory boards are installed in the server. This process allows the two memory boards to share a common address range, with one memory board responding to even-numbered cache lines, and the other memory board responding to odd-numbered cache lines. This configuration has the highest performance because it allows the two SDRAM arrays to be used in a balanced fashion, reducing access conflicts.

5. Installing or removing DIMMs changes the server configuration. Therefore, after installing or removing a DIMM, save the new configuration information in the Configuration/Setup Utility program. See "Using the Configuration/Setup Utility main menu" on page 21 for more information.

6. If you replaced a defective DIMM, you must manually enable the DIMM slot in the Configuration/Setup Utility program. In this case, the system does not automatically access the Configuration/Setup Utility program to enable the DIMM slot. See "Memory settings" on page 30 for additional information.

7. To verify the correct amount of memory installed in your server, review the information on the Logo screen during system startup. The operating system might not reflect the correct amount of memory.

8. See "Memory board component locations" on page 105 for a layout of the memory board.

Table 3 shows the memory installation requirements for your server.

Table 3. Memory installation requirements	
DIMM sizes	128 MB, 256 MB, 512 MB, 1 GB
DIMM population order for a single board configuration — standard memory board (A)	A1, A5, A9, A13, A3, A7, A11, A15, A2, A6, A10, A14, A4, A8, A12, A16
DIMM population order for a dual board configuration — standard memory board (A) and optional memory board (B)	A1/B1, A5/B5, A9/B9, A13/B13, A3/B3, A7/B7, A11/B11, A15/B15, A2/B2, A6/B6, A10/B10, A14/B14, A4/B4, A8/B8, A12/B12, A16/B16

Notes:

1. The 100 MHz DIMMs support the registered mode of operation.

2. Install DIMMs with a maximum height of 4.32 cm (1.7 inches).

3. Your server comes with one standard (preinstalled) memory board (A), and one or more DIMMs installed on this memory board. You can install an optional memory board (B). Both the standard memory board (A) and the optional memory board (B) contain 16 DIMM connectors (J1–J16).

4. When you install DIMMs in both the standard memory board (A) and the optional memory board (B), you must install them in matching pairs with the same part number, in the same slot on each memory board; for example, J1/J1, J5/J5, J9/J9, and so on.

Table 4 shows the available memory configurations.

Table 4. Memory expansion		
DIMM size	**16 Connectors (1 Board)**	**32 Connectors (2 Boards)**
128 MB	2 GB	4 GB
256 MB	4 GB	8 GB
512 MB	8 GB	16 GB
1 GB	16 GB	32 GB

Refer to the following illustration while you perform the steps in this procedure.

Note: The illustrations in this section might differ slightly from your hardware.
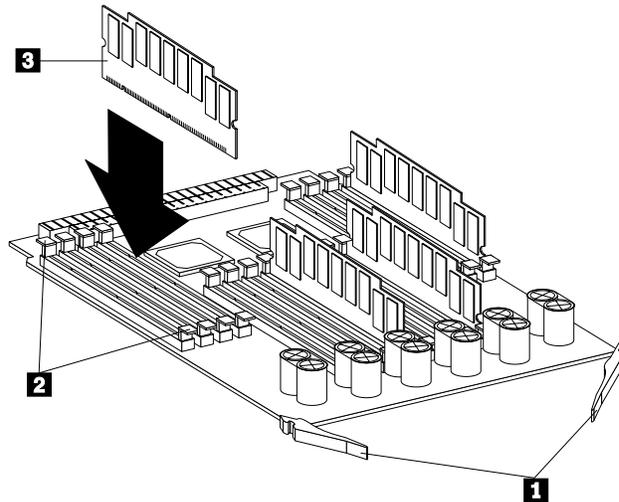
  1 Latches
  2 Retaining clips
  3 DIMM

Before you begin:

- Read the documentation that comes with your option.

To install a DIMM:

1. Read "Safety information" on page 39 through "Handling static-sensitive devices" on page 43.

2. Run the shutdown procedure for the operating system. Turn off the server and peripheral devices; then, remove the front bezel (see "Removing the front bezel" on page 50) and the memory-access panel (see "Removing the memory-access panel" on page 51).

3. If you are not installing an optional memory board, continue with step 4.

   If you are installing an optional memory board, touch the static-protective package containing the memory board to any unpainted metal surface on the server. Then, remove the memory board from the package. Continue with step 5.

4. Remove the memory board from the server:

   a. Pull both latches **1** simultaneously so that they fully extend from the memory board.

   b. Grasp the two latches and pull the memory board from the server.

   c. Place the memory board connector-side up on a flat, static-protective surface.

5. Touch the static-protective package containing the DIMM to any unpainted metal surface on the server. Then, remove the DIMM from the package.

Attention: To avoid breaking the retaining clips or damaging the DIMM connectors, handle the clips gently.

6. Install the DIMM:

   a. Turn the DIMM **3** so that the keys align correctly with the connector.

   b. Align the keyed DIMM **3**, and press on both sides of the DIMM as you insert it into the connector. Be sure to press the DIMM straight into the connector.

      Note: If a gap exists between the DIMM and the retaining clips, the DIMM has not been properly installed. Open the retaining clips and remove the DIMM; then, reinsert the DIMM.

   c. Make sure that the retaining clips **2** are in the closed position.

   d. Repeat these steps for each DIMM that you install.

7. Reinstall the memory board:

   a. Insert the memory board into the guides and gently press the memory board into the connector. When you install the memory board in the server, be sure that it is correctly seated in the connector before you apply force to close the latches.

   b. Push the latches **1** until they close and lock in place.

      Attention: To ensure proper EMC containment and cooling for your server, reinstall the memory-access panel before turning on the server.

   c. Reinstall the memory-access panel:

      1) Ensure that the memory-access panel is fully seated in the appropriate location.

      2) Press in the two plastic fasteners on the memory-access panel to secure it into place.

   d. Reinstall the front bezel (see "Installing the front bezel" on page 92).

8. If you have other options to install or remove, do so now; otherwise, continue with "Completing the installation" on page 90.

Installing a processor

Your xSeries 370 server comes with at least one processor installed on the standard processor daughterboard. When you install one or more additional processors, your server can operate as a symmetric multiprocessing (SMP) server. With SMP, certain operating systems and application programs can distribute the processing load among the processors. This enhances performance for database and point-of-sale applications, integrated manufacturing solutions, and other applications.

Note: To ensure that your operating system supports multiprocessing operations, load the appropriate multiprocessor option software in your operating system programs.

Your server supports a maximum of eight Intel Pentium III Xeon processors. For a list of supported operating systems, see http://www.ibm.com/pc/us/compat/ on the World Wide Web.

> **Before you begin:**
>
> - Thoroughly review the documentation that comes with the processor, so that you can determine whether you need to update the xSeries 370 server basic input/output system (BIOS). Verify that you have the latest BIOS level for your server by accessing http://www.ibm.com/pc/us/compat/ on the World Wide Web.
>
> - If you plan to use the processor serial-number security feature, you must change the setting of the **Processor Serial Number Access** menu choice in the Advanced Setup menu of the Configuration/Setup Utility program. The default value is **Disabled**; change this value to **Enabled**, as described in "Processor serial number access" on page 28.

Notes:

1. The illustrations in this section might differ slightly from your hardware.

2. To ensure proper server operation, when you install an additional processor, use processors with the same cache size and core frequency as those of the currently installed processor.

3. If you replace the processors in your server with processors of a different speed, be sure the processor core frequency selection jumper block is set correctly. (See "Processor-controller board jumpers" on page 108 for more information. For a list of supported processor speeds, see http://www.ibm.com/pc/us/support/ on the World Wide Web.)

4. To maintain signal quality and system reliability, either a processor or a processor terminator card must be installed in each processor connector. A processor must be installed in processor connector A1 on the standard processor daughterboard (A).

5. If you are installing an optional processor daughterboard (B), you must also install the two cache coherency filter cards in the two adjacent, vertical slots between the two processor daughterboards on the processor controller board. (See "Processor-daughterboard component locations" on page 109 for the location of the cache coherency filter card A and the cache coherency filter card B connectors.)

6. Your server comes with a processor installed in connector A1, on the standard processor daughterboard (A). If you need to install additional processors, install them in the following order:

    A1, A3, A2, A4

    If you need to install processors on the optional processor daughterboard (B), install them in the following order:

    B1, B3, B2, B4

7. If you are replacing a failed processor, verify that you have selected the correct processor for replacement. To do this, remove the front bezel (see "Removing the front bezel" on page 50) and check the LEDs on the LED card at the front of the processor housing assembly, above the processor fans, to see which LED is on.

8. If you replaced a defective processor, you must manually enable the processor slot in the Configuration/Setup Utility program. In this case, the system does not automatically access the Configuration/Setup Utility program to enable the processor slot. See "Processor settings" on page 30 for additional information.

The processors in your server reside on processor daughterboards. The standard processor daughterboard (A) and the optional processor daughterboard (B) reside in separate cages on the processor controller board. All of these components reside in the processor housing assembly.

Note: See Chapter 5, "Board and adapter components" on page 101 for a detailed, exploded view of the processor housing assembly.

This section contains the following:

- "Removing the processor housing assembly" on page 58
- "Installing or replacing a processor" on page 60
- "Installing or replacing a processor daughterboard" on page 62
- "Reinstalling the processor housing assembly" on page 67

Removing the processor housing assembly

To remove the processor housing assembly:

1. Read "Safety information" on page 39 through "Handling static-sensitive devices" on page 43.

2. Run the shutdown procedure for the operating system. Turn off the server and peripheral devices, and disconnect all external cables and power cords (see "Preparing to install options" on page 48); then, remove the front bezel (see "Removing the front bezel" on page 50).

3. Remove the three processor fans:
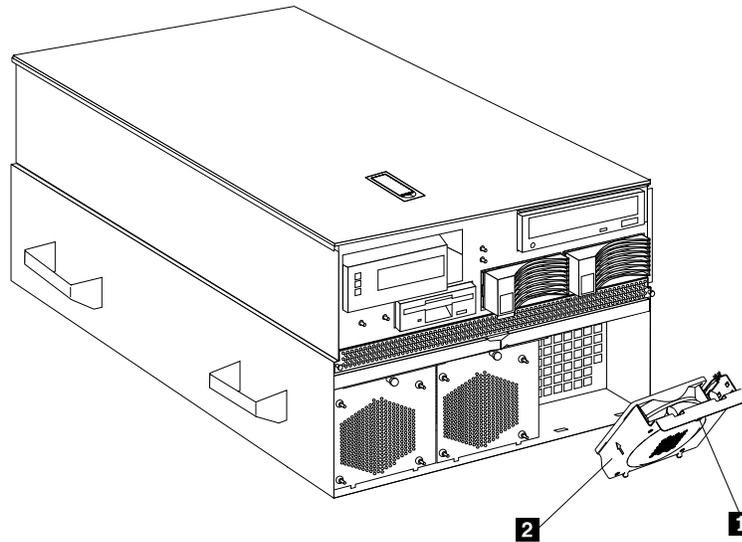
   a. Pull the fastener **1** in the top center of the fan housing **2**. This places the fastener in the unlocked position.

   b. Pivot the fan downward and remove it from the server.

   c. Repeat steps 3a and 3b for each additional fan.

   Refer to the following illustration while you perform the steps in this section.
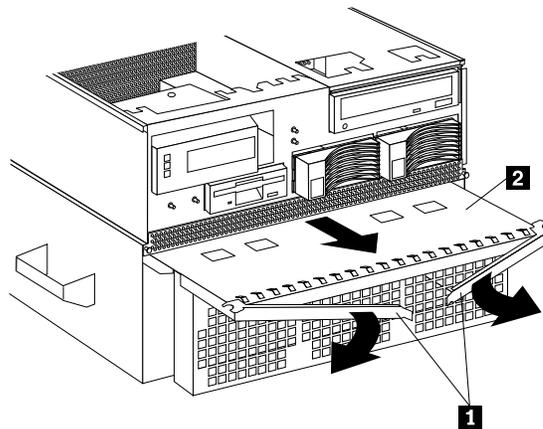
4. Open the two latches **1** at the top of the processor housing assembly **2**. Fully extend the latches.

5. Pull the processor housing assembly partially out of the server, approximately 203.2 mm (8 in.).

   Attention: To avoid injury, do not place your fingers immediately behind the latches at the top of the processor housing assembly.

6. Close the latches at the top of the processor housing assembly.

   Attention: Do not lift the processor housing assembly by the latches.

7. Grasp the bottom sides of the processor housing assembly. Lift and slide the assembly out of the server until it stops, approximately 228.6 mm (9 in.); then, lift the assembly slightly and remove it from the server.

   Note: If the assembly stops before you can slide it out of the server, lift it slightly and continue to remove it from the server.

8. Place the processor housing assembly on a flat, static-protective surface, with processor labels A1–A4 and B1–B4 right side up.
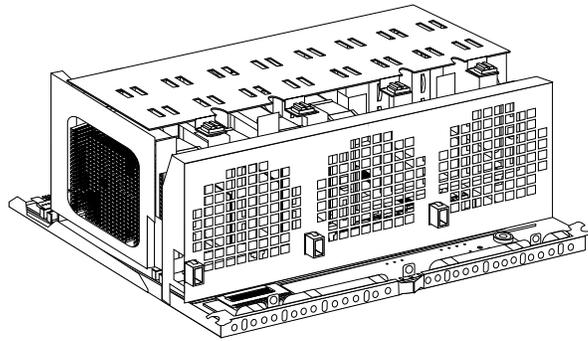
Installing or replacing a processor

Refer to the following illustrations while you perform the steps in this procedure.
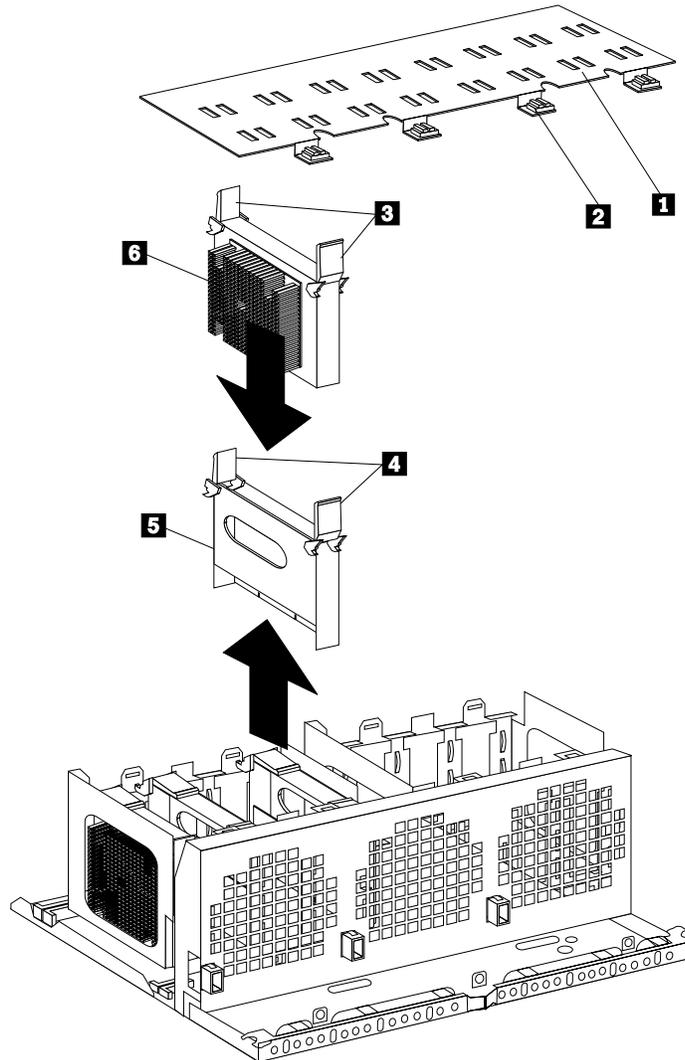
1 Processor-cage cover
2 Fasteners on processor-cage cover
3 Processor latches
4 Terminator card latches
5 Processor terminator card
6 Processor and heat sink

To install or replace a processor:

1. Read "Safety information" on page 39 through "Handling static-sensitive devices" on page 43.

2. Turn the four plastic fasteners **2** on the processor-cage cover **1** until they are in the unlocked position (one quarter-turn). You may use a flat-blade screwdriver or a coin.

3. Remove the processor-cage cover **1** and set it aside.

4. Determine the processor connector in which you want to install the new processor. If the connector contains a processor terminator card **5** :

a. Pull the processor terminator card latches **4** so that they rotate to the unlocked position.

b. Remove the processor terminator card **5** from the processor connector.

c. Store the processor terminator card in a safe place.

   Note: After you install the new processor in your server, place the terminator card in the empty static-protective package.

5. If you are installing processors in the optional processor-daughterboard assembly, first read "Installing or replacing a processor daughterboard" on page 62 then follow the instructions in step 1 on page 64 through 13 on page 65. Then, return here to continue.

6. If you are replacing a defective processor that was indicated by a processor failure LED and you need to verify its location, perform the following test.

   a. The eight processor error LEDs are located on the LED card, behind the processor housing assembly latches. Locate the words `Press to show fault` on the processor housing assembly.

   b. Press the indicated button adjacent to the words `Press to show fault`, and note the amber LEDs that indicate the defective processors, if any.

      If no amber LEDs illuminate and the green capacitor test LED adjacent to the word `Testing` does not illuminate, have the system serviced.

   c. Remove the defective processor. See "LED card (processor and DIMM) LEDs" on page 157 for processor status information.

   Note: The LED card is not a user-removable component. If the LED card requires service, contact your IBM service technician, IBM reseller, or IBM marketing representative.

   a. Pull the processor latches **3** so that they rotate to the unlocked position.

      Attention: Before you remove the processor, note the orientation of the original A1 processor.

   b. Remove the processor **6** from the processor connector.

   c. Set the processor aside. Refer to your processor option documentation for complete instructions on proper handling and disposal of a defective processor.

7. Install the processor:

   a. Touch the static-protective package containing the new processor to any *unpainted* metal surface on the server; then, remove the processor from the package.

   b. Rotate the processor latches **3** to the open position.

      Attention: Before you press the processor into the connector, make sure that the processor has the same orientation as the original A1 processor.

   c. Insert the processor **6** into the guides and gently press the processor into the connector. When the processor is correctly inserted, all the processor heat sinks in both processor cages face the same direction, toward connector A1.

   d. Rotate the processor latches **3** until they close and lock in place.

8. If you plan to install more than one processor, repeat step 4 on page 60 and step 7 in this section.

9. If you replaced a defective processor, you must manually enable the processor slot in the Configuration/Setup Utility program. In this case, the system does not automatically access the Configuration/Setup Utility program to enable the processor slot. See "Processor settings" on page 30 for additional information.

10. Install terminator cards **3** in the connectors that do not contain processors. The arrows on the terminators must face toward the large connector on the processor housing assembly and away from the fan guard.

11. Reinstall the processor-cage cover by inserting the cover tabs into the slots on the top of the processor cage.

12. Turn the four plastic fasteners on the processor-cage cover until they are in the locked position (one quarter-turn). You may use a flat-blade screwdriver or a coin.

    Attention: Do not lift the processor housing assembly by the latches.

13. Reinstall the processor housing assembly as described in "Reinstalling the processor housing assembly" on page 67.

Installing or replacing a processor daughterboard

You will need to install a second processor daughterboard if you plan to use more than four processors in your server. The additional processors must be installed on an optional processor daughterboard. Or, you might need to replace a processor daughterboard.

Refer to the following illustration while you perform the steps in this section. In this illustration, the standard processor cage is installed in the processor housing assembly, with a processor **11** in connector A1. The optional processor cage is item **5** .
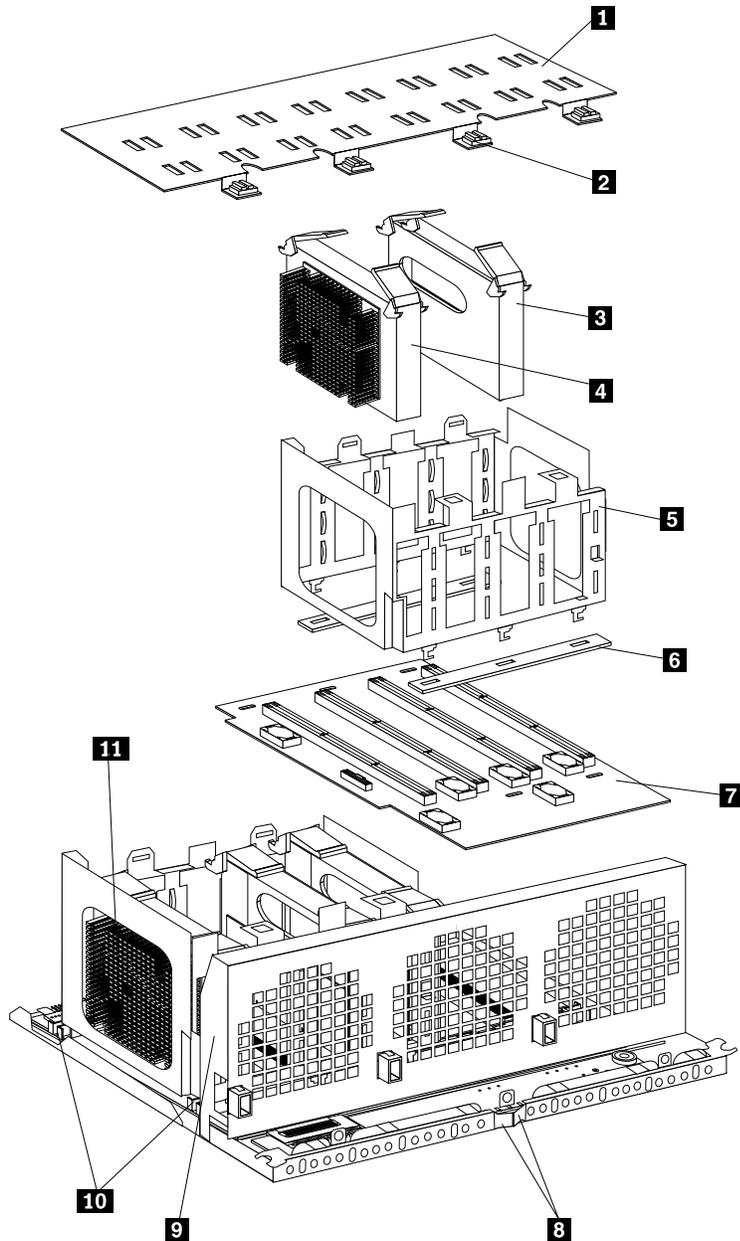
1 Processor-cage cover
2 Fasteners on processor-cage cover
3 Processor terminator card
4 Optional processor
5 Processor cage
6 Processor-daughterboard spacers (not present if processor daughterboard
is present)
7 Processor daughterboard
8 Processor housing assembly latches
9 Fan guard
10 Processor-cage release latches
11 Processor A1

Installing an optional processor daughterboard and cache coherency filter cards

To install an optional processor daughterboard and the cache coherency filter cards:

Attention: Do not lift the processor housing assembly by the latches **8** .

1. If you have not already removed the processor housing assembly, do so now. Perform step 2 on page 58 through step 8 on page 59 and steps 1 and 3 on page 60; then, return here.

2. If you have not already removed the processor-cage cover **1** , do so now. Rotate the four fasteners **2** to the unlocked position; then, lift the cover and set it aside.

3. Remove the empty processor cage **5** :

   a. Squeeze and slide out the release latches **10** as far as they will go, until they reach the unlocked position; then, release.

   b. Lift the empty processor cage out of the processor housing assembly, and remove the spacers **6** .

      Note: When you are removing the processor cage from the processor housing assembly, be sure that the processor cage release latches remain in place. Store the spacers in a safe place for future use.

4. Remove the fan guard **9** :

   a. Remove the two screws from the sides of the fan guard.

   b. Lift the fan guard off the processor housing assembly.

   c. Rotate the fan guard away from the processors.

   d. Slide the fan guard toward the processors to remove the tabs on the bottom of the fan guard from the slots. Do not disconnect the power cables.

5. Install the two cache coherency filter cards in the two adjacent, vertical slots between the two processor daughterboards on the processor controller board. For location, see "Processor-controller board component locations" on page 107.

6. Reinstall the fan guard:

   a. Ensure that the power cables are routed over the top of the retainer bracket that holds the two cache coherency filter cards in place.

   b. Slide the tabs on the bottom of the fan guard into the slots.

   c. Place the fan guard on the processor housing assembly.

   d. Reinstall the two screws that you removed in step 4a to secure the fan guard.

7. Touch the static-protective package containing the new processor daughterboard to any *unpainted* metal surface on the server; then, remove the new processor daughterboard **7** from its static-protective package.

8. Align the processor-daughterboard connector with the keyed connector on the processor controller board.

   Note: For the location of the processor-daughterboard connectors on the processor controller board, see "Processor-controller board component

locations" on page 107. For a layout of the processor daughterboard, see "Processor-daughterboard component locations" on page 109.

9. Firmly press the processor daughterboard **7** down into the keyed connector on the processor controller board. Push in the center of the board, until the processor daughterboard is fully seated.

10. Ensure that the two processor cage release latches are still in the unlocked (pulled out) position.

11. Align the processor cage with its tabs over the corresponding slots on the processor daughterboard. Match the labels on the processor cage with the corresponding labels on the fan guard **9** ; for example, A1/A1.

12. Firmly press the processor cage down into the slots in the processor housing assembly, until the processor cage is fully seated.

13. Squeeze and firmly push the release latches **10** back into the locked position; then, release.

    Attention: Ensure that the release latches are in the fully locked position.

14. Install the processor:

    a. Touch the static-protective package containing the new processor to any *unpainted* metal surface on the server; then, remove the processor from the package.

    b. Rotate the processor latches **3** to the open position.

       Attention: Before you press the processor into the connector, make sure that the processor has the same orientation as the original A1 processor.

    c. Insert the processor **6** into the guides and gently press the processor into the connector. When the processor is correctly inserted, all the processor heat sinks in both processor cages face the same direction, toward connector A1.

    d. Rotate the processor latches **3** until they close and lock in place.

15. If you plan to install more than one processor, repeat step 14.

16. Install terminator cards **3** in the connectors that do not contain processors. The arrows on the terminators must face toward the large connector on the processor housing assembly and away from the fan guard.

17. Reinstall the processor-cage cover by inserting the cover tabs into the slots on the top of the processor cage.

18. Reinstall the processor housing assembly by performing steps 2 through 8 on page 67.

Replacing the standard processor daughterboard

To replace the processor daughterboard in the standard processor cage:

Refer to the illustration that immediately precedes "Installing an optional processor daughterboard and cache coherency filter cards" on page 64 while you perform the steps in this section.

Attention: Do not lift the processor housing assembly by the latches.

1. If you have not already removed the processor housing assembly, do so now. Perform step 2 on page 58 through step 8 on page 59 and steps 1 and 3 on page 60; then, return here.

2. If you have not already removed the processor-cage cover **1**, do so now. Rotate the four fasteners **2** to the unlocked position; then, lift the cover and set it aside.

3. Open the latches at the top of the processor in connector A1, and remove the processor. Place it on a flat, static-protective surface. Repeat these actions for the remaining processors and terminator cards in the processor cage.

4. Remove the processor cage:

   a. Squeeze and slide out the release latches **10** as far as they will go, until they reach the unlocked position; then, release.

   b. Lift the processor cage out of the processor housing assembly, and place it on a flat, static-protective surface.

5. If necessary, remove the processor-daughterboard extraction tool from processor cage A (behind processor A4); then, place the processor-daughterboard extraction tool under and against the processor daughterboard, as shown, in the area marked `Use extraction tool here`.
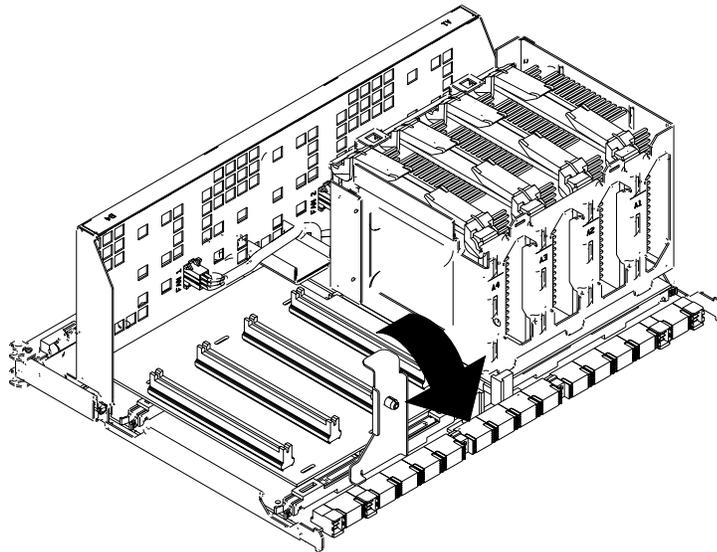
6. Press the processor-daughterboard extraction tool downward to pivot and lift the processor daughterboard; then, remove the processor daughterboard from the processor housing assembly.

7. Remove the new processor daughterboard **7** from its static-protective package.

8. Align the processor-daughterboard connector with the keyed connector on the processor controller board.

   Note: For the location of the processor-daughterboard connectors on the processor controller board, see "Processor-controller board component locations" on page 107. For a layout of the processor daughterboard, see "Processor-daughterboard component locations" on page 109.

9. Firmly press the processor daughterboard **7** down into the keyed connector on the processor controller board. Push in the center of the board, until the processor daughterboard is fully seated.

10. Align the processor cage with its tabs over the corresponding slots on the processor daughterboard. Match the labels on the processor cage with the corresponding labels on the fan guard **9** ; for example, A1/A1.

11. Firmly press the processor cage down into the slots on the processor housing assembly, until the processor cage is fully seated.

12. Squeeze and firmly push the release latches **10** back into the locked position; then, release.

    Attention: Ensure that the release latches are in the fully locked position.

13. Install processors **4** in the desired connectors, as described in step 4 on page 60 through step 8 on page 62; then, return here.

14. Install terminator cards **3** in the connectors that do not contain processors. The arrows on the terminators must face toward the large connector on the processor housing assembly and away from the fan guard.

15. If you removed the processor-daughterboard extraction tool in step 5 on page 66, replace the processor-daughterboard extraction tool on processor cage A, behind processor A4. Otherwise, store the tool in a safe place for future use.

16. Reinstall the processor-cage cover by performing steps 11 and 12 on page 62.

17. Reinstall the processor housing assembly as described in "Reinstalling the processor housing assembly."

Reinstalling the processor housing assembly

To reinstall the processor housing assembly:

Attention: To avoid injury, do not place your fingers immediately behind the latches at the top of the processor housing assembly.

1. Read "Safety information" on page 39 through "Handling static-sensitive devices" on page 43.

2. With the processor housing assembly positioned so that the processors are pointing downward and the latches **8** are closed, align the processor housing assembly with the guides on the inside walls of the server.

3. Grasp the bottom sides of the processor housing assembly. Slide the processor housing assembly partially into the server; then, open the latches fully.

4. Lift and slide the assembly into the server until it stops.

5. Close the processor housing assembly latches.

6. Reinstall the three processor fans:

   a. Insert the fans in the server. Align the tabs on the bottom edge of the fans with the matching slots in the server chassis.

   b. When you have the fans correctly seated, press the fasteners in the top center of the fans to secure the fans in the server.

7. Reinstall the front bezel (see "Installing the front bezel" on page 92).

8. If you have other options to install or remove, do so now; otherwise, continue with "Completing the installation" on page 90.

Working with adapters

You can add adapters to extend the capabilities and power of your server.

You add adapters to the expansion connectors, called slots, on the I/O board of your server. All slots are PCI expansion slots. Your server supports up to 12 adapters in the PCI slots. There are two additional dedicated slots for the I/O function card and the the Advanced System Management PCI adapter.

You can install a new PCI adapter or replace an existing PCI adapter with the same type of adapter without turning the server power off and restarting the system. These slots are called *hot-pluggable* PCI slots. They are also referred to as hot-plug PCI slots.

A PCI adapter comes with built-in identification and configuration specifications (set in memory on the device) that provide installation information to the server during startup. This information is read by the input/output (I/O) bus and interpreted by the server BIOS. The BIOS routines automatically configure the adapter around the resources already in use by other devices.

Your server comes with a video controller. This video controller is an integrated component on the I/O function card. The integrated video controller has super video graphics array (SVGA) technology.

The following illustration shows the location of the expansion slots and other components referred to in these steps.

1 Midplane connector
2 I/O function card slot
3 Voltage regulator module (VRM) connectors
4 Advanced System Management PCI adapter slot
5 USB 1 and USB 2 port connectors
6 PCI switch card connector
7 Hot-plug, 64-bit, PCI slots 10–12 (bus A, 33 MHz)
8 Hot-plug, 64-bit, PCI slots 8–9 (bus B, 66 MHz)
9 Hot-plug, 64-bit, PCI slots 6–7 (bus C, 66 MHz)
10 Hot-plug, 64-bit, PCI slots 1–5 (bus D, 33 MHz)
11 Hot-plug external attention/fail LED for PCI slot (green blink = attention, amber = defective PCI adapter)
12 Hot-plug internal attention/fail LED for PCI slot (green blink = attention, amber = defective PCI adapter)
13 Hot-plug power LED for PCI slot (green solid, on)

PCI slot LED descriptions

Each PCI slot has two lights associated with it — one Attention/Fail light and one Power On light.

- **Power On Light**: This light is on when the PCI slot is active and has power. Do not add or remove an adapter from the PCI slot when the Power On light is on. When this light is off, the PCI slot is inactive and has no power applied. You can install or remove an adapter when the Power On light is off. Refer to your operating-system documentation to determine if your operating system supports hot-plug PCI adapters.

- **Attention/Fail Lights:** These are bicolor lights. When an Attention/Fail light flashes green, it indicates the PCI Hot-Plug Attention function. The meaning of the Attention light is defined by your operating system. Refer to your operating-system documentation to determine if your operating system supports

hot-plug PCI adapters and, if so, what the Attention light indicates. When this light is solid amber, it indicates a failure on the PCI adapter installed in the slot.

Adapter considerations

Before you continue with the adapter-installation procedure:

- Review and follow the instructions that come with the adapter and your operating system in addition to the instructions given in this chapter. If you need to change the switch or jumper settings on your adapter, follow the instructions that come with the adapter documentation.

- Manual assignment of interrupts is never required with operating systems that use the Advanced Programmable Interrupt Controller (APIC) interrupt structure. Although you can manually assign interrupts through the Configuration/Setup Utility program, most adapters designed for PCI slots are auto-configuring. If the required resources are available, the BIOS software automatically configures an adapter around the resources already in use by other devices. The default setting is generally the most appropriate. If you choose to manually assign interrupts, be sure that these interrupts do not conflict with existing values. If a conflict does occur, see "Resolving configuration conflicts" on page 32.

- For a list of compatible RAID adapters, and installation requirements, go to http://www.ibm.com/pc/us/compat/ on the World Wide Web. If you install a RAID adapter, configure the adapter using the RAID adapter documentation.

- The I/O function card slot can support only the I/O function card. It is not an expansion slot.

- The Advanced System Management PCI adapter slot can support only the Advanced System Management PCI adapter. It is not an expansion slot.

  Attention: You must have the Advanced System Management PCI adapter installed for proper operation of your server and to use the system-management functions that the adapter provides. See "Understanding the xSeries 370 server design" on page 45 for more information about the Advanced System Management PCI adapter.

- Your server has assigned PCI slots 10, 11, and 12 as PCI priority slots. The system BIOS scans the PCI priority slots for startable (bootable) devices before scanning the I/O function card.

The integrated video controller is not removable. If you want to disable this controller and use a video adapter instead, you can install a video adapter in an expansion slot. If you want a monitor to be the startup monitor, install a video adapter in slot 10, 11, or 12. When you install a PCI video adapter in one of these slots, the server BIOS automatically disables the integrated video controller.

Table 5 on page 71 contains information on the requirements for the PCI adapter slots and PCI buses in your server.

Table 5. PCI adapter information			
Bus	**Slots**	**Speed**	**PCI slot keying**
A	10–12	33 MHz	5.0 V
B	8–9	66 MHz	3.3 V
C	6–7	66 MHz	3.3 V
D	1–5	33 MHz	5.0 V

Notes:

1. All expansion slots are hot-plug, 64-bit, PCI slots.

2. You can install:

   a. A full-length or half-length, 32-bit or 64-bit, 5 V or Universal, hot-plug or non-hot-plug PCI adapter in slots 1–5 or 10–12. 66 MHz PCI adapters plugged into these slots will operate at 33 MHz.

   b. A full-length or half-length, 32-bit or 64-bit, 3.3 V or Universal, hot-plug or non-hot-plug PCI adapter in slots 6–7 and 8–9. A 33 MHz PCI adapter installed in one of these slots limits a 66 MHz PCI adapter installed on the same bus to 33 MHz.

3. To optimize performance, spread the installation of high-speed adapters, such as 66 MHz Ethernet adapters, between the two 66 MHz PCI buses.

Configuring adapters

PCI devices automatically communicate with the server configuration information. This usually results in automatic configuration of a PCI device. From the Configuration/Setup Utility program, you can select available resources for the adapter that you are installing. If a conflict does occur, see "Resolving configuration conflicts" on page 32.

Refer to the documentation that comes with the adapter for information about required system resources. Then, make the appropriate jumper or switch settings on the adapter.

Installing a hot-plug PCI adapter

This section gives the procedure for installing a hot-plug PCI adapter. If you want to remove a hot-plug adapter, reverse the steps. If your operating system supports hot-plug PCI adapters, you can replace a failing hot-plug PCI adapter with a new adapter of the same type without turning off power to the server.

Notes:

1. You do not need to turn off the server to install or remove a hot-plug PCI adapter.

2. When you install an adapter, be sure that the gold-edge connectors on the adapter match the connectors in the PCI slot.

Before you begin:

- Read the documentation that comes with your adapter for any special requirements or restrictions.

- Read the documentation that comes with your operating system.

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

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

Attention:

Do not remove a hot-plug adapter before performing the operating-system-defined procedure for disabling the hot-plug PCI slot that contains the adapter. Failure to do so might cause your system to lock up. Refer to your operating system documentation.

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

To install a hot-plug PCI adapter:

1. Read "Safety information" on page 39 through "Working inside a server with power on" on page 44.

2. If you have not already done so, remove the top cover (see "Removing the top cover" on page 49).

   Attention: If the server is on, do not leave the top cover off for more than 30 minutes at a time.

3. Determine which expansion slot you will use for the adapter.

   Note: Check the instructions that come with the adapter for any requirements or restrictions.

4. Disable the PCI slot from your operating system. Make sure that the Power On light ▇5▇ for the PCI slot is off. (Refer to the documentation that comes with your operating system for information about disabling a hot-plug PCI slot.)
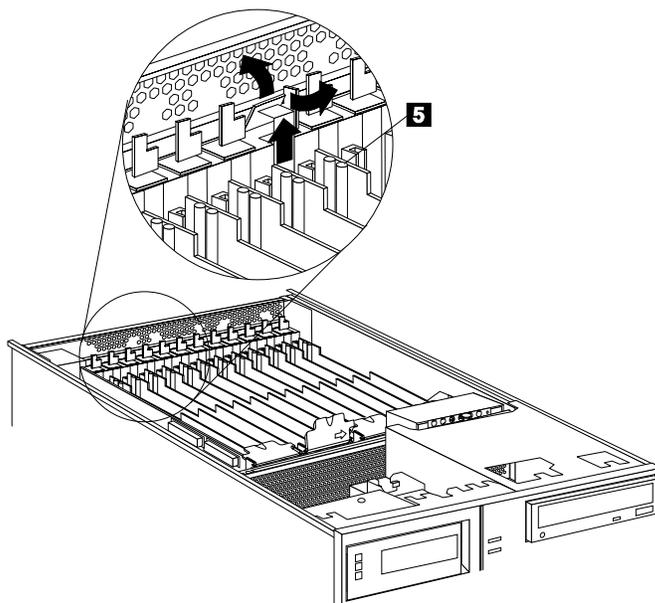
Refer to the following illustration while you perform the following steps.
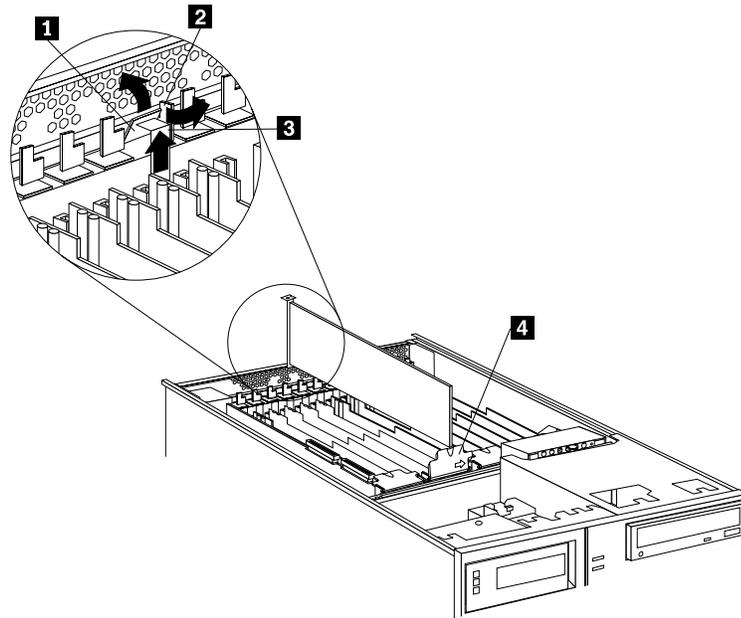
1 Tab
2 Adapter retention latch
3 Expansion-slot cover
4 Adapter retention cover

5. Remove the expansion-slot cover **3** :

   a. Rotate the adapter retention latch **2** to the open (unlocked) position.

   b. Lift the tab **1** at the top of the expansion-slot cover to the open (unlocked) position.

   c. Remove the expansion-slot cover **3** from the server. Store it in a safe place for future use.

      Attention: Expansion-slot covers must be installed on all vacant slots. This maintains the electromagnetic-emissions characteristics of the system and ensures proper cooling of system components.

6. If you are installing a full-length adapter, open the adapter retention cover **4** .

   a. Press outward on the adapter retention assembly where indicated by the arrow.

   b. Continue pressing on the assembly as described in step 6a, and lift the adapter retention cover **4** .

7. Refer to the documentation that comes with your adapter for any cabling instructions. It might be easier for you to route any internal cables before you install the adapter.

8. Touch the static-protective package containing the adapter to any unpainted metal surface on the server. Then, remove the adapter from the static-protective package.

   Note: Avoid touching the components and gold-edge connectors on the adapter.

9. Place the adapter, component-side up, on a flat, static-protective surface.

10. Set any jumpers or switches as described by the adapter manufacturer.

   Refer to the following illustration while you perform the following steps.

11. Install the adapter:
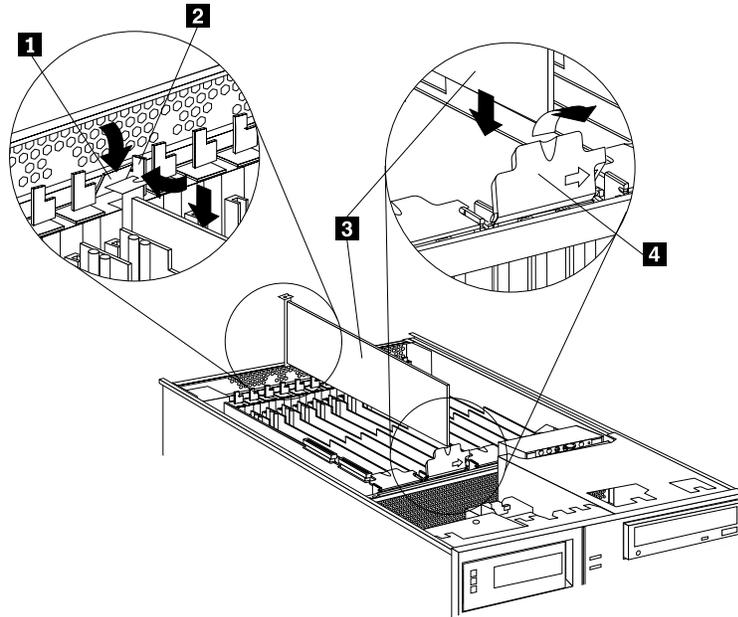
   1 Tab
   2 Adapter retention latch
   3 Adapter
   4 Adapter retention cover

   a. Carefully grasp the adapter **3** by its top edge or upper corners, and align it with the expansion slot on the I/O board.

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

   b. Press the adapter *firmly* into the expansion slot.

   c. If you are installing a full-length adapter, close the adapter retention cover **4** .

   d. Lower the tab **1** over the adapter. Rotate the adapter retention latch **2** until it snaps in place (the locked position).

12. If you have not already done so, connect any cables to the adapter.

13. Enable the PCI slot from your operating system. Make sure that the Power On light for the PCI slot is on.

   Attention: If the installed adapter is not supported by the hot-plug capability of your operating system, shut down and restart the server.

14. If you have other options to install or remove, do so now; otherwise, continue with "Completing the installation" on page 90.

Installing a non-hot-plug PCI adapter

This section gives the procedures for installing a non-hot-plug adapter. If you want to remove a non-hot-plug adapter, reverse the steps.

Before you begin:

- Read the documentation that comes with your adapter for any special requirements or restrictions.

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

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

Refer to the illustrations in "Installing a hot-plug PCI adapter" on page 71 while you perform the steps in this procedure.

To install a non-hot-plug PCI adapter:

1. Read "Safety information" on page 39 through "Handling static-sensitive devices" on page 43.

2. Run the shutdown procedure for the operating system. Turn off the server and peripheral devices; and disconnect all external cables and power cords (see "Preparing to install options" on page 48); then, remove the top cover (see "Removing the top cover" on page 49).

3. Determine which expansion slot you will use for the adapter.

   Note: Check the instructions that come with the adapter for any requirements or restrictions.

4. Perform step 5 on page 74 through step 12 on page 75, and step 14 on page 75.

Verifying compatibility between network adapters and device drivers

Your server supports several types of network adapters. If you are having trouble with the installation or operation of a network adapter or network operating system, ensure that the network-adapter device driver supports multiple processors. Refer to your network-adapter documentation for additional information about adapter compatibility requirements.

Cabling internal hard disk drives to a ServeRAID adapter (optional)

You can install an optional ServeRAID adapter in your server to enable you to configure the internal hot-swap hard disk drives into disk arrays. To do this, you must disconnect the cable from the integrated SCSI controller on the I/O function card, and connect the cable to a ServeRAID adapter. To cable a ServeRAID adapter to the internal hard disk drives in your server, or to make this adapter a startup device, you must install the ServeRAID adapter in PCI slot 10, 11, or 12. Refer to your ServeRAID adapter option documentation for complete instructions on installing a ServeRAID adapter in your server.

The following procedure describes the cable routing that is necessary when you install the ServeRAID adapter. Refer to the following illustration while you perform the steps in this procedure.

Note: It might be easier for you to route the cable before you install the adapter.
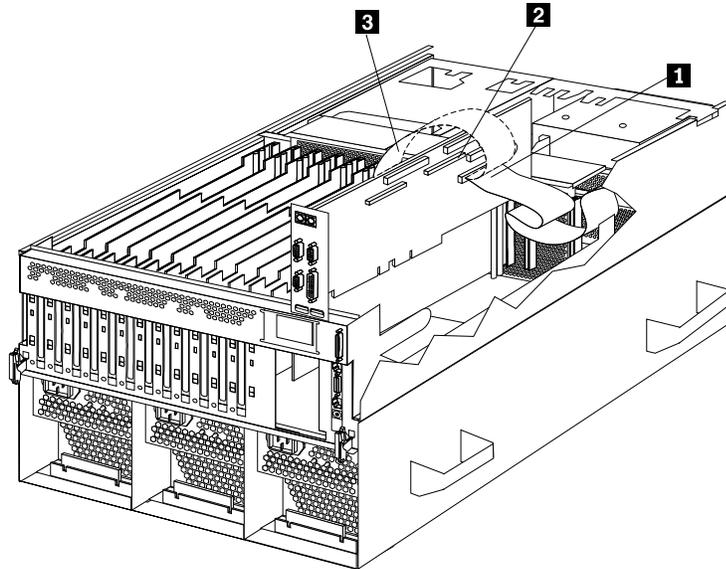
1 Standard internal SCSI cable location for connection to internal SCSI port B
2 Internal SCSI port B
3 New internal SCSI cable location for connection to ServeRAID adapter

1. Read "Safety information" on page 39 through "Working inside a server with power on" on page 44.

2. Disconnect the internal SCSI cable 1 from internal SCSI port B 2 on the I/O function card.

3. Change the setting of the three-pin, SCSI B detect jumper (identifier J19) on the I/O function card from pins 1 and 2 to pins 2 and 3. This prevents the server from displaying a non-applicable error message, `Cable not present.`
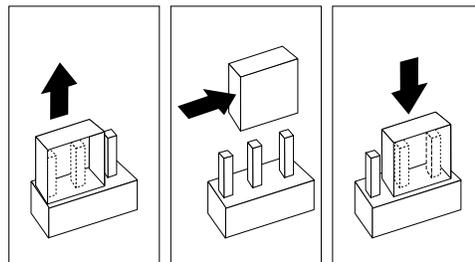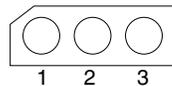
Note: For additional information on changing jumper settings, see "Changing jumper settings" on page 111. For the jumper location, see the illustration of the I/O function card in "I/O function card component locations" on page 103.

4. The SCSI cable comes with two standard folds. Unfold the SCSI cable at the fold that is closer to the connector on the end of the cable. If necessary, refer to the illustration at the beginning of this procedure.

5. Install the ServeRAID adapter in PCI slot 10, 11, or 12.

6. Connect the internal SCSI port B end of the SCSI cable to the appropriate channel on the ServeRAID adapter **3** . Refer to your ServeRAID adapter option documentation for instructions on installing a ServeRAID adapter in your server and connecting the SCSI cable to the ServeRAID adapter.

7. If you have other options to install or remove, do so now; otherwise, continue with "Completing the installation" on page 90.

Installing internal drives

Different types of drives allow your system to read multiple types of media and store more data.

Several types of drives are available, such as:

- Diskette
- Hard disk
- CD-ROM

Some drives have a special design called *small computer system interface*, or SCSI. This design allows you to attach multiple drives to a single SCSI connector. For additional information about SCSI devices, see "SCSI IDs" on page 80.

Internal drive bays

Internal drives are installed in *bays*. Your server comes with one 3.5-inch, 1.44 MB diskette drive, one CD-ROM drive, and two hard disk drive bays.
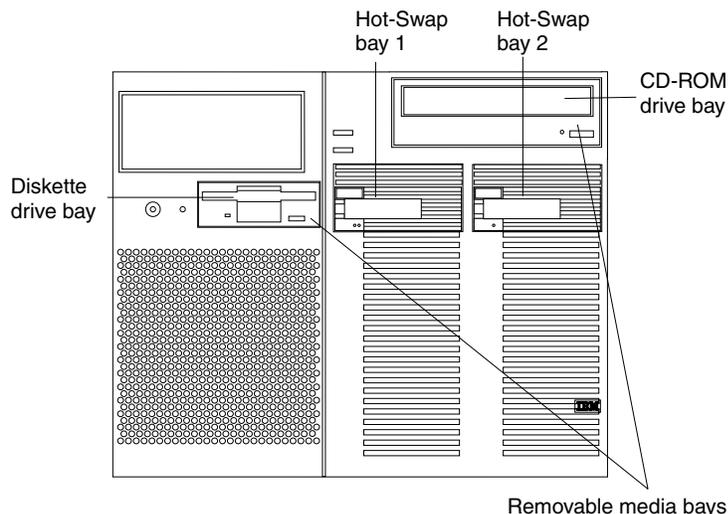
Your server contains hardware and an operating system that support the replacement of a failed hard disk drive without turning off the server, when the drive is connected to a ServeRAID adapter. Therefore, you can continue to operate your system while a hard disk drive is removed or installed. These drives are known as *hot-swappable* drives. They are also referred to as hot-swap drives.

The front of each hot-swap hard disk drive has two indicator lights (see "Controls and indicators" on page 7). If the amber hard disk status light for a drive is lit continuously, that individual drive is defective and needs to be replaced. When the hard disk status light indicates a defective drive, you can replace a hot-swap drive without turning off the server.

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

- Your server comes with a preinstalled 3.5-inch, 1.44 MB diskette drive and a preinstalled integrated drive electronics (IDE) CD-ROM drive.

- The server supports one diskette drive only.

- Your server supports one slim-high (1-inch), 3.5-inch, hot-swap hard disk drive with a filler bezel or one half-high (1.6-inch), 3.5-inch, hot-swap hard disk drive in each hot-swap bay.

- The hot-swap bays connect to a SCSI *backplane*. This backplane is the printed circuit board behind the bay. The backplane supports up to two hard disk drives.

- Empty hot-swap bays and trays that contain slim-high drives must contain a filler bezel.

- The diskette drive uses 2 MB diskettes. For optimum use, format 2 MB diskettes to 1.44 MB.

Hard disk drives

Your server comes with a Wide Ultra-2 SCSI (LVD) controller on the I/O function card.

Notes:

1. LVD = low-voltage differential

2. If you plan to install both internal and external SCSI devices, you must follow the instructions in "Connecting external options" on page 94, in addition to the instructions in this section.

A 16-bit (wide) SCSI cable connects the hot-swap backplane to one channel of the integrated SCSI controller on the I/O function card.

SCSI IDs

Each SCSI device that is connected to an individual integrated SCSI controller needs a unique identification (ID) so that the controller can identify the devices and ensure that different devices do not attempt to transfer data at the same time. (The integrated SCSI controllers operate independently.) If you need to set IDs for SCSI devices, refer to the instructions that come with those devices.

Your server automatically sets SCSI IDs for hot-swap hard disk drives. The server uses the hard disk drive SCSI IDs to send status information to the indicator lights located on each hot-swap drive.

Note: Do not set the SCSI ID jumpers on hard disk drives.

The SCSI backplane in the server supports up to two hot-swap drives. Table 6 shows the default SCSI IDs that the backplane assigns for hot-swap hard disk drives.

Table 6. Automatically assigned SCSI IDs		
Bay	1	2
ID	0	1
Note: The default SCSI ID for the SCSI backplane is 15. The default SCSI ID for each SCSI controller is 7.		

A simplified layout of the SCSI backplane is shown in "SCSI backplane component locations" on page 110.

The processing sequence for SCSI devices is set through the SCSISelect Utility program. The default sequence proceeds from the lowest SCSI ID to the highest (0 to 6, then 8 to 14). The default SCSI ID for each SCSI controller is 7. The default SCSI ID for the SCSI backplane is 15.

Termination

All the internal hot-swap drives in your server have automatic termination.

Preinstallation steps

Before you install drives in your server, verify that you have all the cables and any other equipment specified in the documentation that comes with the internal drive. You might also need to perform certain preinstallation activities. Some of the steps are required only during the initial installation of an option.

1. Choose the bay in which you want to install the drive.

2. Verify that all jumpers are removed from the drive.

3. To install the drive, continue with "Installing or replacing a drive."

Installing or replacing a drive

Notes:

1. You do not have to turn off the server to install hot-swap drives in these bays. If these bays are not connected to a ServeRAID adapter, shut down and restart the server. If these bays are connected to a ServeRAID adapter, you can use your RAID management software to bring the drives online.

   Refer to your ServeRAID adapter option documentation for instructions on installing a ServeRAID adapter.

2. You do not have to turn off the server to remove a drive from a hot-swap bay, when that bay is connected to a ServeRAID adapter.

If the amber hard disk status light for a drive is lit continuously, that individual drive is defective and needs to be replaced. For additional information, see "LEDs for Internal hard disk drives in a ServeRAID environment" on page 158. For the location of the hard disk status light, see "Controls and indicators" on page 7.

Attention:

1. Before you hot-swap a drive, refer to the amber hard-disk status light for that drive to make sure that it is defective. If your server has a ServeRAID adapter installed and you assigned RAID level 1 or 5 to the logical drives in your disk array, make sure that the drive is defective. If you partially or completely remove a good drive instead of a defective one, your server might lose valuable data. However, the ServeRAID adapter can rebuild the data that you need, provided that certain conditions are met. Refer to the ServeRAID adapter documentation for further details.

2. To avoid damage to a hard disk drive, *do not* remove the drive from the hot-swap bay until it has had time to spin down (approximately 30 seconds after disconnecting). Handle the drive gently.

> **Before you begin:**
>
> Read the documentation that comes with your drive.

Refer to the following illustration while you perform the steps in this procedure.
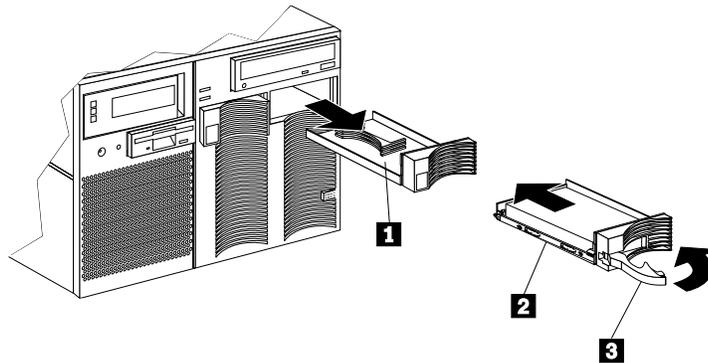
1 Filler panel (tray and slim filler bezel)
2 Hot-swap hard disk drive
3 Drive tray handle (open position)

To install or replace a hard disk drive:

1. Read "Safety information" on page 39 through "Handling static-sensitive devices" on page 43.

2. Determine the bay in which you want to install the drive.

3. If you are removing a defective hard disk drive, do so now. Otherwise, continue with step 4.

   Remove the defective hard disk drive **2** by pressing on the lock to release the handle **3**, placing the handle in the open position (perpendicular to the drive), and pulling the hot-swap tray from the bay. Continue with step 5.

4. Remove the filler panel **1** from the empty hot-swap bay by inserting your finger into the depression at the left side of the filler panel and pulling it away from the server.

   Note: If you are installing a slim-high drive, you must separate the slim filler bezel from the tray, and insert the slim filler bezel into the top of the hard disk drive cage. Otherwise, store the filler panel in a safe place.

5. Install the hard disk drive **2** in the hot-swap bay:

   a. Remove the new drive assembly from the static-protective package.

   b. Touch the static-protective package containing the drive assembly to any unpainted metal surface on the server. Then, remove the drive assembly from the static-protective package.

   c. If you are installing a slim-high drive, separate the slim filler bezel from the tray, and insert the slim filler bezel into the top of the hard disk drive cage.

   d. Ensure that the tray handle **3** is open (that is, perpendicular to the drive).

   e. Align the drive assembly so that it engages the guide rails in the bay.

   f. Gently push the drive assembly into the bay until the drive stops.

      g. Push the tray handle to the closed (locked) position.

6. Check the hard disk drive status indicators to verify that the hard disk drives are operating properly. See "Identifying problems through status indicators" on page 155 for details.

    Note: If your server has a ServeRAID adapter installed, refer to the ServeRAID adapter documentation for details about configuration requirements.

Replacing a hot-swap power supply

13

⚠️   ⚡

DANGER

> **Overloading an electrical circuit breaker is potentially a fire hazard and a shock hazard under certain conditions. To avoid these hazards, adhere to the instructions in the following statements.**
>
> 1. **If you are connecting to a 100–127 V ac power source, connect each power cord to a separate branch circuit.**
>
> 2. **If you are connecting to a 200–240 V ac power source and the branch circuit breaker rating is:**
>
>   a. **13 amps or less, connect each power cord to a separate branch circuit.**
>
>   b. **14 amps to 19 amps, do not connect more than two power cords to the same branch circuit.**
>
>   c. **20 amps or greater, you may connect up to three power cords to the same branch circuit.**

Your server comes with three power supplies, three 220 V ac power cords, and three 110 V ac power cords (U.S. only). Be sure to select the appropriate power cord voltage for your server environment. All three power cords must have the same voltage.

If you connect all three power cords of the same voltage to the power supplies, the three power supplies support redundancy and hot-swap capability.

For servers with redundant power, the loss of a single power supply will not affect the server operation. Replace a power supply that has failed as soon as convenient to help maintain the redundant power and cooling capability. When the ac power LED is on, the dc power LED is on, and the System Power light on the operator panel is on, the power supply has failed. See "Power supplies" on page 13 for the location of the dc power LEDs. See "Power supply LEDs" on page 156 for more information on the dc power LEDs.

Attention: To ensure proper server operation, be sure to connect all three 220 V ac power cords or all three 110 V ac power cords to the power supplies.

Note: Your server also comes with three 220 V ac power cords for connection to the server rack power distribution unit (PDU). Refer to the documentation that comes with your PDU option for additional information on installing a PDU. Refer to the *Rack Mounting Instructions* for additional information on installing a server in a rack.

8

CAUTION:
Never remove the cover on a power supply or any part that has the following label attached.
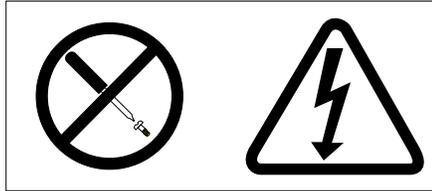
Hazardous voltage, current, and energy levels are present inside any component that has this label attached. There are no serviceable parts inside these components. If you suspect a problem with one of these parts, contact a service technician.

Refer to the following illustration while performing the steps in this procedure.

Notes:

1. The illustrations in this section might differ slightly from your hardware.

2. You do not need to turn off the power to the server to replace hot-swap power supplies.
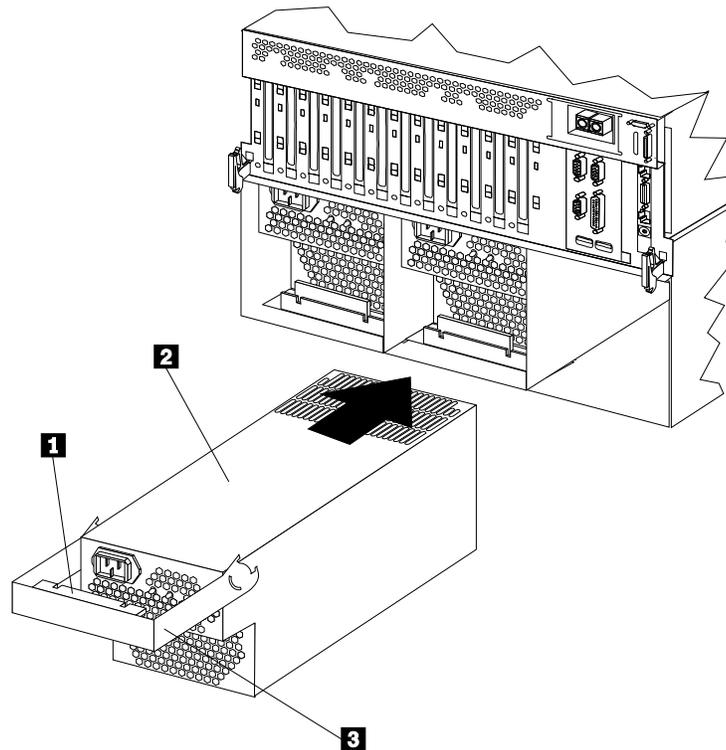
1 Handle release latch
2 Power supply
3 Handle

To replace a hot-swap power supply:

1. Remove the power supply:

    a. Unplug the power cord from the power supply and the electrical outlet and, if necessary, remove the power supply cord from the strain-relief bracket.

    b. If a strain-relief bracket is attached to the power supply, remove the screw on the back of the power supply (lower right side), and remove the strain-relief bracket.

    c. Press the release latch **1** on the handle **3** on the power supply **2** .

    d. Lift and fully extend the handle on the power supply. Then, slide the power supply out of the chassis. Refer to your power supply option documentation for complete instructions on proper handling and disposal of a defective power supply.

2. Replace the power supply:

   a. Touch the static-protective package containing the power supply to any unpainted metal surface on the server. Then, remove the power supply from the static-protective package.

   b. Place the power supply handle **3** in the open (up) position, and slide the power supply into the chassis. If necessary, lower the handle slightly to avoid the I/O housing assembly; then, continue inserting the power supply into the bay until it stops.

   c. Press the handle down to seat the power supply in the bay. This places the power supply in the locked position.

   d. Reconnect the power cord to the power supply and the electrical outlet (if removed).

   e. Remove the new strain-relief bracket from its package and install it on the power supply cord.

      Note: If a new strain-relief bracket did not come with your new power supply, attach the strain-relief bracket that you removed in step 1b on page 86 on the new power supply.

   f. Verify that the ac power light and the dc power light are lit, indicating that the power supply is operating correctly. See "Power supply LEDs" on page 156 for details. See "Power supplies" on page 13 for the location of the ac and dc power LEDs.

3. If you have other options to install or remove, do so now; otherwise, continue with "Completing the installation" on page 90.

Replacing a hot-swap fan

Your server comes with three hot-swap processor fans (labeled and numbered 1, 2, and 3) in the front of the processor housing assembly at the front of the server, and three hot-swap I/O fans (labeled and numbered 4, 5, and 6) behind the hot-swap drive bays. Each fan has an LED; the fan LEDs are amber in color. A fan LED is lit only when the fan needs replacement.

Notes:

1. The illustrations in this section might differ slightly from your hardware.

2. You do not need to turn off the power to the server to replace a fan.

3. Replace a fan that has failed as soon as convenient to maintain the redundant cooling capability.

4. The top cover is in place during normal operation. If the server is on, do not leave the top cover off for more than 30 minutes at a time.

To replace a hot-swap fan:

- To replace a processor fan, continue with "Replacing a processor fan."

- To replace an I/O fan, continue with "Replacing an I/O fan" on page 89.

Replacing a processor fan

1. Determine which fan you will replace.

2. Remove the front bezel (see "Removing the front bezel" on page 50).
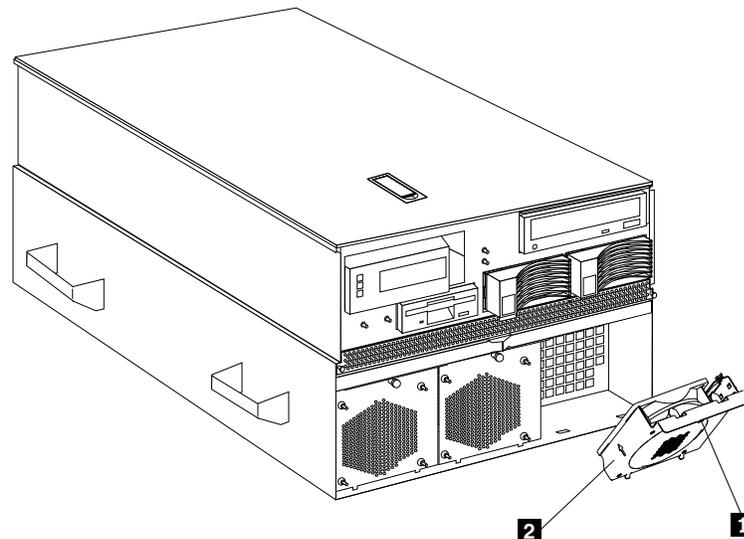
3. Pull out the fastener **1** in the top center of the processor fan **2**. This places the fastener in the unlocked position.

4. Pivot the fan downward and remove it from the server.

5. Insert the replacement fan in the fan bay. Align the bottom tabs of the fan **2** with the matching slots in the server chassis.

6. Pivot the fan in an upward position.

7. When you have the fan correctly seated in the fan bay, press on the fastener in the center of the fan to secure the fan in the server.

   Note: When you correctly seat the fan in the chassis, the fan blades begin to spin. The fan LED goes out a few seconds after the new fan is installed.

8. If you have other options to install or remove, do so now; otherwise, continue with "Completing the installation" on page 90.

Replacing an I/O fan

1. Read "Working inside a server with power on" on page 44.

2. Determine which fan you will replace.

3. Remove the top cover (see "Removing the top cover" on page 49).
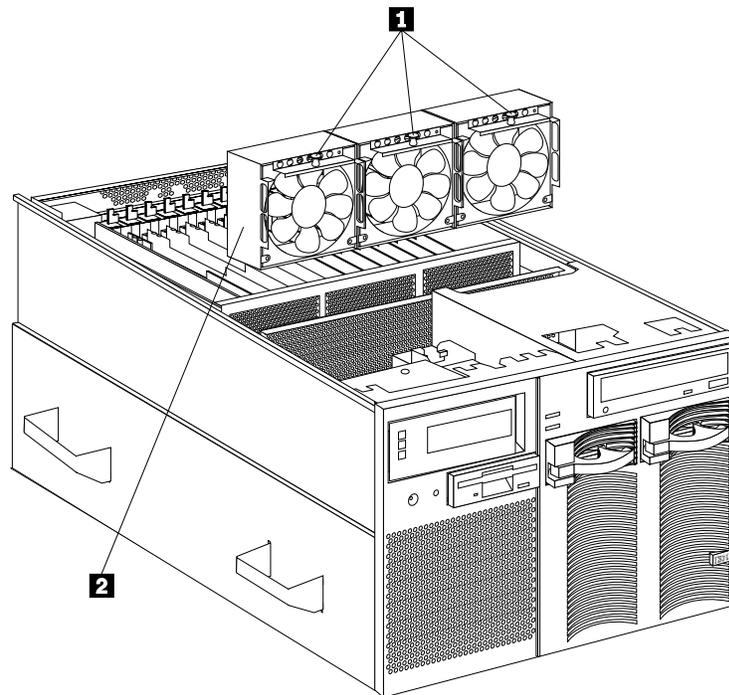
4. Pull up the fastener **1** in the center of the fan **2** . This places the fastener in the unlocked position.

5. Lift the fan out of the server.

6. Insert the replacement fan in the fan bay. Align the connector on the bottom of the fan with the matching connector in the server chassis.

7. When you have the fan correctly seated in the fan bay, press down on the fastener in the center of the fan to secure the fan in the server.

   Note: When you correctly seat the fan in the chassis, the fan blades begin to spin. The fan LED goes out a few seconds after the new fan is installed.

8. If you have other options to install or remove, do so now; otherwise, continue with "Completing the installation" on page 90.

Completing the installation

Depending on the options that you have installed, you must reinstall the top cover and the front bezel to complete the installation. You must also reconnect all the cables that you disconnected in "Preparing to install options" on page 48, and, after installing certain options, you must run the Configuration/Setup Utility program. Follow the instructions in this section.

Installing the top cover

Notes:

1. The top cover is in place during normal operation. If the server is on, do not leave the top cover off for more than 30 minutes at a time.

2. If necessary, see "Input/output connectors and expansion slots" on page 11 for connector locations.

To install the server top cover:

1. Before installing the top cover, check that all cables, adapters, and other components are installed and seated correctly and that you have not left tools or loose parts inside the server.

2. Place the cover-release latch **1** in the open (up) position.

3. Insert the bottom tabs of the cover **2** in the matching slots in the server chassis.
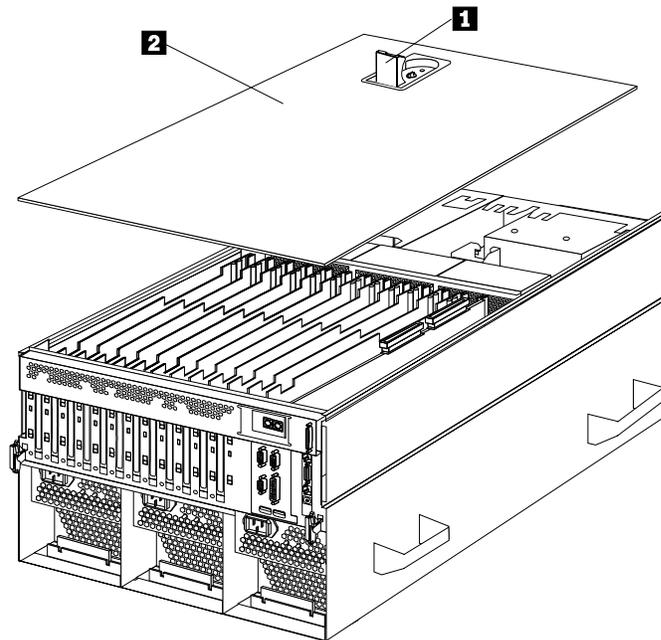
4. Close the cover-release latch to pull the cover forward and lock the cover in place.

13

DANGER

> **Overloading an electrical circuit breaker is potentially a fire hazard and a shock hazard under certain conditions. To avoid these hazards, adhere to the instructions in the following statements.**
>
> a. **If you are connecting to a 100–127 V ac power source, connect each power cord to a separate branch circuit.**
>
> b. **If you are connecting to a 200–240 V ac power source and the branch circuit breaker rating is:**
>
> > 1) **13 amps or less, connect each power cord to a separate branch circuit.**
> >
> > 2) **14 amps to 19 amps, do not connect more than two power cords to the same branch circuit.**
> >
> > 3) **20 amps or greater, you may connect up to three power cords to the same branch circuit.**

5. If you disconnected any cables or power cords from the back of the server, reconnect the cables; then, plug the power cords into properly grounded electrical outlets.

Installing the front bezel

To install the front bezel:

1. Insert the bottom tabs of the bezel in the matching slots in the server chassis.

2. Press in the tab on the bezel; then, pivot the top of the bezel until the latches ◼ snap into place. This places the bezel in the locked position.
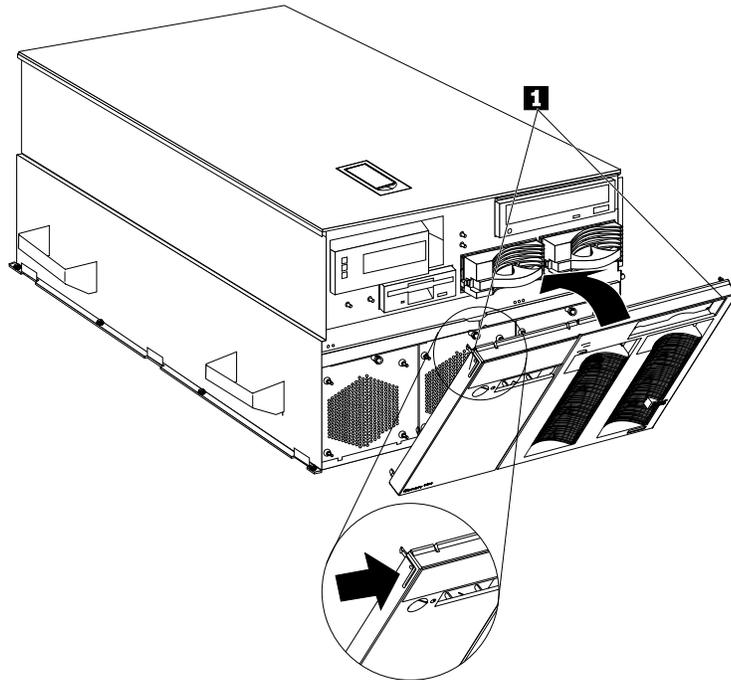
Reconfiguring the server and updating server records

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

- Device drivers

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

- DIMMs

  If you replaced a defective DIMM, you must manually enable the DIMM slot in the Configuration/Setup Utility program. In this case, the system does not automatically access the Configuration/Setup Utility program to enable the DIMM slot. See "Memory settings" on page 30 for additional information.

- Processors

  Your xSeries 370 server comes with at least one processor installed on the standard processor daughterboard. If you have installed one or more additional processors, your server can now operate as an SMP server. Therefore, you might need to upgrade your operating system. Refer to your operating-system documentation for additional information.

  If you replaced a defective processor, you must manually enable the processor slot in the Configuration/Setup Utility program. In this case, the system does not automatically access the Configuration/Setup Utility program to enable the processor slot. See "Processor settings" on page 30 for additional information.

- Reconfiguring the server

  Run the Configuration/Setup Utility program to save the new configuration information. See Chapter 3, "Configuring your server" on page 19.

- Updating server records

  Record your updated device and configuration information and keep it in a safe place.

Connecting external options

┌─ **Before you begin:** ──────────────────────────────────┐
│   │
│ Read the documentation that comes with your options.   │
│   │
└──┘

Connecting external SCSI devices

Your server comes with one external SCSI port so that you can connect external SCSI devices.

You can also attach a SCSI storage expansion enclosure to your server.

Cabling requirements

If you plan to install external SCSI devices, you must order additional SCSI cables. These cables must have the proper connectors for the SCSI external connector and the external devices. To select and order the correct cables for use with external devices, contact your IBM reseller or IBM marketing representative.

Refer to the information that comes with your adapter to determine the number of internal and external connectors, channels, and SCSI devices that the adapter supports.

For information about the maximum length of SCSI cable between the terminated ends of the cable, see the following ANSI SCSI Standards:

- X3.131-1986 (SCSI)
- X3.131-1994 (SCSI-2)
- X3T10/1071D
- X3T10/1142D (Ultra-2 SCSI)
- X3.302:1998 (Ultra-2 SCSI)

Adhering to these standards ensures that your server operates properly.

Setting SCSI IDs for external devices

Each SCSI device that is connected to a SCSI controller must have a unique SCSI ID, so that the SCSI controller can identify the devices and ensure that different devices do not attempt to transfer data at the same time. SCSI devices that are connected to different SCSI controllers can have duplicate SCSI IDs. See "SCSI IDs" on page 80 and to the instructions that come with the SCSI devices for more information about setting a SCSI ID.

Installing external devices

To attach an external device:

1. Read "Safety information" on page 39 through "Handling static-sensitive devices" on page 43.

2. Run the shutdown procedure for the operating system. Turn off the server and all attached devices.

3. Follow the instructions that come with the option to prepare it for installation and to connect it to the server.

Input/Output port connectors

The input/output (I/O) port connectors are for attaching external devices, such as printers, keyboards, and displays, to your server. The I/O port connectors on your server include:

- Two serial-port connectors
- One parallel-port connector
- One video-port connector
- One keyboard-port connector
- One auxiliary-device-port connector
- One external Wide Ultra-2 SCSI (LVD) port connector
- Two USB-port connectors
- One 10/100 Mbps Ethernet port connector on the Advanced System Management PCI adapter
- One dual serial-port connector on the Advanced System Management PCI adapter
- One Advanced System Management Interconnect port connector

See the illustration in "Input/output connectors and expansion slots" on page 11 for the locations of the connectors.

Serial port

Your server comes with two serial ports. (See "Input/output connectors and expansion slots" on page 11 for the locations of the connectors.) These ports are used to communicate with printers, plotters, external modems, scanners, and auxiliary terminals. You can also use these ports to transfer data between computers.

Serial ports transfer data one bit at a time, using direct memory access (DMA). DMA is a method of transferring data between I/O devices and system memory without intervention by the system processor.

Serial ports can transfer data *asynchronously*, which means that they can transmit any number of characters at any time, with no restriction on the duration of the pauses between characters.

The serial ports can transmit and receive data and commands at rates of from 300 bits per second up to 345 600 bits per second. To use a serial port at 345 600 bits per second, you need a shielded serial cable. For information about this cable, contact your IBM marketing representative or your IBM authorized reseller.

Each serial port has a 9-pin, male D-shell connector on the back of the server. The pin-number assignments of this connector conform to the industry standard.
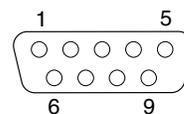
The following table shows the pin-number assignments for the serial-port connectors.

Table 7. Serial port pin-number assignments			
Pin	**Signal**	**Pin**	**Signal**
1	Data carrier detect	6	Data set ready
2	Receive data	7	Request to send
3	Transmit data	8	Clear to send
4	Data terminal ready	9	Ring indicator
5	Signal ground		

When you turn on your server, the POST routine assigns the serial ports to specific communication port addresses.

Some application programs use only certain ports, and some modems are designed for use only at certain communication port addresses. You might need to use the Configuration/Setup Utility program to change communication port address assignments to resolve conflicts.

Parallel port

The parallel port usually is used to communicate with printers, and transfers data one byte at a time using DMA. The parallel port has a 25-pin, female D-shell connector on the back of your server. (See "Input/output connectors and expansion slots" on page 11 for the location of the connector.)
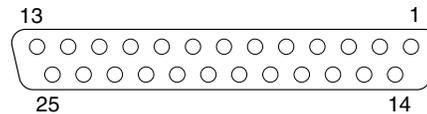
The following table shows the pin-number assignments for the parallel-port connector.

Table 8. Parallel port pin-number assignments			
Pin	**Signal**	**Pin**	**Signal**
1	STROBE	14	-AUTO FEED XT
2	Data 0	15	-ERROR
3	Data 1	16	-INIT
4	Data 2	17	-SLCT IN
5	Data 3	18	Ground
6	Data 4	19	Ground
7	Data 5	20	Ground
8	Data 6	21	Ground
9	Data 7	22	Ground
10	-ACK	23	Ground
11	BUSY	24	Ground
12	PE (paper end)	25	Ground
13	SLCT (select)		

When you turn on your server, the POST routine assigns the parallel port a specific port address. You can change the parallel-port assignment by using the Configuration/Setup Utility program.

Video port

The I/O function card in your server has one SVGA video port. This port is used to attach a video monitor. The video port has a 15-pin analog connector on the back of the server. (See "Input/output connectors and expansion slots" on page 11 for the location of the connector.)
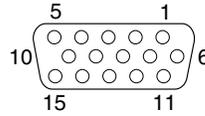
The following table shows the pin-number assignments for the video connector.

Table 9. Video port pin-number assignments	
Pin	**Signal**
1	Red
2	Green or monochrome
3	Blue
4	Not connected
5	Ground
6	Ground
7	Ground
8	Ground
9	Not connected
10	Ground
11	Not connected
12	Not connected
13	Horizontal synchronization (Hsync)
14	Vertical synchronization (Vsync)
15	Not connected

The integrated video controller has 4 MB of video memory. The integrated video controller supports the following screen resolutions:

- 640 × 480 pels with up to 16,000,000 colors
- 800 × 600 pels with up to 16,000,000 colors
- 1024 × 768 pels with up to 16,000,000 colors
- 1152 × 864 pels with up to 16,000,000 colors
- 1280 × 1024 pels with up to 64,000 colors
- 1600 × 1200 pels with up to 64,000 colors

Keyboard and auxiliary-device ports

The I/O function card has one keyboard port and one auxiliary-device port that supports a mouse or other pointing device. (See "Input/output connectors and expansion slots" on page 11 for the locations of the connectors.)
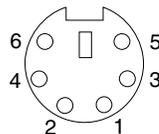
The following table shows the pin-number assignments for the connectors used by the keyboard and auxiliary-device ports.

Table 10. Keyboard and auxiliary-device port pin-number assignments	
Pin	**Signal**
1	Data
2	Not connected
3	Ground
4	+5 V dc
5	Clock
6	Not connected

Wide Ultra-2 SCSI (LVD) ports

Your server has two Wide Ultra-2 SCSI (LVD) bus-master controllers on the I/O function card; one supports internal devices and the other is connected to an external connector for support of external devices. Each controller supports up to 15 SCSI devices. You can use the 68-pin, SCSI connectors for these controllers to expand the capabilities of your server by attaching different types of SCSI devices, such as drives or printers.

Table 11 shows the pin-number assignments for the 68-pin SCSI connectors.

Table 11. 68-Pin SCSI port pin-number assignments			
Pin	**Signal**	**Pin**	**Signal**
1	+DB12	35	-DB12
2	+DB13	36	-DB13
3	+DB14	37	-DB14
4	+DB15	38	-DB15
5	+DBP1	39	-DBP1
6	+DB0	40	-DB0
7	+DB1	41	-DB1
8	+DB2	42	-DB2
9	+DB3	43	-DB3
10	+DB4	44	-DB4
11	+DB5	45	-DB5
12	+DB6	46	-DB6
13	+DB7	47	-DB7
14	+DBP	48	-DBP
15	Ground	49	Ground
16	Ground	50	-Cable Detect
17	Termpwr	51	Termpwr
18	Termpwr	52	Termpwr
19	Ground	53	Reserved
20	Ground	54	Ground
21	+ATN	55	-ATN
22	Ground	56	Ground
23	+BSY	57	-BSY
24	+ACK	58	-ACK
25	+RST	59	-RST
26	+MSG	60	-MSG
27	+SEL	61	-SEL
28	+C/D	62	-C/D
29	+REQ	63	-REQ
30	+I/O	64	-I/O
31	+DB8	65	-DB8
32	+DB9	66	-DB9
33	+DB10	67	-DB10
34	+DB11	68	-DB11

Universal Serial Bus ports

The I/O board in your server contains two Universal Serial Bus (USB) ports. Each USB port has an external connector on the rear on the server for attaching devices that previously used serial, parallel, keyboard, mouse, and game ports.

USB is an emerging serial interface standard for telephony and multimedia devices. USB technology uses Plug and Play to determine what device is attached to the connector. Each USB device is accessed by a unique *USB address*. A device called a hub is used to convert the USB port into multiple attachment points. A hub has multiple ports where devices can be attached. USB provides 12 megabits-per-second (Mbps) data transfer rate with a maximum of 63 devices and a maximum signal distance of 5 meters (16 ft.) per data segment.

Note: If more than one USB device is to be attached, the device must be connected to a hub.

Table 12 shows the pin-number assignments for the USB connectors.

Table 12. USB connector pin-number assignments	
Pin	**Signal**
1	VCC
2	−Data
3	+Data
4	Ground

Advanced System Management PCI adapter 10/100 Mbps Ethernet port

The Advanced System Management PCI adapter contains a 10/100 Mbps Ethernet controller. The Ethernet controller has an external RJ-45 connector that is used with Category 3, 4, or 5 unshielded twisted-pair (UTP) cable. The connector enables your Advanced System Management PCI adapter to attach to an Ethernet network for remote communication.

Notes:

1. The Advanced System Management PCI adapter 10/100 Mbps Ethernet port cannot be accessed from the network operating system. The connector is dedicated to connecting your Advanced System Management PCI adapter to an Ethernet network through a service-processor interface, such as the system management software that comes with your server.

2. The 100BASE-TX Fast Ethernet standard requires that the cabling in the network is Category 5 or higher.

Table 13 on page 100 shows the pin-number assignments for the RJ-45 connector. These assignments apply to both 10BASE-T and 100BASE-TX devices.

10BASE-T or 100 BASE-TX
UTP cable

RJ-45 modular plug connector

Pins 1 2 3 6
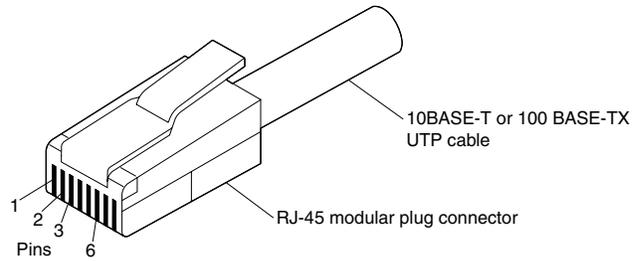
Table 13. 10/100 Mbps Ethernet connector pin-number assignments			
Pin	**Signal**	**Pin**	**Signal**
1	Transmit data+	5	Reserved
2	Transmit data−	6	Receive data−
3	Receive data+	7	Reserved
4	Reserved	8	Reserved

Advanced System Management dual serial port

The Advanced System Management PCI adapter contains a dual serial port. The port has an external connector that can be used to attach to a Y-cable that is shipped with your server. The serial connectors on the Y-cable and the pin-number assignments are the same as for the system serial ports. This Y-cable can be used to attach to a modem that is dedicated to communication with the Advanced System Management PCI adapter.

You can obtain a listing of compatible modems and related information by accessing the following address: http://www.ibm.com/pc/us/compat/ on the World Wide Web.

Advanced System Management Interconnect port

The Advanced System Management PCI adapter contains an Advanced System Management Interconnect port. The port has an external connector that must be attached to an optional Y-cable that provides for chaining other compatible service processors for remote access. To obtain an optional Y-cable, contact an IBM reseller or IBM marketing representative.

The following table shows the pin-number assignments for the connectors used by the Advanced System Management Interconnect bus port.

Table 14. Advanced System Management Interconnect bus connector pin-number assignments	
Pin	**Signal**
1	Term power
2	+ Input
3	− Input
4	+ Output
5	− Output
6	Ground

Chapter 5. Board and adapter components

This chapter contains information about the server board and adapter component locations. This section also provides the instructions needed to change the jumper settings.

Advanced System Management PCI adapter component locations

The following simplified layout of the Advanced System Management PCI adapter identifies the components.
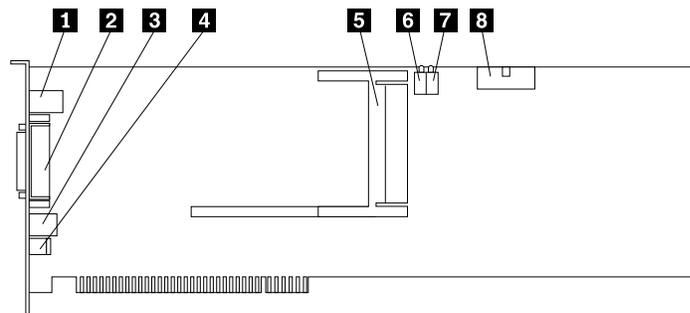
1 10/100 Mbps Ethernet port connector (J8)
2 Dual serial port connector (J11)
3 Advanced System Management Interconnect (formerly RS 485) bus connector (J16)
4 External power supply connector (12 V dc jack J19, not used)
5 Personal Computer Memory Card International Association (PCMCIA) token-ring connector (J2)
6 Power on LED (CR2 bottom, green) and processor error LED (CR2 top, amber)
7 Ethernet activity LED (CR3 bottom, amber) and Ethernet link LED (CR3 top, green)
8 I/O function card connector (J4)

I/O board component locations

A simplified layout of the I/O board is shown in the following illustration.

1 Midplane connector
2 I/O function card slot
3 Voltage regulator module (VRM) connectors
4 Advanced System Management PCI adapter slot
5 USB 1 and USB 2 port connectors
6 PCI switch card connector
7 Hot-plug, 64-bit, PCI slots 10–12 (bus A, 33 MHz)
8 Hot-plug, 64-bit, PCI slots 8–9 (bus B, 66 MHz)
9 Hot-plug, 64-bit, PCI slots 6–7 (bus C, 66 MHz)
10 Hot-plug, 64-bit, PCI slots 1–5 (bus D, 33 MHz)
11 Hot-plug external attention/fail LED for PCI slot (green blink = attention, amber = defective PCI adapter)
12 Hot-plug internal attention/fail LED for PCI slot (green blink = attention, amber = defective PCI adapter)
13 Hot-plug power LED for PCI slot (green solid, on)

Your server has assigned PCI slots 10, 11, and 12 as PCI priority slots. The system BIOS scans the PCI priority slots for startable (bootable) devices before scanning the I/O function card.

Note: If you install additional storage adapters and external hard disk drives, and you do not want to change the startup hard disk drive, you must install the adapters in PCI slots 1 through 9.

I/O function card component locations

The following simplified layout of the I/O function card identifies the components.
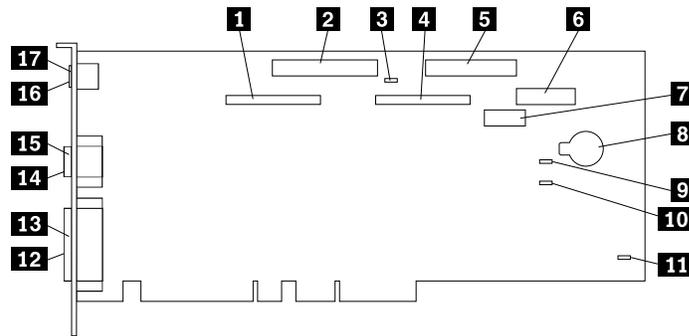
1 External SCSI connector (channel A)
2 CD-ROM drive connector
3 SCSI B detect jumper (J19)
4 Internal SCSI connector (channel B)
5 Diskette drive connector
6 Front panel connector
7 Advanced System Management PCI adapter connector
8 Battery
9 Flash page swap jumper (J13)
10 Power-on password override jumper (J14)
11 Clear CMOS register contents jumper (J15)
12 Video port connector (note 1)
13 Parallel port connector
14 Serial port A connector
15 Serial port B connector
16 Keyboard connector (note 2)
17 Mouse connector

Notes:

1. The video port connector is a 15-pin, D-shell connector behind the parallel port connector.

2. The keyboard connector is behind the mouse connector, and is closer to the circuit side of the board.

Attention

You cannot clear the administrator password by changing the CMOS jumper. If an administrator password is set and then forgotten, contact your IBM service technician.

I/O function card jumpers

Table 15 describes the jumpers on the I/O function card. The highlighted numbers in the table correspond to the highlighted numbers on the illustration in "I/O function card component locations" on page 103. See "Three-Pin jumper blocks" on page 112 for instructions and an illustration on changing the I/O function card jumper settings.

Note: Turn off the server, and disconnect the power cord before moving any jumpers.

Table 15. I/O function card jumpers	
Jumper name	**Description**
3 J19 SCSI B detect jumper	The default position is a jumper installed on pins 1 and 2. Change the position of this jumper after you disconnect the SCSI cable from the internal SCSI port B and connect the cable to a ServeRAID adapter. See "Cabling internal hard disk drives to a ServeRAID adapter (optional)" on page 76 for additional information.
9 J13 Flash page swap	The default position is a jumper installed on pins 1 and 2. Changing the position of this jumper changes which of the two pages of flash ROM is used when the system starts.
10 J14 Power-on password override	Changing the position of this jumper bypasses the power-on password check. You do not need to move the jumper back to the default position after the password is overridden.
	Changing the position of this jumper does not affect the administrator password check if an administrator password is set.
11 J15 Clear CMOS register contents jumper	If you need to *erase* configuration information, you must move this jumper. The default position is a jumper installed on pins 1 and 2. When you change the position of this jumper, you must remove the battery (see "Replacing the battery" on page 159) on the I/O function card, and then move the jumper to pins 2 and 3. After removing the battery and moving the jumper, wait at least 5 minutes.
	Changing the position of this jumper erases all configuration and setup information, including the power-on password. Therefore, you must reconfigure the server after clearing CMOS memory (see "Reconfiguring the server and updating server records" on page 93). If possible, record your server configuration information *before* moving the Clear CMOS register contents jumper.
	Attention You cannot clear the administrator password by changing the CMOS jumper. If an administrator password is set and then forgotten, contact your IBM service technician.
	After you clear the CMOS register contents, move the jumper back to its normal position (pins 1 and 2); then, reinstall the battery on the I/O function card (see "Replacing the battery" on page 159).

Memory board component locations

The following simplified layout of a memory board identifies the components. Your server supports two memory boards.

Note: Your memory board might look slightly different, depending on the hardware that comes with your server.
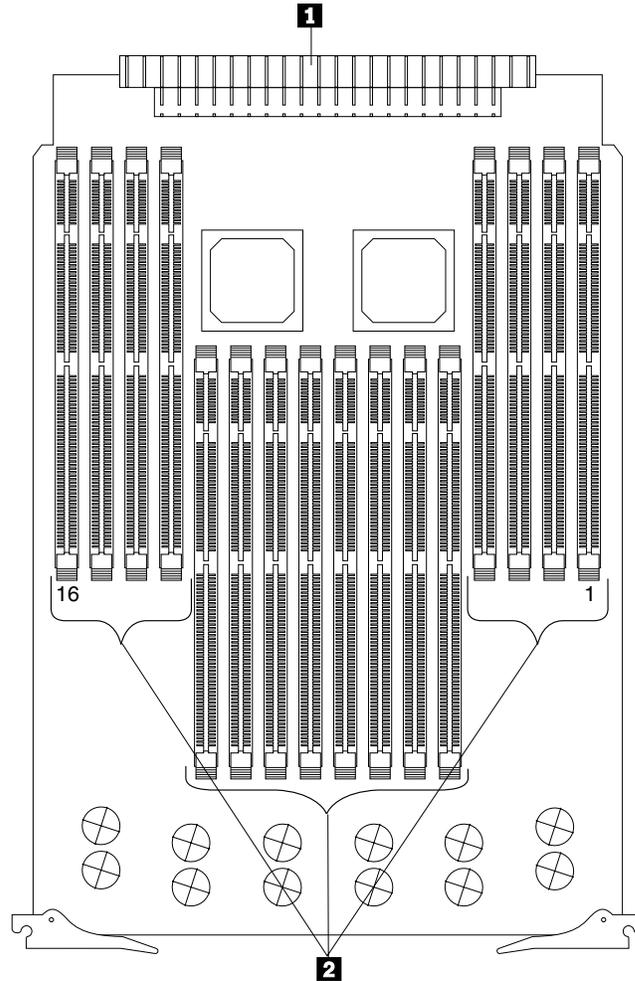
1 Midplane connector
2 DIMM connectors (J1–J16)

See "LED card (processor and DIMM) LEDs" on page 157 for details about the DIMM error LEDs.

See "Installing DIMMs and memory boards" on page 52 for instructions on installing a DIMM on a memory board, and installing a memory board in the server.

Notes:

1. The 100 MHz DIMMs support the registered mode of operation.

2. Install DIMMs with a maximum height of 4.32 cm (1.7 inches).

3. Your server comes with one standard memory board (A), and one or more DIMMs installed on this memory board. You can install an optional memory board (B). Both the standard memory board (A) and the optional memory board (B) contain 16 DIMM connectors (J1–J16).

4. When you install DIMMs in both the standard memory board (A) and the optional memory board (B), you must install them in matching pairs with the same part number, in the same slot on each memory board; for example, J1/J1, J5/J5, J9/J9, and so on.

5. The connector identifiers located on both the standard (A) and the optional (B) memory boards are J1–J16. To distinguish the two memory boards, use the labels provided on the processor housing assembly. These labels refer to the connector identifiers as A1–A16 on the standard memory board, and B1–B16 on the optional memory board.

6. Your server comes with a system label on the server cover. The numbers located to the right of the memory boards on the system label do not indicate DIMM connector identifiers. These numbers indicate the DIMMs; for example, **1** means the first DIMM that you install, **9** means the ninth DIMM that you install, and so on.

Processor-controller board component locations

A simplified layout of the processor controller board is shown in the following illustration.
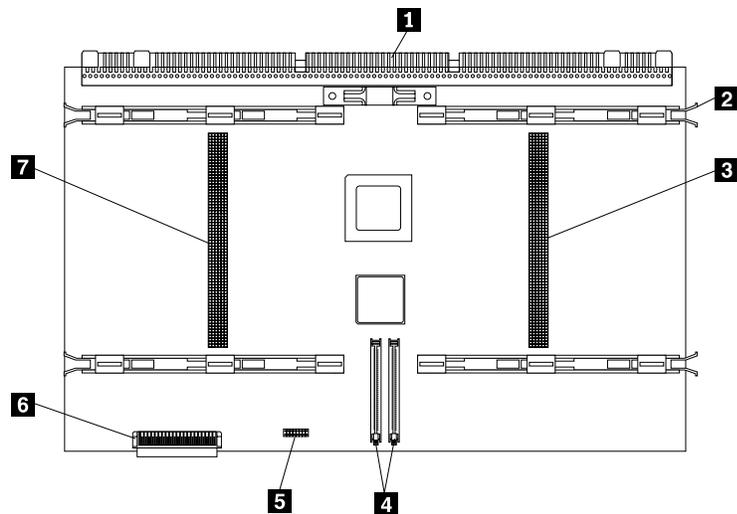
1 Midplane connector
2 Processor-cage release latches (four)
3 Processor-daughterboard slot B connector (secondary slot)
4 Cache coherency filter card connectors
5 Processor-core-frequency-selection jumper block
6 LED card connector
7 Processor-daughterboard slot A connector (primary slot)

Processor-controller board jumpers

Table 16 describes the jumper on the processor controller board.

Attention: Before moving any jumpers, do the following:

1. Read the safety information in "Safety information" on page 39 through "Handling static-sensitive devices" on page 43.

2. Turn off the server and disconnect all power cords.

Notes:

1. Be sure the processor bus-to-core ratio is set correctly (see Table 16). For example, if you have a 700 MHz processor installed and the system bus speed is 100 MHz (the default), be sure that the jumpers are set to a bus-to-core ratio of 7.0 (700/100).

2. Be sure the processor-core-frequency-selection jumper block is set for the slowest speed processor installed in your server. For example, if your server has a 700 MHz processor installed and you install three 900 MHz processors, set the processor-core-frequency-selection jumper block for the 700 MHz processor.

   MHz denotes internal clock speed of the processor only; other factors also affect application performance.

3. If you plan to use the processor serial-number security feature, you must change the setting of the **Processor Serial Number** menu choice in the Advanced Setup menu of the Configuration/Setup Utility program. The default value is **Disabled**; change this value to **Enabled**, as described in "Processor serial number access" on page 28.

Attention: Be sure that the processor bus-to-core ratio jumper is properly set. If the processor bus-to-core ratio does not match the processor speed in your server, your server might operate with a degraded performance or not at all.

The highlighted number in the table corresponds to the highlighted number on the illustration in "Processor-controller board component locations" on page 107.

Processors listed in Table 16 are not necessarily available or planned for your model. If a processor becomes available for your model, use these jumper settings.

Table 16. Processor-controller board jumper	
Jumper name	**Description**
5 Processor-core-frequency-selection	The default core/bus fraction is 7.0 (700/100 MHz). Pins 9/10 and 11/12 are open, and pins 13/14 and 15/16 are closed.
	For the core/bus fraction 9 (900/100 MHz), any jumper settings are ignored; the core frequency is set automatically.
Note:	
Open = No jumper is present.	
Closed = A jumper is present.	

Processor-daughterboard component locations

A simplified layout of a processor daughterboard is shown in the following illustration. Your server supports two processor daughterboards.
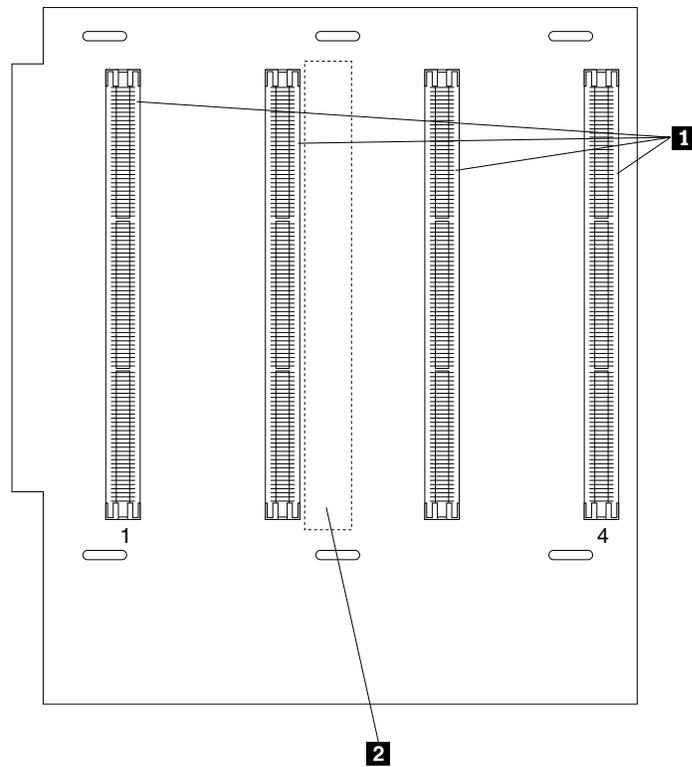
1 Processor or processor terminator card connectors (A1–A4 or B1–B4)
2 Processor-controller board connector (on opposite side of processor daughterboard)

SCSI backplane component locations

The following simplified layout of the SCSI backplane identifies the components. See "SCSI IDs" on page 80 for information on SCSI IDs.
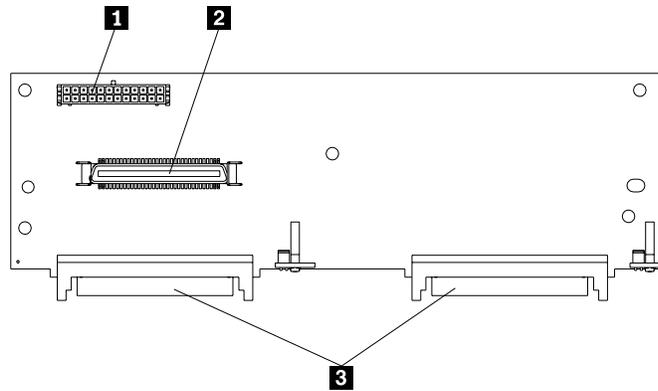
1 Media power connector
2 Wide (16-bit) SCSI connector
3 SCSI hot-swap drive connectors (on opposite side of backplane)

Additional server boards

For details about other server boards, for example, the power control card, refer to the *IBM xSeries 370 Server Hardware Maintenance Manual*, part number 24P2902, which is available for purchase.

Changing jumper settings

Jumpers located on the I/O function card and processor controller board help you to customize the way your server operates.

Your processor controller board and I/O function card contain two-pin jumper blocks and three-pin jumper blocks, respectively. In some cases, groups of jumpers might combine to define a function.

To change a jumper setting:

1. Read "Safety information" on page 39 through "Handling static-sensitive devices" on page 43.

2. Remove the server top cover or front bezel, depending on the location of the jumper (see "Preparing to install options" on page 48).

3. Locate the jumper whose setting you want to change:

   • To change a two-pin jumper block, continue with "Two-pin jumper blocks."

   • To change a three-pin jumper block, continue with "Three-Pin jumper blocks" on page 112.

Two-pin jumper blocks

Two-pin jumper blocks are located on the processor controller board.

Covering both pins with a jumper defines one function of the jumper block. To change the function of the jumper block, cover one pin only or remove the jumper entirely.

The following illustration identifies pins 1 and 2 on a two-pin jumper block.
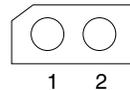
To change the jumper setting on a two-pin jumper block:

1. Lift the jumper straight off the block; then, do one of the following:

   • Align the holes in the bottom of the jumper with the two pins on the pin block, and then slide the jumper carefully onto these pins.
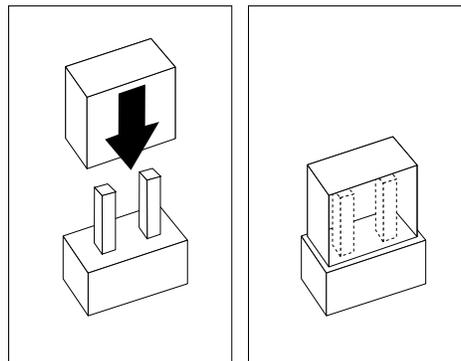
   • Align one of the holes in the bottom of the jumper with one of the pins on the pin block, and then slide the jumper carefully onto that pin only.
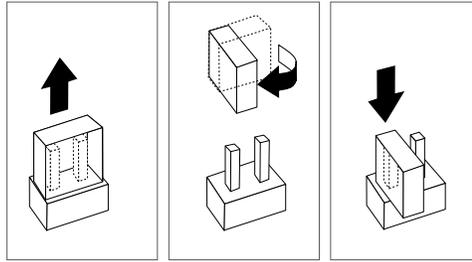
2. Reinstall the server top cover or front access cover and connect the cables (see "Completing the installation" on page 90).

Three-Pin jumper blocks

Three-pin jumper blocks are located on the I/O function card.

With the three-pin jumper blocks, each jumper covers two of the three pins on a pin block. You can position the jumper to fit over the center pin and either of the other two pins.

The following illustration identifies pins 1, 2, and 3 on the three-pin jumper blocks that are described in this chapter:
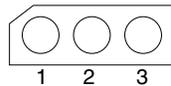
To change the jumper setting on a three-pin jumper block:

1. Remove the I/O function card from the server:

   a. Refer to the following illustration while you perform the steps in this procedure.

   b. Disconnect all cables **1** from the I/O function card **2** . Note carefully where each cable is connected before you remove it. See "I/O function

card component locations" on page 103 for the connector locations on the I/O function card.

   c. Remove the two screws 4 located on the metal connector plate inside the server.

   d. Remove the I/O function card retention bracket 3 on the right side of the card by pulling out the fastener on the bracket.

   e. Carefully grasp the I/O function card by its top edge and pull the I/O function card out of the server.

   f. Place the I/O function card connector-side up on a flat, static-protective surface.

2. Lift the jumper straight off the pin block.

3. Align the holes in the bottom of the jumper with the center pin and the pin that was not covered previously.
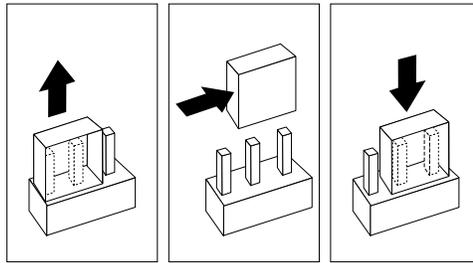
4. Slide the jumper fully onto these pins.

5. Reinstall the I/O function card:

    a. Refer to the illustration in step 1a on page 112 while you perform the steps in this procedure.

    b. Carefully grasp the I/O function card by its top edge, and insert the tabs on the bottom edge of the metal connector plate into the matching openings on the server back panel.

    c. Align the I/O function card with the guide on the opposite end of the adapter and the slot on the I/O board.

    d. Press the I/O function card *firmly* into the slot.

       Attention: When you install the I/O function card in the server, be sure that it is completely and correctly seated. Incomplete insertion might cause damage to server components.

    e. Reinstall the I/O function card retention bracket that you removed in step 1d on page 113 by pressing in the fastener on the bracket.

    f. Insert the two screws that you removed in step 1c on page 113.

    g. Connect the cables that you disconnected in step 1b on page 112. See "I/O function card component locations" on page 103 for the connector locations on the I/O function card.

6. Reinstall the server top cover or front access cover and connect the cables (see "Completing the installation" on page 90).

Chapter 6. Solving problems

Server problems can be caused by hardware, software, or a user error. An example of a user error is pressing the wrong key on the keyboard. You can check server hardware by using the diagnostic programs and other information in this chapter.

Diagnostic tools overview

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

- EEPROM-based diagnostics
- Power-on self-test (POST)
- POST beep codes
- Error messages
- Troubleshooting charts
- System error log
- Option diskettes

Diagnostic programs

The Diagnostics Utility program contains several server diagnostic programs. These diagnostic programs are stored on electrically erasable programmable read-only memory (EEPROM). These programs are the primary method of testing the major components of your server and some external devices.

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

Note: When you run the diagnostic programs, a single problem might cause several error messages. When this occurs, work to correct the cause of the first error message. After the cause of the first error message is corrected, the other error messages might not occur the next time that you run the test.

Server Support

```
        ┌─────────────┐  Yes
        ◇ Server working ◇ ─────────────────────────────────►  ┌──────────────────────────────────────────┐
        ◇   properly?  ◇                                       │ **Register and profile your server**       │
        └──────┬──────┘                                        │                                            │
               │ No                                            │ After you register and profile, you will   │
               ▼                                               │ be able to:                                │
   ┌──────────────────────────────┐                           │ • Diagnose problems using the IBM Online   │
   │ Check all cables for loose    │◄──────────────────────┐  │   Assistant                                │
   │ connections and verify that   │                       │  │ • Participate in the IBM discussion forum  │
   │ all optional devices you      │                       │  │ • Receive e-mail notifications of technical│
   │ installed are on the          │                       │  │   updates related to your profiled products│
   │ ServerProven® list.           │                       │  │                                            │
   │ You can view the ServerProven │                       │  │ Register at:  **http://www.ibm.com/pc/register**│
   │ list at:                      │                    ◄──┼──│ Profile at:   **http://www.ibm.com/pc/support** │
   │                               │                       │  └──────────────────────────────────────────┘
   │ **http://www.ibm.com/pc/compat**│                     │
   └───────────────┬──────────────┘                       │
                   │                                       │
                   ▼                                       │
            ◇ Problem ◇  Yes                               │
            ◇ solved? ◇ ───────────────────────────────────┘
            └────┬───┘                                                   ┌──────────────────────────────────┐
                 │ No                                                    │ You can view a list of            │
                 ▼                                                       │ IBM HelpCenter® phone numbers at: │
   ┌──────────────────────────┐                                         │ **http://www.ibm.com/pc/support** │
   │ Use the troubleshooting   │                                        └──────────────────────────────────┘
   │ information provided with │
   │ your server to determine  │
   │ the cause of the problem  │
   │ and the action to take.   │
   └─────────────┬────────────┘
                 │
                 ▼
            ◇ Problem ◇  Yes
            ◇ solved? ◇ ─────────────────────────────────────────────────┘
            └────┬───┘
                 │ No
                 ▼
   ┌──────────────────────────┐                                  Yes
   │ Flash the latest levels   │                                  ◇ Problem ◇  No    ┌──────────────────┐
   │ of BIOS, service          │ ───────────────────────────────►◇ solved? ◇ ──────►│ Phone an         │
   │ processor, diagnostics,   │                                  └─────────┘        │ IBM HelpCenter   │
   │ and RAID code.            │                                                     └──────────────────┘
   │ You can download this     │
   │ code at:                  │
   │                           │
   │ **http://www.ibm.com/pc/support**│
   └──────────────────────────┘
```

Power-on self-test (POST)

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

POST does the following:

- Checks the operation of some basic I/O function card, processor daughterboard, and I/O board operations
- Checks the memory
- Compares the current server configuration with the stored server configuration information
- Configures PCI adapters
- Starts the video operation
- Verifies that drives (such as the diskette, CD-ROM, and hard disk drives) are connected properly

If you have a power-on password or administrator password set, you must type the password and press Enter before POST will continue.

While the memory is being tested, the amount of available memory appears on the screen. These numbers advance as the server progresses through POST and the final number that appears on the screen represents the total amount of memory available. If POST finishes without detecting any problems, a single beep sounds and the first screen of your operating system or application program appears.

If POST detects a problem, more than one beep sounds, or an error message appears on your screen.

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

POST beep codes

POST generates beep codes to indicate successful completion or the detection of a problem.

- One beep indicates the successful completion of POST.

- No beep indicates that a irrecoverable error occurred during POST.

- More than one beep indicates that POST detected a problem. For more information, see "Power-on self-test (POST) beep codes" on page 129.

Error messages

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

Hardware error messages that occur can be text, numeric, or both. Messages generated by your software generally are text messages, but they also can be numeric.

POST error messages

POST error messages occur during startup when POST finds a problem with the hardware or detects a change in the hardware configuration. For more information, see "Viewing the test log" on page 121.

System-monitoring messages

System-monitoring messages occur as the Advanced System Management PCI Adapter monitors critical system functions. For more information, see "System-monitoring messages" on page 146.

Diagnostic error messages

Diagnostic error messages occur when a diagnostic test finds a problem with the server hardware. These error messages are alphanumeric and they are saved in the test log. For more information, see "Viewing the test log" on page 121.

Software-Generated error messages

These messages occur if a problem or conflict is found by an application program, the operating system, or both. Messages are generally text messages, but they also can be numeric. For information on these error messages, refer to the documentation that comes with your software.

Troubleshooting charts

The charts under "Troubleshooting" on page 148 list symptoms of problems (for example, a symptom might be "The mouse or pointing device does not work."), along with steps to correct the problems.

POST error log

The POST error log contains a maximum of three error and warning messages issued during POST and all system status messages from the Advanced System Management PCI Adapter (service processor). See "POST error log" on page 31 for information on how to view the POST error log.

System error log

The system error log contains all error and warning messages issued during POST, all system status messages from the Advanced System Management PCI Adapter (service processor), and all error messages issued during diagnostic testing. See "System error log" on page 31 for information on how to view the system error log.

Option diskettes

An optional device or adapter can come with an Option Diskette. Option Diskettes usually contain option-specific diagnostic test programs or configuration files.

If your optional device or adapter comes with an Option Diskette, follow the instructions that come with the option. Different instructions apply depending on whether or not the Option Diskette is startable.

Diagnostic programs

This section includes useful information on running the diagnostic programs. These programs are designed to test the IBM xSeries 370 server. If you want to test a non-IBM product, refer to the information that comes with that product.

Notes:

1. When you run the diagnostic programs, a single problem might cause several error messages. When this occurs, work to correct the cause of the first error message. After the cause of the first error message is corrected, the other error messages usually will not appear the next time that you run the test.

2. You can also run the diagnostic programs remotely with the Advanced System Management PCI Adapter in conjunction with the Advanced System Management service capabilities of your system-management software, a terminal program, or a Web browser. Refer to the documentation provided with your system-management software for more information.

Running the diagnostic programs

While you are running the diagnostic programs, pressing **F1** displays help information. Pressing **F1** from within a help screen provides a help index from which you can select different categories. Pressing **Esc** closes the Help window and returns to running the diagnostic programs.

Notes:

1. To run the diagnostic programs, you must start the server with the highest level password.

   That is, if you enter the power-on password and an administrator password is set, you cannot run the programs. You can only view the error messages in the Test Log.

   You must enter the administrator password to run the diagnostic programs.

2. If the server stops during testing and you cannot continue, restart the server and try running the diagnostic programs again. If the problem persists, have the system serviced.

3. If the diagnostic tests do not find a problem, but the problem persists during normal operations, see "Troubleshooting" on page 148 and look for the problem symptom.

4. You might have to install a wrap connector on your active parallel or serial port to obtain accurate test results for these ports. If you do not have a wrap connector, contact your IBM reseller or IBM marketing representative.

5. You might need a scratch diskette to obtain accurate test results when testing the diskette drive.

6. The keyboard and mouse (pointing device) tests assume that a keyboard and mouse are attached to the server.

Starting the diagnostic programs

To start the diagnostic programs:

1. Ensure that there is no diskette in the diskette drive. If the diskette drive contains a diskette, remove it.

2. Turn on the server and watch for the IBM logo screen.

   If the server is turned on already, shut down your operating system and restart the server.

3. After you start the server, several prompts appear on the IBM logo screen. When the prompt `Press F2 for Diagnostics` appears, press F2.

   If a power-on password or administrator password is set, the server prompts you for it. Type in the appropriate password; then, press Enter.

   The Diagnostics Utility program window appears.

4. Select either **Extended** or **Basic** from the top of the screen.

5. Select the test that you want to run from the list that appears; then, follow the instructions on the screen.

   When the tests have completed, you can view the Test Log by selecting **Utility** from the top of the screen.

   Also, you can view server configuration information (such as system configuration, memory contents, interrupt request (IRQ) use, direct memory access (DMA) use, device drivers, and so on) by selecting **Hardware Info** from the top of the screen.

6. When you are finished running the tests or viewing information in the Diagnostics Utility program, select **Quit** from the top of the screen.

If the hardware checks out OK, but the problem persists during normal server operations, a software error might be the cause. If you suspect a software problem, refer to the information that comes with the software package.

After you start the Diagnostics Utility program, the following menu headings will appear at the top of the screen:

- **Extended**
- **Basic**
- **Utility**
- **Hardware Info**
- **Quit**

1. Use the cursor control keys (arrow keys) to scroll across the menu headings.

2. Press Enter to view the selections under the main headings.

3. Use the Up Arrow (↑) and Down Arrow (↓) keys to scroll down to the test that you want to run, and press Enter.

   Note: If you select `Run Normal Test` or `Run Quick Test` from the **Extended** test menu, omit steps 4 and 5.

4. Select the test components that you want to run.

5. Use these keys to tailor your selection:

   - Space = Select a test component
   - F1 = Help

- F2 = Options (a pop-up window appears)
- F3 = Test log
- F5 = Run all tests
- F10 = Deselect all
- Esc = Exit
- Enter = Run highlighted tests
- CTRL+Enter = Run tests in view

Using the Online Manual

To obtain detailed descriptions of the available tests, press F1 twice to gain access to the Diagnostics Utility program *Online Manual*. The *Online Manual* also describes:

- The error messages that the diagnostic tests generate

- The menu structure and options

- The function keys

In addition, the *Online Manual* contains a glossary of terms.

Viewing the test log

If you are already running the diagnostic programs, continue with step 1 in this procedure. If you have not run the diagnostic programs, follow the instructions in "Starting the diagnostic programs" on page 120; then, return here.

To view the Test Log:

1. Select **Utility** from the top of the screen.

2. Select **View Test Log** from the list that appears; then, follow the instructions on the screen.

Diagnostic error message tables

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

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

Note: In addition to the actions given for the messages, see "Troubleshooting" on page 148 for general troubleshooting activities.

The following pages contain the error codes that you might receive in the diagnostic program detailed test log and summary log when running the diagnostic programs for your xSeries 370 server. These messages might appear on your screen, in the system error log, or in the test log.

The format for the codes is:

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

where:

fff   is the three-digit function code that indicates the function being tested when the error occurred. For example, function code 089 is for the processor.

ttt   is the three-digit failure code that indicates the exact test failure that was encountered.

iii   is the three-digit device ID.

date   is the date that the diagnostic test was run and the error was recorded.

cc   is the check digit that is used to verify the validity of the information.

text message is a message that the diagnostic program generates that indicates the reason for the problem. More information on the text message follows.

Text messages

The text message format is:

```
Function Name:  Result (test-specific string)
```

where:

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

Result   can be one of the following:

    Passed   This result occurs when the diagnostic test completes without any errors.

    Failed   This result occurs when the diagnostic test discovers an error.

    Aborted This result occurs when the user ends the diagnostic test before it is complete.

    Warning This result occurs when a possible problem is reported during the diagnostic test, such as when a device that is to be tested is not installed.

Test-specific string is additional information that can be used to analyze the diagnostic problem.

Failed diagnostic messages

The following tables display the primary hardware failure messages that the diagnostic programs might display.

Function: core system messages (001)

Result	Test-specific string
Failed	Processor daughterboard, I/O function card, or I/O board.
	Action: Have the system serviced.

Function: video system messages (005)

Result	Test-specific string
Failed	Processor daughterboard, I/O function card, or I/O board.
	Action: Have the system serviced.

Function: serial port messages (011)

Result	Test-specific string
Failed	Built-in serial port on I/O function card.
	Action: Have the system serviced.

Function: parallel port messages (014)

Result	Test-specific string
Failed	Built-in parallel port on I/O function card.
	Action: Have the system serviced.

Function: USB port interface messages (015)

Result	Test-specific string
Failed	I/O function card or I/O board.
	Action: Have the system serviced.

Function: PCI interface messages (020)

Result	Test-specific string
Failed	Tab on PCI Hot Swap slot #*xx* has failed.
	Where *xx* represents a hot-plug PCI slot number.
	Action: Make sure that the tab and latch on the hot-plug PCI slot *xx* are closed correctly.
	Note: For normal operation, when a hot-plug PCI slot is enabled and a hot-plug PCI adapter is installed, the Power LED for the hot-plug PCI slot will be on and the Attention LEDs will be off.
	If the problem persists, have the system serviced.
Failed	I/O function card or I/O board.
	Action: Have the system serviced.

Function: SCSI interface messages (030)

Result	Test-specific string
Failed	Internal SCSI interface.
	Action: Have the system serviced.

Function: RAID messages (035)

Result	Test-specific string
Failed	RAID adapter.
	Action: Have the system serviced.
Failed	RAID adapter; indicates POST error.
	Action: Have the system serviced.
Failed	RAID adapter; testing drive in bay #1, SCSI ID 0.
	Action: Have the system serviced.
Failed	RAID adapter; testing drive in bay #2, SCSI ID 1.
	Action: Have the system serviced.

Function: power supply messages (075)

Result	Test-specific string
Failed	Voltage sensed by the system is out of range.
	Action: Have the system serviced.

Function: processor error messages (089)

Result	Test-specific string
Failed	Processor in socket number *xx*.
	Where *xx* represents a processor socket.
	Action:
	1. Reseat the processor.
	2. If the problem persists, replace the processor.
	If the problem persists, have the system serviced.

Function: Advanced System Management PCI adapter messages (165)

Result	Test-specific string
Failed	Advanced System Management PCI adapter.
	Action: Have the system serviced.

Function: thermal system messages (175)

Result	Test-specific string
Failed	Fan #1
	Action: Replace fan 1.
	If the problem persists, have the system serviced.
Failed	Fan #2
	Action: Replace fan 2.
	If the problem persists, have the system serviced.
Failed	Fan #3
	Action: Replace fan 3.
	If the problem persists, have the system serviced.
Failed	Fan #4
	Action: Replace fan 4.
	If the problem persists, have the system serviced.
Failed	Fan #5
	Action: Replace fan 5.
	If the problem persists, have the system serviced.
Failed	Fan #6
	Action: Replace fan 6.
	If the problem persists, have the system serviced.
Failed	Temperature sensed on processor daughterboard is out of range.
	Action: If one of the fans has failed, replace the fan.
	If the problem persists, have the system serviced.

Function: status display messages (180)

Result	Test-specific string
Failed	Information panel.
	Action: Have the system serviced.
Failed	LED on I/O board.
	Action: Have the system serviced.
Failed	LED on processor daughterboard.
	Action: Have the system serviced.
Failed	LED on hot-swap SCSI backplane.
	Action: Have the system serviced.

Function: system memory messages (201)

Result	Test-specific string
Failed	DIMM location J*xx*
	Where *xx* represents a DIMM socket.
	Action:
	1. Reseat the DIMM in DIMM socket J*xx*.
	2. If the problem persists, replace the DIMM.
	If the problem persists, have the system serviced.

Function: system cache messages (202)

Result	Test-specific string
Failed	Processor in socket number *xx*.
	Where *xx* represents a processor socket.
	Action:
	1. Reseat the processor. 2. If the problem persists, replace the processor.
	If the problem persists, have the system serviced.

Function: diskette drive messages (206)

Result	Test-specific string
Failed	Internal diskette drive bay.
	Action: Have the system serviced.

Function: CD-ROM messages (215)

Result	Test-specific string
Failed	I/O function card or I/O board.
	Action: Have the system serviced.

Function: hard disk drive messages (217)

Result	Test-specific string
Failed	BIOS bay #1.
	Action: Have the system serviced.
Failed	BIOS bay #2.
	Action: Have the system serviced.

Function: keyboard messages (301)

Result	Test-specific string
Failed	An I/O function card keyboard test failed.
	Action:
	1. Replace the keyboard. 2. If the problem persists, replace the keyboard cable.
	If the problem persists, have the system serviced.

Function: pointing device (mouse) messages (302)

Result	Test-specific string
Failed	An I/O function card pointing device test failed.
	Action: Replace the pointing device (mouse).
	If the problem persists, have the system serviced.

Failed diagnostic messages

The following tables display failures that occur during diagnostic testing that prevent proper testing of the hardware.

Function: processor messages (089)

Result	Test-specific string
Failed	Test setup error: Processor in socket number *xx* is installed but not functioning; check system error log. Where *xx* represents a processor socket. **Action:** 1. Update the BIOS. See Chapter 7, "Getting help, service, and information" on page 163 for information about obtaining updates. 2. If the problem persists, replace the processor and run the processor diagnostic program again. If the problem persists, have the system serviced.
Failed	Test setup error: Invalid processor in socket number *xx* or BIOS setup problem. Where *xx* represents a processor socket. **Action:** 1. Update the BIOS. See Chapter 7, "Getting help, service, and information" on page 163 for information about obtaining updates. 2. If the problem persists, replace the processor and run the processor diagnostic program again. If the problem persists, have the system serviced.
Warning	Test setup error: Processor not installed in socket number *xx* or BIOS setup problem. Where *xx* represents a processor socket. **Action:** 1. Verify that the processor is installed and seated correctly. 2. If the problem persists, update the BIOS. See Chapter 7, "Getting help, service, and information" on page 163 for information on obtaining updates. 3. If the problem persists, replace the processor and run the processor diagnostic program again. If the problem persists, have the system serviced.

Function: system memory messages (201)

Result	Test-specific string
Failed	Test setup error: Damaged DMI BIOS, information in BIOS is not as expected. **Action:** Update the BIOS. See Chapter 7, "Getting help, service, and information" on page 163 for information about obtaining updates. If the problem persists, have the system serviced.
Failed	Test setup error: Unknown hardware problem associated with processor in socket number *xx*. Where *xx* represents a processor socket. **Action:** 1. Update the BIOS and run the diagnostic program again. See Chapter 7, "Getting help, service, and information" on page 163 for information on obtaining updates. 2. If the problem persists, replace the processor. If the problem persists, have the system serviced.

Result	Test-specific string
Failed	Test setup error: Damaged BIOS in ROM. **Action:** Update the BIOS. See Chapter 7, "Getting help, service, and information" on page 163 for information about obtaining updates. If the problem persists, have the system serviced.

Function: system cache messages (202)

Result	Test-specific string
Failed	Test setup error: No L2 cache detected on processor socket *xx* or BIOS setup problem. Where *xx* represents a processor socket. **Action:** 1. Update the BIOS and run the diagnostic program again. See Chapter 7, "Getting help, service, and information" on page 163 for information on obtaining updates. 2. If the problem persists, replace the processor. If the problem persists, have the system serviced.
Warning	Test setup error: Cache is disabled. Use system setup to enable before retrying the test. **Action:** Use the **Cache Control** selection in the Advanced Setup menu of the Configuration/Setup Utility program to enable the cache. (See "Advanced setup" on page 28.) If the problem persists, have the system serviced.
Failed	Test setup error: Damaged DMI BIOS. Information in BIOS is not as expected. **Action:** Update the BIOS. See Chapter 7, "Getting help, service, and information" on page 163 for information about obtaining updates. If the problem persists, have the system serviced.
Failed	Test setup error: BIOS cannot access VPD information. **Action:** Update the BIOS. See Chapter 7, "Getting help, service, and information" on page 163 for information about obtaining updates. If the problem persists, have the system serviced.
Failed	Test setup error: Unknown hardware problem associated with processor in socket number *xx*. Where *xx* represents a processor socket. **Action:** 1. Update the BIOS. See Chapter 7, "Getting help, service, and information" on page 163 for information about obtaining updates. 2. If the problem persists, replace the processor and run the diagnostic program again. If the problem persists, have the system serviced.
Failed	Test setup error: Cannot allocate memory due to unknown memory problem. **Action:** Have the system serviced.

Power-on self-test (POST) beep codes

The successful completion of POST is indicated by one beep and the appearance of the first screen of your operating system or application program. More than one beep indicates that POST detected an error.

Beep codes are sounded in a series of beeps. For example, a 1–2–4 beep code sounds like one beep, a pause, two consecutive beeps, another pause, and four more consecutive beeps.

POST beep code descriptions

The following list contains more detailed descriptions of the possible types of beeps that your server might emit.

No beeps
> If no beep occurs, have the system serviced.

Continuous beep
> This indicates that your startup processor has failed, or the I/O function card, processor daughterboard, I/O board, or speaker subsystem might contain a failing component. If the system continues through POST with no errors, have the system serviced. If no video appears, the startup processor has failed; replace the startup processor.

One short beep
> If one beep occurs after your server successfully completes POST (that is, after the System POST Complete (OK) light on the information panel is illuminated), then POST has no configuration or functional errors to report. One beep also occurs after your server completes POST if you enter an incorrect power-on password.

Two short beeps
> This beep combination indicates that POST encountered an error. The Configuration/Setup Utility program will display additional information; follow the instructions displayed. See "Viewing the test log" on page 121 for explanations of any POST error messages.

Three short beeps
> This beep combination indicates a system memory error. This combination occurs only if the video BIOS cannot display the error message. Replace the failing DIMM.

Repeating short beeps
> This beep combination indicates that your I/O function card, processor daughterboard, or I/O board might contain a failing component; your keyboard might be defective; or a key on the keyboard might be stuck. Ensure that:
>
> 1. Nothing is resting on the keyboard and pressing a key.
> 2. No key is stuck.
> 3. The keyboard cable is connected correctly to the keyboard and to the correct connector on the server.

Running the diagnostic tests can isolate the server component that failed, but you must have your system serviced. If the beep code repeats, have the keyboard, cable, and system serviced.

Note: If you have just connected a new mouse or other pointing device, turn off the server and disconnect that device. Wait at least five seconds, and then, turn on the server. If the beep code repeats, replace the device.

One long and one short beep

This beep combination indicates that POST encountered an error on a video adapter. Have the system serviced if the integrated video adapter on the I/O function card is being used. If an optional video adapter is being used, replace the failing video adapter.

One long and two short beeps

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

One long and three short beeps

This beep combination indicates that the video subsystem has not detected a monitor connection to the server. Ensure that the monitor is connected to the server. If the problem persists, replace the monitor.

Two long and two short beeps

This beep combination indicates that POST does not support the optional video adapter. This beep combination occurs when you install a video adapter that is incompatible with your server. Replace the optional video adapter with one that is supported by the server, or use the integrated video controller on the I/O function card.

POST beep code table

Beep Code	Description
1-1-2	Processor register test has failed.
1-1-3	Complementary metal oxide semiconductor (CMOS) write/read test has failed.
1-1-4	BIOS flash EEPROM checksum has failed.
1-2-1	Programmable-interval-timer test has failed.
1-2-2	DMA initialization has failed.
1-2-3	DMA page register write/read test has failed.
2-1-1	Secondary DMA register test has failed.
2-1-2	Primary DMA register test has failed.
2-1-3	Primary interrupt-mask register test has failed.
2-1-4	Secondary interrupt-mask register test has failed.
2-2-1	Interrupt vector loading test has failed.
2-2-2	Keyboard controller test has failed.
2-2-3	CMOS power failure and checksum checks have failed.
2-2-4	CMOS configuration information validation has failed.
2-3-1	Screen initialization has failed.
2-3-2	Screen memory test has failed.
2-3-3	Screen retrace tests have failed.
2-3-4	Search for video ROM has failed.
2-4-1	Screen test indicates the screen is inoperable.
3-1-1	Timer tick interrupt test has failed.
3-1-2	Interval timer channel 2 test has failed.
3-1-3	RAM test has failed above address hex 0FFFF.
3-1-4	Time-of-day clock test has failed.
3-2-1	Serial port test has failed.
3-2-2	Parallel port test has failed.
3-2-3	Math coprocessor test has failed.
3-2-4	Comparison of CMOS memory size against actual has failed.
	Action: Have the system serviced.
1-2-4	RAM refresh verification has failed.
1-3-1	First 64 KB RAM test has failed.
1-3-2	First 64 KB RAM parity test has failed.
3-3-1	A memory size mismatch has occurred.
	Action: Reseat the DIMMs.
	If the problem persists, have the system serviced.
3-3-2	Critical System Management bus error.
	Action: Disconnect the server from all electrical sources, wait for 30 seconds, and reconnect the server to the electrical sources. If the processor error LED on the Advanced System Management PCI adapter lights continuously, have your system serviced. (See "Advanced System Management PCI adapter component locations" on page 101 for the location of the Processor Error LED.)

POST error codes and messages

The following table shows the error messages that can appear on the screen during the power-on self-test (POST).

Notes:

1. In addition to the actions given for the messages, see "Troubleshooting" on page 148 for general troubleshooting activities.

2. The actions for some of the messages require you to run the Configuration/Setup Utility program. For information on using the Configuration/Setup Utility program, see "Using the Configuration/Setup Utility main menu" on page 21.

3. If a password prompt appears with a POST message, type the administrator or power-on password; then, press Enter.

POST message	Description
062	The server failed to load the operating system on three consecutive attempts. All caches are disabled. This can be caused by repeatedly turning the server on and then off or resetting the server. **Action:** Start the Configuration/Setup Utility program and verify that all settings are correct. (See Chapter 3, "Configuring your server" on page 19.) Use the **Cache Control** selection in the Advanced Setup menu of the Configuration/Setup Utility program to enable the caches. (See "Advanced setup" on page 28.) If the problem persists, have the system serviced. When the problem is corrected, make sure to enable the caches.
101 102	An error occurred during the I/O function card, I/O board, and processor test. **Action:** Have the system serviced.
106	An error occurred during the I/O function card and processor test. **Action:** Have the system serviced.
114	An adapter read-only memory (ROM) error occurred. **Action:** Remove the adapters. If you can start the server without the adapters installed, reinstall each adapter one at a time, and retest after each is reinstalled. When an adapter fails, replace it. If you cannot isolate and correct the problem, have the system serviced.

129	An error was detected in the L1 cache of a processor.
	
	Action:
	
	1. If you just installed a processor, verify that the processor is installed and seated correctly.
	
	2. If the problem persists, run the diagnostic program for the processors.
	
	   • If the processor tests fail, replace the processor.
	
	   • If the processor tests do not fail, have the system serviced.
	
	3. Review the error logs in the Configuration/Setup Utility program for information on the processor error.
	
	If the problem persists, have the system serviced.

151	A real-time clock (RTC) error occurred. **Action:** Have the system serviced.
161	The real-time clock battery has failed. **Action:** Have the system serviced, or replace the battery yourself. For additional information, see "Replacing the battery" on page 159 *before* you attempt to change the battery. You can use the server until you replace the battery. However, you must run the Configuration/Setup Utility program and set the time and date and other custom settings each time you turn on the server.

POST message	Description
162	A change in device configuration occurred. This error occurs under one or more of the following conditions: • A new device has been installed. • A device has been moved to a different location or cable connection. • A device has been removed or disconnected from a cable. • A device is failing and is no longer recognized by the server as being installed. • An external device is not turned on. • An invalid checksum is detected in the battery-backed memory. **Action:** Verify that all external devices are turned on. You must turn on external devices before turning on the server. If you did not add, remove, or change the location of a device, a device is probably failing. Running the diagnostic test programs might isolate the failing device, but you must have the system serviced.
163	The date and time are incorrect. **Action:** Set the correct date and time. If the date and time are set correctly and saved, but the 163 error message reappears, have the system serviced. The server can be used until the system is serviced, but any application programs that use the date and time will be affected.
164	A change in the memory configuration occurred. This message might appear after you add or remove memory. **Note:** The server can be used with decreased memory capacity. **Action:** 1. If POST error message 289 also occurred, follow the instructions for that error message first. 2. If you have installed or removed memory, run the Configuration/Setup Utility program; then, exit, saving the new configuration settings. For information on using the Configuration/Setup Utility program, see "Using the Configuration/Setup Utility main menu" on page 21. If the message appears again, shut down the server, reseat the DIMMs, and restart the server. 3. Review the error logs in the Configuration/Setup Utility program for information on the memory error. If the problem persists, have the system serviced.
173	A system CMOS checksum error occurred. **Action:** Verify the system configuration in the Configuration/Setup Utility program. If the problem persists, have the system serviced.
175	A vital product data (VPD) error occurred. **Action:** Check to see if the error logs in the Configuration/Setup Utility program provide additional information on the error. If the problem persists, have the system serviced.
176 177 178	A security hardware error occurred. **Action:** Check for indications that someone has tampered with the server. If no one has tampered with the server, have the system serviced.
184	The power-on password information stored in your server has been removed. **Action:** You must reset the power-on password. From the Configuration/Setup Utility main menu, select **System Security**; then, follow the instructions on the screen. For information on using the Configuration/Setup Utility program, see "Using the Configuration/Setup Utility main menu" on page 21. If this information cannot be restored, have the system serviced.

POST message	Description
185	A power failure damaged the stored information on the drive-startup sequence.
	Action: You must reset the drive-startup sequence. From the Configuration/Setup Utility main menu, select **Start Options**; then, follow the instructions on the screen. For information on using the Configuration/Setup Utility program, see "Using the Configuration/Setup Utility main menu" on page 21.
	If this information cannot be restored, have the system serviced.
186	An I/O function card, I/O board, or hardware error occurred.
	Action: Check to see if the error logs in the Configuration/Setup Utility program provide additional information on the error.
	If the problem persists, have the system serviced.
187	The VPD serial number is not set.
	Action: The system serial number is set in the VPD EEPROM at the time of manufacturing. If the I/O function card has been replaced, the system serial number will be invalid and must be set. From the main menu of the Configuration/Setup Utility program, select **System Information**; then, select **Product Data**. If the problem persists, have the system serviced.
188	A vital product data (VPD) error occurred.
	Action: Check to see if the error logs in the Configuration/Setup Utility program provide additional information on the error.
	If the problem persists, have the system serviced.
189	An attempt has been made to access the server with invalid passwords. After three incorrect attempts, the server locks up; that is, the log-on data fields are no longer available to the user.
201	An error occurred during the memory controller test. This error can be caused by:
	• Incorrectly installed memory • A failing DIMM • A Processor controller board problem • An I/O function card problem • An I/O board problem
	Action:
	1. If you just installed memory, see "Installing DIMMs and memory boards" on page 52 to verify that the new memory is correct for your server. Verify that the DIMMs are seated correctly and installed using the DIMM population sequence described in "Installing DIMMs and memory boards" on page 52.
	2. If the problem persists, check to see if the system has isolated the problem to a DIMM:
	• Check the memory fail LEDs on the LED card (see "LED card (processor and DIMM) LEDs" on page 157). If a memory fail LED is on, run the diagnostic program for the DIMM indicated by the LED.
	• If the tests fail, replace the DIMM. If the problem persists after you replace the DIMM, have the system serviced.
	• If the memory tests do not fail, have the system serviced.
	3. Review the error logs in the Configuration/Setup Utility program for information on the memory error.
	If the problem persists, have the system serviced.

POST message	Description
229	An error was detected in the L2 cache of one of the processors. This error can be caused by:

- An incorrectly installed processor
- A failing processor
- A processor controller board problem
- A processor daughterboard problem

Action:

1. If you just installed a processor, see "Installing a processor" on page 56 to verify that the new processor is correct for your server. Verify that the processors are seated correctly and installed using the processor population sequence described in "Installing a processor" on page 56.

2. If the problem persists, check to see if the system has isolated the problem to a processor:

   - Check the processor fail LEDs on the LED card (see "LED card (processor and DIMM) LEDs" on page 157). If a processor status LED is on, run the diagnostic program for the processor indicated by the LED.

   - Run the diagnostic program for the processors. If the tests fail, replace the processor (see "Installing or replacing a processor" on page 60).

   - If the processor tests do not fail:

     – Run the diagnostic program for the processor daughterboard. If the tests fail, replace the processor daughterboard (see "Installing or replacing a processor daughterboard" on page 62).

     – If the processor daughterboard tests do not fail, have the system serviced.

   - Review the error logs in the Configuration/Setup Utility program for information on the processor error.

If the problem persists, have the system serviced.

| 262 | A DRAM parity configuration error occurred. |

Action:

1. If you just installed a processor, see "Installing a processor" on page 56 to verify that the new processor is correct for your server. Verify that the processors are seated correctly and installed using the processor population sequence described in "Installing a processor" on page 56.

2. If the problem persists, check to see if the system has isolated the problem to a processor:

   - Check the processor fail LEDs on the LED card (see "LED card (processor and DIMM) LEDs" on page 157). If a processor status LED is on, run the diagnostic program for the processor indicated by the LED.

   - Run the diagnostic program for the processors. If the tests fail, replace the processor.

   - If the processor tests do not fail, have the system serviced.

   - Review the error logs in the Configuration/Setup Utility program for information on the processor error.

If the problem persists, have the system serviced.

POST message	Description
289	An error occurred during POST memory tests and a failing DIMM was disabled. **Note:** The server can be used with decreased memory. **Action:** 1. If you just installed memory, see "Installing DIMMs and memory boards" on page 52 to verify that the new memory is correct for your server. Verify that the DIMMs are installed and seated correctly. 2. Check to see if the error logs in the Configuration/Setup Utility program provide additional information on the error. 3. If the problem persists, replace the failing DIMM. If the problem persists, have the system serviced.

301
303
	An error occurred during the keyboard and keyboard controller test. These error messages also might be accompanied by continuous beeping.
	
	Action:
	
	1. If you have just connected a new mouse or other pointing device, turn off the server and disconnect that device. Wait at least five seconds, and then turn on the server. If the error message goes away, replace the device.
	
	2. Ensure that:
	
	   a. Nothing is resting on the keyboard and pressing a key.
	   b. No key is stuck.
	   c. The keyboard cable is connected correctly to the keyboard and to the correct connector on the server.
	
	3. Attach another keyboard to the keyboard connector.
	
	4. Running the diagnostic tests can isolate the server component that failed, but you must have your system serviced. If the error message remains, have the keyboard, cable, and system serviced.

602	The diskette has an invalid startup (boot) record. **Action:** 1. Verify that the Configuration/Setup Utility program correctly reflects the type of diskette drive that you have installed. 2. Verify that the diskette is a startable (bootable) diskette. 3. Remove the diskette from the diskette drive, and install a different startable (bootable) diskette. 4. Run the diagnostic tests on the diskette drive. If the diagnostic tests fail, have the system serviced.
604	An error occurred during a diskette drive test. **Action:** 1. Verify that the Configuration/Setup Utility program correctly reflects the type of diskette drive that you have installed. 2. Run the diagnostic tests on the diskette drive. If the diagnostic tests fail, have the system serviced.
605	A diskette unlock error occurred. **Action:** Run the diagnostic tests on the diskette drive. If the diagnostic tests fail, have the system serviced.
662	A diskette drive configuration error occurred. **Action:** If you removed a diskette drive, make sure that the diskette drive setting is correct in the Configuration/Setup Utility program. If the setting is not correct, change it. For information on using the Configuration/Setup Utility program, see "Using the Configuration/Setup Utility main menu" on page 21. If the problem persists, have the system serviced.

POST message	Description
762	A math coprocessor configuration error occurred. **Action:** Run the diagnostic program for the processors. If the diagnostic tests fail, have the system serviced.
962	A parallel port configuration error occurred. **Action:** If you changed a hardware option, make sure that the parallel port setting is correct in the Configuration/Setup Utility program. If the setting is not correct, change it. For information on using the Configuration/Setup Utility program, see "Using the Configuration/Setup Utility main menu" on page 21. If the problem persists, have the system serviced.
11*xx*	An error occurred during the I/O function card, I/O board, and serial port test. **Action:** If you have a modem, serial printer, or other serial device attached to your server, verify that the serial cable is connected correctly. If it is, use the following procedure: 1. Turn off the server. 2. Disconnect the serial cable from the serial port. 3. Wait five seconds; then, turn on the server. If the POST error message does not reappear, either the serial cable or the device is probably failing. See the documentation that comes with the serial device for additional testing information. If the POST error message reappears, have the system serviced.
1162	The serial port configuration conflicts with another device in the system. **Action:** 1. Make sure the IRQ and I/O port assignments needed by the serial port are available. (See Chapter 3, "Configuring your server" on page 19.) 2. If all interrupts are being used by adapters, you might need to remove an adapter to make an interrupt available to the serial port, or force other adapters to share an interrupt. For information on removing adapters, see "Working with adapters" on page 68. For information about setting interrupts, see Chapter 3, "Configuring your server."
1600	POST is unable to communicate with the service processor. **Action:** 1. Turn off the server. 2. Disconnect the server from all electrical sources. 3. Remove ac power from all power supplies for at least 30 seconds. 4. Reconnect the ac power cables to the power supplies, reconnect the server to the electrical sources, and wait for 30 seconds. 5. Turn on and restart the server. 6. If the error still occurs, run the diagnostic programs on the service processor. (See "Diagnostic programs" on page 115 for information on running the diagnostic programs that come with your server.) If the diagnostic tests fail, or if the problem persists, have the system serviced.

POST message	Description
1762	A hard disk configuration error occurred.
	Action:
	1. Verify that the Configuration/Setup Utility program correctly reflects the number of hard disk drives that you have installed. If the drive information is not correct, change it. (For instructions on using the Configuration/Setup Utility program, see "Using the Configuration/Setup Utility main menu" on page 21.)
	2. If you added or removed a hard disk drive, you must save the new configuration in the Configuration/Setup Utility program. See "Using the Configuration/Setup Utility main menu" on page 21 for additional information and instructions on saving the configuration.
	3. Run the diagnostic programs on the hard disk. (See "Diagnostic programs" on page 115 for information on running the diagnostic programs that come with your server.)
	If the diagnostic tests fail, or if the problem cannot be isolated and corrected, have the system serviced.
178X	A hard disk error or failure occurred during testing of the hard disk drive.
	Action:
	1. Run the diagnostic programs on the hard disk. (See "Diagnostic programs" on page 115 for information on running the diagnostic programs that come with your server.)
	2. If the diagnostic programs detect a failure, replace the defective hard disk drive.
	If the diagnostic tests fail, or if the problem cannot be isolated and corrected, have the system serviced.
1800	A PCI adapter has requested a hardware interrupt that is not available.
	Action:
	1. Make sure that the resource settings for the PCI adapter and all other adapters are set correctly in the Configuration/Setup Utility program. If the interrupt resource settings are not correct, change the settings. For information on using the Configuration/Setup Utility program, see "Using the Configuration/Setup Utility main menu" on page 21.
	2. If all interrupts are being used by other adapters, you might need to remove an adapter to make an interrupt available to the PCI adapter, or force other adapters to share an interrupt. For information on removing adapters, see "Working with adapters" on page 68. For information on setting interrupts, see "PCI slot/device information" on page 29.
1801	A PCI adapter has requested memory resources that are not available.
	Action:
	1. Make sure that the resource settings for the PCI adapter and all other adapters are set correctly in the Configuration/Setup Utility program. If the memory resource settings are not correct, change the settings. For information on using the Configuration/Setup Utility program, see "Using the Configuration/Setup Utility main menu" on page 21.
	2. If all memory resources are being used, you might need to remove an adapter to make memory available to the PCI adapter. For information on removing adapters, see "Working with adapters" on page 68. Disabling the adapter BIOS on the adapter might correct the error. Refer to the documentation that comes with the adapter.

POST message	Description
1802	A PCI adapter has requested an I/O address that is not available, or the PCI adapter might be defective.
	Action:
	1. Make sure that the I/O addresses for the PCI adapter and all other adapters are set correctly in the Configuration/Setup Utility program. For information on using the Configuration/Setup Utility program, see "Using the Configuration/Setup Utility main menu" on page 21.
	2. If the I/O port resource settings are correct, the PCI adapter might be defective. Have the system serviced.
1803	A PCI adapter has requested a memory address that is not available, or the PCI adapter might be defective.
	Action:
	1. Make sure that the memory addresses for all other adapters are set correctly in the Configuration/Setup Utility program. If the memory resource settings are not correct, change the settings. For information on using the Configuration/Setup Utility program, see "Using the Configuration/Setup Utility main menu" on page 21.
	2. If the memory resource settings are correct, the PCI adapter might be defective. Have the system serviced.
1804	A PCI adapter has requested a memory address that is not available.
	Action: If all memory addresses are being used, you might need to remove an adapter to make memory address space available to the PCI adapter. For information on removing adapters, see "Working with adapters" on page 68. Disabling the adapter BIOS on the adapter might correct the error. Refer to the documentation that comes with the adapter.
1805	A PCI adapter ROM error occurred.
	Action: Remove the PCI adapters. If you can start the server without the adapters, reinstall each adapter one at a time and retest after each is reinstalled. When an adapter fails, replace it.
	If you cannot isolate and correct the problem, have the system serviced.
1806	A PCI-to-PCI bridge error occurred. More than one PCI bus tried to access memory below 1 MB.
	Action: Remove the PCI adapter that has the PCI bridge. If you can start the server without the adapter, reinstall and retest the adapter. If the adapter fails, replace it.
	If you cannot isolate and correct the problem, have the system serviced.
1808	An unsupported PCI device is installed.
	The latch on a hot-plug PCI slot might have been opened while the slot was active or the optical switch for the slot might be defective.
	Action: Shut down the server, ensure the latches on the hot-plug PCI slots are closed and locked; then, restart the server.
	If the problem persists, have the system serviced.

POST message	Description
1962	No valid startup devices were found. The system cannot find the startup drive or operating system.

Action: Be sure that the drive you want to start from is in the startup sequence.

1. Select **Start Options** from the Configuration/Setup Utility main menu. (See Chapter 3, "Configuring your server" on page 19.) If you are unable to set the startup sequence, have the system serviced.
2. Check the list of startup devices in the **Startup device** data fields. Is the drive that you want to start from in the startup sequence?

   Yes Exit from this screen; then, select **Exit Setup** to exit the Configuration/Setup Utility main menu. Go to step 3.

   No Follow the instructions on the screen to add the drive; then, save the changes and exit the Configuration/Setup Utility main menu. Restart the server.

3. Is an operating system installed?

   Yes Turn off the server. Go to step 4.

   No Install the operating system; follow your operating system instructions to shut down and restart the server.

4. During server startup, watch for messages indicating a hardware problem.

If the same error message appears, have the system serviced.

POST message	Description
2400	An error occurred during the video controller test. This error can be caused by a failing monitor, a failing I/O function card, or, if a video adapter is installed, a failing video adapter.

Action: Verify that the monitor is connected correctly to the video connector. If the monitor is connected correctly, have the system serviced.

POST message	Description
2462	A video memory configuration error occurred.

Action:

1. Make sure that the monitor cables are correctly and securely connected to the server.
2. If the problem persists, have the system serviced.

POST message	Description
5962	An IDE CD-ROM configuration error occurred.

Action: Check the signal and power cable connections to the CD-ROM drive. See "I/O board component locations" on page 102 for the locations of the cable connectors.

If the problem persists, have the system serviced.

POST message	Description
8603	An error occurred during the mouse (pointing device) and mouse (pointing device) controller test. This error can be caused by the addition or removal of a mouse, or by a failing I/O function card.

Note: This error also can occur if electrical power was lost for a very brief period and then restored. In this case, turn off the server for at least five seconds, and then turn it back on.

Action: Ensure that the keyboard and mouse (pointing device) are attached to the correct connectors. (See "Input/output connectors and expansion slots" on page 11.) If they are connected correctly, use the following procedure:

1. Turn off the server.
2. Disconnect the mouse from the server.
3. Turn on the server.

If the POST error message does not reappear, the mouse is probably failing. See the documentation that comes with the mouse for additional testing information. If the problem remains, have the mouse (pointing device) serviced.

If the POST error message reappears, run the diagnostic tests to isolate the problem. If the diagnostic tests do not find a problem and the POST error message remains, have the system serviced.

POST message	Description
000195A01	Processor A01 is not functioning. **Action:** Replace the processor. If the problem persists, have the system serviced.
000195A02	Processor A02 is not functioning. **Action:** Replace the processor. If the problem persists, have the system serviced.
000195A03	Processor A03 is not functioning. **Action:** Replace the processor. If the problem persists, have the system serviced.
000195A04	Processor A04 is not functioning. **Action:** Replace the processor. If the problem persists, have the system serviced.
000195B01	Processor B01 is not functioning. **Action:** Replace the processor. If the problem persists, have the system serviced.
000195B02	Processor B02 is not functioning. **Action:** Replace the processor. If the problem persists, have the system serviced.
000195B03	Processor B03 is not functioning. **Action:** Replace the processor. If the problem persists, have the system serviced.
000195B04	Processor B04 is not functioning. **Action:** Replace the processor. If the problem persists, have the system serviced.
000197A01	Processor A01 failed the built-in self-test. **Action:** Replace the processor. If the problem persists, have the system serviced.
000197A02	Processor A02 failed the built-in self-test. **Action:** Replace the processor. If the problem persists, have the system serviced.
000197A03	Processor A03 failed the built-in self-test. **Action:** Replace the processor. If the problem persists, have the system serviced.
000197A04	Processor A04 failed the built-in self-test. **Action:** Replace the processor. If the problem persists, have the system serviced.
000197B01	Processor B01 failed the built-in self-test. **Action:** Replace the processor. If the problem persists, have the system serviced.
000197B02	Processor B02 failed the built-in self-test. **Action:** Replace the processor. If the problem persists, have the system serviced.
000197B03	Processor B03 failed the built-in self-test. **Action:** Replace the processor. If the problem persists, have the system serviced.

POST message	Description
000197B04	Processor B04 failed the built-in self-test. **Action:** Replace the processor. If the problem persists, have the system serviced.
0001980A01	The BIOS does not support the current stepping level of processor A01. **Action:** Update the system BIOS to a level that supports the processors installed in the server. See Chapter 7, "Getting help, service, and information" on page 163 for information on obtaining updates from the World Wide Web. If the problem persists, have the system serviced.
0001980A02	The BIOS does not support the current stepping level of processor A02. **Action:** Update the system BIOS to a level that supports the processors installed in the server. See Chapter 7, "Getting help, service, and information" on page 163 for information on obtaining updates from the World Wide Web. If the problem persists, have the system serviced.
0001980A03	The BIOS does not support the current stepping level of processor A03. **Action:** Update the system BIOS to a level that supports the processors installed in the server. See Chapter 7, "Getting help, service, and information" on page 163 for information on obtaining updates from the World Wide Web. If the problem persists, have the system serviced.
0001980A04	The BIOS does not support the current stepping level of processor A04. **Action:** Update the system BIOS to a level that supports the processors installed in the server. See Chapter 7, "Getting help, service, and information" on page 163 for information on obtaining updates from the World Wide Web. If the problem persists, have the system serviced.
0001980B01	The BIOS does not support the current stepping level of processor B01. **Action:** Update the system BIOS to a level that supports the processors installed in the server. See Chapter 7, "Getting help, service, and information" on page 163 for information on obtaining updates from the World Wide Web. If the problem persists, have the system serviced.
0001980B02	The BIOS does not support the current stepping level of processor B02. **Action:** Update the system BIOS to a level that supports the processors installed in the server. See Chapter 7, "Getting help, service, and information" on page 163 for information on obtaining updates from the World Wide Web. If the problem persists, have the system serviced.
0001980B03	The BIOS does not support the current stepping level of processor B03. **Action:** Update the system BIOS to a level that supports the processors installed in the server. See Chapter 7, "Getting help, service, and information" on page 163 for information on obtaining updates from the World Wide Web. If the problem persists, have the system serviced.
0001980B04	The BIOS does not support the current stepping level of processor B04. **Action:** Update the system BIOS to a level that supports the processors installed in the server. See Chapter 7, "Getting help, service, and information" on page 163 for information on obtaining updates from the World Wide Web. If the problem persists, have the system serviced.
0001981A01	Unable to apply the microcode update for processor A01. **Action:** The processor might be downlevel. Verify that the current stepping level is supported. If so, the BIOS might be downlevel. In that case, update the system BIOS to a level that supports the processors installed in the server. See Chapter 7, "Getting help, service, and information" on page 163 for information on obtaining updates from the World Wide Web. If the problem persists, have the system serviced.

POST message	Description
0001981A02	Unable to apply the microcode update for processor A02. **Action:** The processor might be downlevel. Verify that the current stepping level is supported. If so, the BIOS might be downlevel. In that case, update the system BIOS to a level that supports the processors installed in the server. See Chapter 7, "Getting help, service, and information" on page 163 for information on obtaining updates from the World Wide Web. If the problem persists, have the system serviced.
0001981A03	Unable to apply the microcode update for processor A03. **Action:** The processor might be downlevel. Verify that the current stepping level is supported. If so, the BIOS might be downlevel. In that case, update the system BIOS to a level that supports the processors installed in the server. See Chapter 7, "Getting help, service, and information" on page 163 for information on obtaining updates from the World Wide Web. If the problem persists, have the system serviced.
0001981A04	Unable to apply the microcode update for processor A04. **Action:** The processor might be downlevel. Verify that the current stepping level is supported. If so, the BIOS might be downlevel. In that case, update the system BIOS to a level that supports the processors installed in the server. See Chapter 7, "Getting help, service, and information" on page 163 for information on obtaining updates from the World Wide Web. If the problem persists, have the system serviced.
0001981B01	Unable to apply the microcode update for processor B01. **Action:** The processor might be downlevel. Verify that the current stepping level is supported. If so, the BIOS might be downlevel. In that case, update the system BIOS to a level that supports the processors installed in the server. See Chapter 7, "Getting help, service, and information" on page 163 for information on obtaining updates from the World Wide Web. If the problem persists, have the system serviced.
0001981B02	Unable to apply the microcode update for processor B02. **Action:** The processor might be downlevel. Verify that the current stepping level is supported. If so, the BIOS might be downlevel. In that case, update the system BIOS to a level that supports the processors installed in the server. See Chapter 7, "Getting help, service, and information" on page 163 for information on obtaining updates from the World Wide Web. If the problem persists, have the system serviced.
0001981B03	Unable to apply the microcode update for processor B03. **Action:** The processor might be downlevel. Verify that the current stepping level is supported. If so, the BIOS might be downlevel. In that case, update the system BIOS to a level that supports the processors installed in the server. See Chapter 7, "Getting help, service, and information" on page 163 for information on obtaining updates from the World Wide Web. If the problem persists, have the system serviced.
0001981B04	Unable to apply the microcode update for processor B04. **Action:** The processor might be downlevel. Verify that the current stepping level is supported. If so, the BIOS might be downlevel. In that case, update the system BIOS to a level that supports the processors installed in the server. See Chapter 7, "Getting help, service, and information" on page 163 for information on obtaining updates from the World Wide Web. If the problem persists, have the system serviced.
000199900A	Processor bus A is disabled. **Action:** Replace the cache coherency filter cards. They might be missing or defective. If the problem persists, have the system serviced.

POST message	Description
000199900B	Processor bus B is disabled. **Action:** Replace the cache coherency filter cards. They might be missing or defective. If the problem persists, have the system serviced.
01298001	No update data for processor B01. **Action:** Update the system BIOS to a level that supports the processors installed in the server. See Chapter 7, "Getting help, service, and information" on page 163 for information on obtaining updates from the World Wide Web.
01298002	No update data for processor B02. **Action:** Update the system BIOS to a level that supports the processors installed in the server. See Chapter 7, "Getting help, service, and information" on page 163 for information on obtaining updates from the World Wide Web.
01298003	No update data for processor B03. **Action:** Update the system BIOS to a level that supports the processors installed in the server. See Chapter 7, "Getting help, service, and information" on page 163 for information on obtaining updates from the World Wide Web.
01298004	No update data for processor B04. **Action:** Update the system BIOS to a level that supports the processors installed in the server. See Chapter 7, "Getting help, service, and information" on page 163 for information on obtaining updates from the World Wide Web.
01298A01	No update data for processor A01. **Action:** Update the system BIOS to a level that supports the processors installed in the server. See Chapter 7, "Getting help, service, and information" on page 163 for information on obtaining updates from the World Wide Web.
01298A02	No update data for processor A02. **Action:** Update the system BIOS to a level that supports the processors installed in the server. See Chapter 7, "Getting help, service, and information" on page 163 for information on obtaining updates from the World Wide Web.
01298A03	No update data for processor A03. **Action:** Update the system BIOS to a level that supports the processors installed in the server. See Chapter 7, "Getting help, service, and information" on page 163 for information on obtaining updates from the World Wide Web.
01298A04	No update data for processor A04. **Action:** Update the system BIOS to a level that supports the processors installed in the server. See Chapter 7, "Getting help, service, and information" on page 163 for information on obtaining updates from the World Wide Web.
01298B01	Invalid update data for processor B01. **Action:** Update the system BIOS to a level that supports the processors installed in the server. See Chapter 7, "Getting help, service, and information" on page 163 for information on obtaining updates from the World Wide Web.
01298B02	Invalid update data for processor B02. **Action:** Update the system BIOS to a level that supports the processors installed in the server. See Chapter 7, "Getting help, service, and information" on page 163 for information on obtaining updates from the World Wide Web.
01298B03	Invalid update data for processor B03. **Action:** Update the system BIOS to a level that supports the processors installed in the server. See Chapter 7, "Getting help, service, and information" on page 163 for information on obtaining updates from the World Wide Web.
01298B04	Invalid update data for processor B04. **Action:** Update the system BIOS to a level that supports the processors installed in the server. See Chapter 7, "Getting help, service, and information" on page 163 for information on obtaining updates from the World Wide Web.

POST message	Description
01298105	Invalid update data for processor A01. **Action:** Update the system BIOS to a level that supports the processors installed in the server. See Chapter 7, "Getting help, service, and information" on page 163 for information on obtaining updates from the World Wide Web.
01298106	Invalid update data for processor A02. **Action:** Update the system BIOS to a level that supports the processors installed in the server. See Chapter 7, "Getting help, service, and information" on page 163 for information on obtaining updates from the World Wide Web.
01298107	Invalid update data for processor A03. **Action:** Update the system BIOS to a level that supports the processors installed in the server. See Chapter 7, "Getting help, service, and information" on page 163 for information on obtaining updates from the World Wide Web.
01298108	Invalid update data for processor A04. **Action:** Update the system BIOS to a level that supports the processors installed in the server. See Chapter 7, "Getting help, service, and information" on page 163 for information on obtaining updates from the World Wide Web.
I9990301	A hard disk drive error occurred. **Action:** Have the system serviced.
I9990305	POST could not find an operating system. **Action:** 1. Install an operating system. 2. If you have already installed the operating system, check the drive startup sequence (see "Start options" on page 27). 3. If the drive sequence is correct, run the diagnostic tests to verify that the hard disk drive is functioning correctly. 4. If there is a problem with the hard disk drive (such as a defective sector), you might have to reinstall the operating system. If you cannot reinstall the operating system, have the system serviced.
I9990605	AC power has been restored. **Action:** No action is required. This message occurs each time ac power is restored to the server after an ac power loss.
Other Numbers	POST found an error. **Action:** Follow the instructions on the screen.

System-monitoring messages

The following table shows the system-monitoring messages that can appear on the information panel. The Advanced System Management PCI adapter monitors critical system functions and generates the messages.

Notes:

1. In addition to the actions given for the messages, see "Troubleshooting" on page 148 for general troubleshooting activities that might help you resolve an error.
2. Refer to the documentation provided with your system-management software for information on the system-monitoring functions of the Advanced System Management PCI adapter.

Code	Message	Description
None	Device Not Inst	A card or cable must be installed. **Action:** 1. Review the event log for more information regarding which device is not installed. 2. Install the specified device.
00	Post Fail	Errors were detected that prevent the system from successfully completing POST. **Action:** Review the error logs in the Configuration/Setup Utility program for information on the error.
01	Post Warn	Errors were detected in POST that allow the system to complete POST (for example, a memory sizing configuration error). **Action:** Review the error logs in the Configuration/Setup Utility program for information on the error.
08	App Fail	An application has failed. **Action:** Review the error logs in the Configuration/Setup Utility program for information on the error.
09	App Warning	An application has issued a warning message. **Action:** Review the error logs in the Configuration/Setup Utility program for information on the error.
10	Boot Fail	The network operating system failed to load. **Action:** Restart the server. If the problem persists, review the error logs in the Configuration/Setup Utility program for information on the error.
18	OS Hang	A network operating system error occurred. **Action:** Restart the server.
20	Log Full	The system error log is full. **Action:** Review the error logs in the Configuration/Setup Utility program and clear the error logs.

Code	Message	Description
30	CPU Fail	A processor has encountered an error, and will be taken offline.
		Action:
		1. Review the error log for more information regarding the failure. If you enabled the dialout feature through the Advanced System Management PCI adapter, a dialout alert will also occur.
		2. Replace the processor or the processor daughterboard that contains the processor.
		a. First, determine whether the processor indicated by the processor error LED on the LED card is defective. Perform the test described in step 6 on page 61.
		b. If the processor is defective, replace it as described in "Installing or replacing a processor" on page 60.
		c. If the processor is not defective, run the diagnostic programs on the processor daughterboard. (See "Diagnostic programs" on page 115 for information on running the diagnostic programs that come with your server.)
		d. If the processor daughterboard is defective, replace it as described in "Installing or replacing a processor daughterboard" on page 62.
		e. If the processor daughterboard is not defective, have the system serviced.
70	VRM Fail	A VRM has failed.
		Action:
		1. Review the event log for more information regarding the failure.
		2. Replace the VRM or the circuit board that contains the VRM.
80	Over Temp	A monitored temperature is above the normal range.
		Action:
		1. Make sure all four fans are functioning properly and air intakes are clear.
		2. Make sure the room temperature is within normal limits.
		3. If the problem persists, have the system serviced.
85	Over Volt	A monitored power source exceeds the threshold value.
		Action: Review the error logs in the Configuration/Setup Utility program for information on the error.
86	Under Volt	A monitored power source is below the threshold value.
		Action: Review the error logs in the Configuration/Setup Utility program for information on the error.
9x	Power	A power supply has failed; *x* is the power supply identifier.
		Action: Replace the power supply.
98	Power Fail	A failure occurred in the power supply system.
		Action: Review the error logs in the Configuration/Setup Utility program for information on the error.
99	Nonredundant	This is a warning to the system operator. The load on the power subsystem is large enough that the power subsystem is no longer operating with redundancy. If one power supply fails, the remaining power supplies might not be able to reliably power the system.
		Action: If possible, install an additional power supply, or reduce the load on the power subsystem.
A0	Fan *x* Fail	A fan has failed; *x* is the fan identifier.
		Action: Replace the fan.

Code	Message	Description
B0	Intrusion	The intrusion-detection switches have been set.
		Action: Check that the covers are attached correctly. Then, verify that there has been an intrusion.
B8	Display Fail	The information panel has failed.
		Action: Check the cable connections to the front panel.
C0	SMI Error	A critical error has occurred.
		Action: Review the error logs in the Configuration/Setup Utility program for information on the error.
C1	Memory Fail	A double-bit ECC system memory error has occurred.
		Action: Review the error logs in the Configuration/Setup Utility program for information on the error.

Note: Critical temperature and voltage messages are accompanied by a system shutdown. You can override the shutdown by subsequently turning on the server. Be aware that if you shut down and restart the server, no further messages will be generated even though the faulty condition might still exist. To re-enable message generation, remove all server ac power cords, wait 30 seconds, and then reconnect the server ac power cords.

Troubleshooting

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

Do the following before using the troubleshooting charts:

1. Check to make sure that all cables and cords are securely connected to the rear of the server and to attached options.

2. Remove any software or device that you just installed.

3. Run any diagnostic tests that come with the options that you have installed.

4. Run the server diagnostic tests.

5. Check to see if the system error logs in the Configuration/Setup Utility program provide additional information on the error.

6. Reinstall the new software or new device.

7. Go to http://www.ibm.com/pc/support on the World Wide Web for answers to frequently asked questions, technical updates, BIOS updates, updates to device drivers, and many other sources of technical support.

8. If the error persists, use the troubleshooting charts. Look for the symptom in the left column of the chart. Instructions and probable solutions to the problem are in the right column.

Note: If you cannot find the problem in the troubleshooting charts, continue with "Running the diagnostic programs" on page 119 to test the server. If you have run the diagnostic test programs or if running the tests does not reveal the problem, have the system serviced.

CD-ROM drive problems	Action
The CD is not working properly.	Clean the CD by wiping it with a soft, lint-free cloth, from the center of the CD to the outer edge. Do not clean in a circular pattern. This can cause loss of data.
	If this does not correct the problem, clean the optical-head lens. Discs for cleaning the lens are available from your place of purchase.
The CD-ROM drive tray is not working.	The server must be turned on. If the system is on and the tray does not eject, insert the end of a paper clip into the small hole (to the left of the tray eject/load button) on the front of the CD-ROM drive, and push in approximately 25.4 mm (1 in.).
The server programs do not recognize the CD-ROM drive.	Use the Configuration/Setup Utility program to verify that the CD-ROM drive is enabled.

Diskette drive problems	Action
Diskette Drive In-Use light stays on, or the system bypasses the diskette drive.	If there is a diskette in the drive, verify that:
	1. The diskette is good and not damaged. (Try another diskette, if you have one.)
	2. The diskette is inserted correctly (label up and metal-shutter end first) in the drive.
	3. The diskette contains the necessary files to start the system.
	4. The system is not in unattended-start mode (see "System security" on page 24).
	5. The diskette drive is enabled. Check the drive startup sequence setting in the Configuration/Setup Utility program (see "Start options" on page 27).
	6. Your software program is OK (see the **Software problem** troubleshooting chart).
	7. Your drive startup sequence is set correctly (see "Start options" on page 27).
	If the Diskette Drive In-Use light stays on, or the system continues to bypass the diskette drive, have the system serviced.

Monitor self-tests	Action
	Some IBM monitors have their own self-tests. If you suspect a problem with your monitor, refer to the information that comes with the monitor for adjusting and testing instructions.
	If you still cannot find the problem, have the monitor and system serviced.

Monitor problems	Action
Wavy, unreadable, rolling, distorted screen, or screen jitter.	Verify that the correct device driver is properly installed.
	If the monitor self-tests show that the monitor is OK, 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.
	Notes:
	1. The distance between monitors and diskette drives should be at least 76 mm (3 in.) to prevent diskette drive read/write errors.
	2. Non-IBM monitor cables might cause unpredictable problems.
	3. An enhanced monitor cable with additional shielding is available for the 9521 and 9527 monitors. See your IBM reseller or IBM marketing representative for information on the enhanced monitor cable.
	If the problem recurs, have the monitor and system serviced.
The monitor works when you turn on the system, but goes blank when you start some application programs.	Verify that the primary monitor cable is connected to the video port.
	Be sure that you installed the necessary drivers for the application.
Blank screen	Verify that:
	1. The server power cord is plugged into the server and a working electrical outlet.
	2. The monitor power cord is plugged into the monitor and a working electrical outlet.
	3. The monitor is turned on and the Brightness and Contrast controls are adjusted correctly.
	4. The monitor signal cable is connected to the correct connector on the system.
	If the items above are correct and the screen remains blank, have the system serviced.
Only the cursor appears.	Have the system serviced.
Wrong characters appear on the screen.	Have the system serviced.

General problems	Action
problems such as indicator lights not working.	Have the system serviced.
System continuously restarts.	Run the diagnostic programs. If the problem recurs, have the system serviced.
Server does not respond to the Power On or Reset button.	Unattended-start mode might be enabled; enter the user password to disable unattended-start mode and try again (see "System security" on page 24).
	If the server still does not respond, have the system serviced.

Intermittent problems	Action
A problem occurs only occasionally and is difficult to detect.	Verify that: 1. All cables and cords are securely connected to the rear of the system and to attached options. 2. The last external device in each SCSI chain is terminated correctly. (See "Hard disk drives" on page 80 for more information on SCSI termination.) If the items above are correct, have the system serviced.

Keyboard, mouse, or pointing-device problems	Action
All or some keys on the keyboard do not work.	Do the following: 1. Verify that the keyboard cable is properly connected to the system and that the system and the monitor are turned on. 2. Attach another keyboard to the keyboard connector. If the problem persists, have the system serviced.
The mouse or pointing device does not work.	Do the following: 1. Verify that the mouse or pointing-device cable is securely connected. 2. Verify that the device drivers are installed correctly. 3. Attach another mouse or pointing device to the pointing-device port. **Note:** The pointing-device port is also known as the auxiliary-device port or mouse port. If the problem recurs, have the system and the device serviced.

Memory problems	Action
The amount of memory displayed is less than the amount of memory installed.	Verify that: 1. The memory modules and memory boards are seated properly. 2. You have installed the correct type of memory (see "Installing DIMMs and memory boards" on page 52). 3. If you changed the memory, you must update the configuration by running the Configuration/Setup Utility program (see "Using the Configuration/Setup Utility main menu" on page 21). If the above items are correct, run the memory diagnostic program. The system might have detected a defective memory module and automatically reallocated memory to enable you to continue to operate. If the memory tests fail, have the system serviced or replace the failing DIMM.

Option problems	Action
An IBM option that was just installed does not work.	Verify that: 1. The option is designed for your server. For a list of supported options, go to http://www.ibm.com/pc/us/compat/ on the World Wide Web. 2. You followed the installation instructions that were supplied 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. Whenever you change the memory or an option, you must update the configuration by running the Configuration/Setup Utility program (see "Using the Configuration/Setup Utility main menu" on page 21). If all of the above items are correct, start the diagnostic programs. If the diagnostic programs find no problem, have the system and the option serviced.

Option problems	Action
An IBM option that used to work does not work now.	Verify that all of the option hardware and cable connections are secure.
	If the option comes with its own test instructions, use those instructions to test the option.
	If the items above are correct and the test programs found no problem, have the system and the option serviced.
	If the failing option is a SCSI option, verify that:
	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. (See "Termination" on page 81 for more information on SCSI termination.) 3. All external SCSI options are turned on. External SCSI options must be turned on before the system is turned on.
	If the problem recurs, have the system serviced.

Parallel port problems	Action
The number of parallel ports displayed is less than the number of parallel ports installed.	Verify that:
	1. Each port is assigned a unique address. 2. The parallel-port adapter, if you installed one, is seated properly.
	If the items above are correct, have the system serviced.

Serial port problems	Action
The number of serial ports displayed is less than the number of serial ports installed.	Verify that:
	1. Each port is assigned a unique address. 2. The serial-port adapter, if you installed one, is seated properly.
	If the items above are correct, have the system serviced.

Universal Serial Bus (USB) port problems	Action
The number of serial buses displayed is less than the number of serial buses installed.	Verify that:
	1. Each bus is assigned a unique address. 2. The serial-port adapter, if you installed one, is seated properly.
	If the items above are correct, have the system serviced.
A USB device does not work.	Verify that:
	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, then the USB is disabled and no USB device will work during POST.
	2. The correct USB device driver is installed.
	If the problem still persists, have the system serviced.

Printer problems	Action
The printer does not work.	Verify that:
	1. The printer is turned on and is online.
	2. The printer signal cable is connected to the correct serial or parallel port on the system. (For the location of the serial and parallel ports, see "Input/output connectors and expansion slots" on page 11.)
	Note: Non-IBM printer cables might cause unpredictable problems.
	3. You have assigned the printer port correctly in your operating system or application program.
	4. You have assigned the printer port correctly using the Configuration/Setup Utility program.
	If the items above are correct and the printer still does not work, run the tests described in the manual that comes with your printer. If the tests show the printer is OK, have the system serviced.

Expansion enclosure problems	Action
The SCSI expansion enclosure used to work, but does not now work.	Verify that all of the SCSI expansion enclosure hardware and cable connections are secure.
	Verify that:
	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. (See "Termination" on page 81 for more information on SCSI termination.)
	3. Any external SCSI option is turned on. You must turn on an external SCSI option before turning on the server.
	For more information, see your SCSI and expansion enclosure documentation.
	If the SCSI expansion enclosure comes with its own test instructions, use those instructions to test it. In addition, test the power supply.
	If the items above are correct and the test programs found no problem, have the server and SCSI expansion enclosure serviced.

Software problem	Action
Suspected software problem	To determine if problems are caused by the software, verify that:
	1. Your system has the minimum memory requirements needed to use the software. Refer to the information supplied with the software to verify memory requirements.
	Note: If you have just installed an adapter or memory, you might have a memory address conflict (see "Resolving configuration conflicts" on page 32).
	2. The software is designed to operate on your system.
	3. Other software works on your system.
	4. The software you are using works on another system.
	If you received any error messages when using the software program, refer to the information supplied with the software for a description of the messages and solutions to the problem.
	If the items above are correct and the problem remains, contact your place of purchase or service technician for help.

Advanced System Management PCI Adapter problems	Action
The Advanced System Management PCI adapter is not working properly	Disconnect the server from all electrical sources, wait for 30 seconds, and reconnect the server to the electrical sources. If the processor error LED (CR2 top) lights continuously, have your system serviced. (See "Advanced System Management PCI adapter component locations" on page 101 for the location of the processor error LED.)

SCSI messages

The following table lists messages that reflect problems with the SCSI controller or a SCSI device.

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

You will get these messages only when running the SCSISelect Utility. For more information, see the documentation that comes with the SCSISelect Utility.

SCSI messages	Description
All	One or more of the following might be causing the problem. • A failing SCSI device (adapter, drive, controller) • An improper SCSI configuration • Duplicate SCSI IDs in the same SCSI chain • An improperly installed SCSI terminator • A defective SCSI terminator • An improperly installed cable • A defective cable **Action:** Verify that: • The external SCSI devices are turned on. External SCSI devices must be turned on before the system. • The cables for all external SCSI devices are connected correctly. • The last device in each SCSI chain is terminated correctly. (See "Hard disk drives" on page 80 for more SCSI chain information.) • The SCSI devices are configured correctly. If the above are correct, run the diagnostic programs for additional information on the failing device. If the error recurs, have the system serviced.

Resolving configuration conflicts

The Configuration/Setup Utility program configures only the server hardware. It does not consider the requirements of the operating system or the application programs. For these reasons, memory-address configuration conflicts might occur.

Changing the software configuration setup

The best way to resolve memory-address conflicts is to change the software configuration by changing the addresses that the EMS device driver defined. The SVGA video memory occupies 32 Kb (1 Kb = approximately 1000 bits) of space in the hex C0000 to C7FFF EMS memory area. EMS device drivers must use addresses different from those assigned to video read-only memory (ROM). You can use the Configuration/Setup Utility program to view or change the current setting for video ROM. For information on using the Configuration/Setup Utility program, see "Using the Configuration/Setup Utility main menu" on page 21.

Changing the hardware configuration setup

An alternative way to resolve memory-address conflicts is to change the address of the conflicting hardware option.

Identifying problems through status indicators

Your server has status indicators to help you identify problems with some server components. Status indicators are located on the following components:

- Front panel

  For more information, see "Controls and indicators" on page 7 and "Front panel" on page 10.

- Rear panel

  For more information, see "Input/output connectors and expansion slots" on page 11.

- Power supplies

  For more information, see "Power supply LEDs" on page 156.

- LED card (processor and memory)

  For more information, see "LED card (processor and DIMM) LEDs" on page 157.

- PCI slots

  For more information, see "PCI slot LEDs" on page 157.

- I/O board

  For more information, see "I/O board VRM LEDs" on page 158 and "Installing a hot-plug PCI adapter" on page 71.

- Advanced System Management PCI Adapter

  For more information, see "Advanced System Management PCI adapter LEDs" on page 158.

- Hard disk drives

For more information, see "LEDs for Internal hard disk drives in a ServeRAID environment" on page 158 and "Controls and indicators" on page 7.

Power supply LEDs

The ac and dc power LEDs on the power supplies provide status information on the power supplies. See "Power supplies" on page 13 for the location of the LEDs.

The following table describes the ac and dc power LEDs.

AC power LED	DC power LED	Description and action
On	On	The power supply is on and operating correctly.

On	Off	There is a dc power problem.
		
		Possible causes:
		
		1. The power control button on the front of the server is in the Off position (the dc power LEDs on all the power supplies are off).
		
		   Action: Press the power control button to start the server.
		
		2. The power supply has failed (the dc power LED on at least one of the power supplies is off).
		
		   Action: Replace the power supply.
		
		   Note: If the the dc power LEDs on all three power supplies are off, have the system serviced.
		
		3. The power supply is not fully seated in the power supply connector.
		
		   Action: Reinstall the power supply.
		
		If the problem persists, have the system serviced.

Off	Off	There is an ac power problem.
		
		Possible causes:
		
		1. There is no ac power to the power supply.
		
		   Action: Verify that:
		
		   • The power cord is properly connected to the server.
		
		   • The electrical outlet functions properly.
		
		2. The power supply has failed.
		
		   Action: Replace the power supply.
		
		If the problem persists, have the system serviced.

System component status indicators

Status indicators on the LED card behind the processor housing assembly latches, I/O board, and the Advanced System Management PCI Adapter can help identify problems. The indicators are lit during POST to ensure that the indicators operate. After POST completes, the indicators show the status of the component.

For the location of the status indicators, see "Removing the processor housing assembly" on page 58, "I/O board component locations" on page 102, and "Advanced System Management PCI adapter component locations" on page 101.

LED card (processor and DIMM) LEDs

The eight processor error LEDs and the 16 DIMM error LEDs are located on the LED card, behind the processor housing assembly latches.

1. To locate these LEDs, remove the processor housing assembly (see "Removing the processor housing assembly" on page 58) and open the processor housing assembly latches.

2. To verify which processor is faulty, see step 6 on page 61 and the following table.

3. To verify which DIMM is faulty, see the following table.

4. Reinstall the processor housing assembly (see "Reinstalling the processor housing assembly" on page 67) and restart the server to clear the processor error LEDs or DIMM error LEDs.

Notes:

1. The LED card is not a user-removable component. If the LED card requires service, contact your IBM service technician, IBM reseller, or IBM marketing representative.

2. For an illustration that contains the LED card, see "Removing the processor housing assembly" on page 58.

3. For information about replacing processors, see "Installing or replacing a processor" on page 60.

4. For information about replacing DIMMs, see "Installing DIMMs and memory boards" on page 52.

Indicator	Description
Processor fail LED	If a processor is present and has failed, the indicator for the connector (A1–A4 or B1–B4) is on.
Memory fail LED	If a DIMM is present and has failed or is disabled, the indicator for the slot (A1/J1–A16/J16 or B1/J1–B16/J16) is on.

PCI slot LEDs

The following table describes the PCI slot LEDs on the I/O board.

Indicator	Description
Power On LED	If a PCI slot is active and power to the slot is present, the indicator for the slot is on. Do not add or remove an adapter from the PCI slot when the Power On LED is on.
	When this LED is off, the PCI slot is inactive and has no power applied. You can install or remove an adapter when the Power On LED is off. Refer to your operating-system documentation to determine if your operating system supports hot-plug PCI adapters.
Attention/Fail LED	This is a bicolor LED. When an Attention/Fail LED flashes green, it indicates the PCI Hot-Plug Attention function. The meaning of the Attention LED is defined by your operating system. Refer to your operating-system documentation to determine if your operating system supports hot-plug PCI adapters and, if so, what the Attention/Fail LED indicates. When this LED is solid amber, it indicates a failure on the PCI adapter installed in the slot.

I/O board VRM LEDs

The following table describes the VRM status LED on the I/O board.

Indicator	Description
I/O board VRM status LED	If an I/O board voltage regulator module (VRM) is present and has failed, the indicator for the slot is on.

Advanced System Management PCI adapter LEDs

The following table describes the LEDs on the Advanced System Management PCI adapter.

Indicator	Description
Power on LED	If power to the Advanced System Management PCI adapter is present, the indicator is on.
Processor error LED	If the processor on the Advanced System Management PCI adapter has failed, the indicator is on.
Ethernet activity LED	If the Ethernet controller on the Advanced System Management PCI adapter is transmitting data or receiving data, the indicator is on.
Ethernet link LED	If an active link to the Ethernet controller on the Advanced System Management PCI adapter is present, the indicator is on.

Note: See "Advanced System Management PCI adapter component locations" on for an illustration of the Advanced System Management PCI adapter LED locations.

LEDs for Internal hard disk drives in a ServeRAID environment

Note: See "Controls and indicators" on for an illustration of the hard disk drive indicator locations.

Indicator	Description
Hard disk status LED (amber)	• When this LED is on continuously, the drive has failed.
	• When this LED flashes slowly (one flash per second), the drive is being rebuilt.
	• When this LED flashes rapidly (three flashes per second), the ServeRAID controller is identifying the drive.
	• When this LED is off, the hard disk drive is operating correctly.

Replacing the battery

IBM has designed this product with your safety in mind. The lithium battery must be handled correctly to avoid possible danger. If you replace the battery, you must adhere to the following instructions.

2

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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.

Note: In the U.S., please call 1-800-IBM-4333 for information on battery disposal.

If you replace the original lithium battery with a heavy-metal battery or a battery with heavy-metal components, be aware of the following environmental consideration. Batteries and accumulators that contain heavy metals must not be disposed of with normal domestic waste. They will be taken back free of charge by the manufacturer, distributor, or representative, to be recycled or disposed of in a proper manner.

To order replacement batteries, call 1-800-388-7080 within the United States, and 1-800-465-7999 or 1-800-465-6666 within Canada. Outside the U.S. and Canada, call your IBM reseller or IBM marketing representative.

Before you begin, be sure you have:

- Read "Safety information" on page 39 through "Handling static-sensitive devices" on page 43.

- Followed any special handling and installation instructions supplied with the replacement battery.

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

To replace the battery:

1. Turn off the server and peripheral devices, and disconnect all external cables and power cords (see "Preparing to install options" on page 48); then, remove the top cover (see "Removing the top cover" on page 49).

2. Remove the I/O function card from the server:

   a. Refer to the following illustration while you perform the steps in this procedure.

   b. Disconnect all cables **1** from the I/O function card **2** . Note carefully where each cable is connected before you remove it. See "I/O function card component locations" on page 103 for the connector locations on the I/O function card.

   c. Remove the two screws **4** located on the metal connector plate inside the server.

   d. Remove the I/O function card retention bracket **3** on the right side of the card by pulling out the fastener on the bracket.

   e. Carefully grasp the I/O function card by its top edge and pull the I/O function card out of the server.

   f. Place the I/O function card connector-side up on a flat, static-protective surface.

3. Locate the battery on the I/O function card (see "I/O function card component locations" on page 103).

4. Remove the battery:

   a. Use one finger to lift the battery clip over the battery.

   b. Use one finger to slightly slide the battery toward the rear of the I/O function card. The spring mechanism behind the battery will push it out toward you as you slide it forward.

   c. Use your thumb and index finger to pull the battery from under the battery clip.

   d. Ensure that the battery clip is touching the base of the battery socket by pressing gently on the clip.
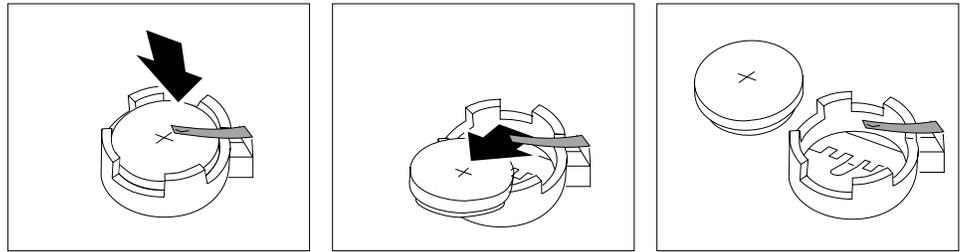
5. Insert the new battery:

   a. Tilt the battery so that you can insert it into the front of the socket, under the battery clip.

   b. As you slide it under the battery clip, press the battery down into the socket.
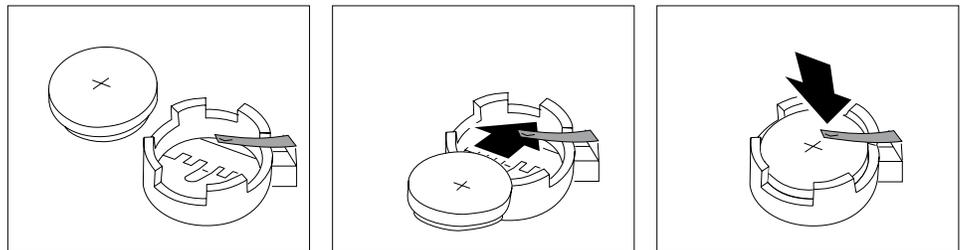
6. Install the I/O function card:

   a. Refer to the illustration in step 2a on page 160 while you perform the steps in this procedure.

   b. Carefully grasp the I/O function card by its top edge, and insert the tabs on the bottom edge of the metal connector plate in the matching openings on the server back panel.

   c. Align the I/O function card with the guide on the opposite end of the adapter and the slot on the I/O board.

   d. Press the I/O function card *firmly* into the slot.

      Attention: When you install the I/O function card in the server, be sure that it is completely and correctly seated. Incomplete insertion might cause damage to server components.

   e. Reinstall the I/O function card retention bracket that you removed in step 2d on page 160 by pressing in the fastener on the bracket.

   f. Insert the two screws that you removed in step 2c on page 160.

g. Connect the cables that you disconnected in step 2b on page 160. See "I/O function card component locations" on page 103 for the connector locations on the I/O function card.

7. Reinstall the top cover and complete the installation (see "Completing the installation" on page 90).

   Note: You will have to wait approximately 20 seconds after you plug the power cord of your server into an electrical outlet for the Power Control button to become active.

8. Start the Configuration/Setup Utility program and reset configuration parameters as needed.

   - To reset the system date and time, continue with "Date and time" on page 23.

   - To reset the power-on password, continue with "Using the power-on password menu" on page 25.

   - To reconfigure your server, follow the instructions given in "The Configuration/Setup Utility program" on page 20 (all models).

Chapter 7. Getting help, service, and information

If you need help, service, technical assistance, or just want more information about IBM products, you will find a wide variety of sources available from IBM to assist you.

For example, IBM maintains pages on the World Wide Web where you can get information about IBM products and services, find the latest technical information, and download device drivers and updates. Some of these pages are:

`http://www.ibm.com`	Main IBM home page
`http://www.ibm.com/pc`	IBM Personal Computing
`http://www.ibm.com/pc/support`	IBM Personal Computing Support
`http://www.ibm.com/pc/us/ibmpc`	IBM Commercial Desktop PCs (U.S.)
`http://www.ibm.com/pc/us/intellistation`	IBM IntelliStation Workstations (U.S.)
`http://www.ibm.com/pc/us/accessories`	Options by IBM (U.S.)
`http://www.ibm.com/pc/us/eserver/xseries`	IBM xSeries Servers (U.S.)
`http://www.ibm.com/pc/us/server/sguide`	IBM ServerGuide (U.S.)
`http://www.ibm.com/pc/us/netfinity/system_management`	IBM Systems Management (U.S.)
`http://www.ibm.com/software/os/warp-server`	IBM OS/2 Warp Server
`http://www.ibm.com/pc/techconnect`	IBM TechConnect

You can select a country-specific Web site from these pages.

You might also want to visit the Web pages of other companies for information about other operating systems, software, and accessories. The following are some other Web sites you might find helpful:

```
http://www.lotus.com

http://www.tivoli.com

http://www.microsoft.com

http://www.novell.com

http://www.sco.com

http://www.adaptec.com

http://www.apcc.com

http://www.norton.com
```

Help is also available from bulletin boards and online services, as well as by fax and telephone. This section provides information about these sources.

Services available and telephone numbers listed are subject to change without notice.

Service support

With the original purchase of an IBM hardware product, you have access to extensive support coverage. During the IBM hardware product warranty period, you may call the IBM Personal Computer HelpCenter (1-800-772-2227 in the U.S.) for hardware product assistance covered under the terms of the IBM hardware warranty. See "Getting help by telephone" on page 167 for HelpCenter telephone numbers in other countries.

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 Engineering Changes (ECs) available that apply to your hardware.

Be sure to retain your proof of purchase to obtain warranty service.

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

If possible, be at your computer when you call.

A compatible monitor, keyboard, and mouse are required for many service activities. Before you have the computer serviced, be sure to have these components attached to your computer, either directly or through a console switch.

The following items are not covered:

- Replacement or use of non-IBM parts or nonwarranted IBM parts

    Note: 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

See your IBM hardware warranty for a full explanation of IBM's warranty terms.

Before you call for service

Many computer problems can be solved without outside assistance, by using the online help or by looking in the online or printed documentation that comes with your computer or software. Also, be sure to read the information in any README files that come with your software.

Most computers, operating systems, and application programs come with documentation that contains troubleshooting procedures and explanations of error messages. The documentation that comes with your computer also contains information about the diagnostic tests you can perform.

If you receive a POST error code when you turn on your computer, see the POST error-message charts in Chapter 6, "Solving problems." If you do not receive a POST error code, but suspect a hardware problem, see the troubleshooting information in Chapter 6, "Solving problems" or run the diagnostic tests.

If you suspect a software problem, consult the documentation (including README files) for the operating system or application program.

Getting customer support and service

Purchasing an IBM PC hardware product entitles you to standard help and support during the warranty period. If you need additional support and services, a wide variety of extended services are available for purchase that address almost any need.

Using the World Wide Web

On the World Wide Web, the IBM Personal Computing Web site has up-to-date information about IBM Personal Computer 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, including supported options, on the IBM Personal Computing Support page at:

```
http://www.ibm.com/pc/support
```

If you select 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. You will have the information you need, all in one place. In addition, you can choose to receive e-mail notifications whenever new information becomes available about your registered products. You also can access online support forums, which are community sites monitored by IBM support staff.

For information about specific Personal Computer products, visit the following pages:

```
http://www.ibm.com/pc/us/intellistation
```

```
http://www.ibm.com/pc/us/ibmpc
```

```
http://www.ibm.com/pc/us/eserver/xseries
```

```
http://www.ibm.com/pc/us/thinkpad
```

```
http://www.ibm.com/pc/us/accessories
```

```
http://www.direct.ibm.com/content/home/en_US/aptiva
```

You can select a country-specific Web site from these pages.

Using electronic support services

If you have a modem, you can get help from several popular services. Online information services provide assistance through question-and-answer message areas, live chat rooms, searchable databases, and more.

Technical information is available on a wide range of topics, such as:

- Hardware setup and configuration
- Preinstalled software
- Windows, OS/2, and DOS
- Networking
- Communications
- Multimedia

In addition, the latest device driver updates are available.

Commercial online services, such as America Online (AOL), contain information about IBM products. (For AOL, use the keyword **IBM**.)

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 online

Online Housecall is a remote communication tool that allows an IBM technical-support representative to access your PC by modem. Many problems can be remotely diagnosed and corrected quickly and easily. In addition to a modem, a remote-access application program is required. This service is not available for servers. There might be a charge for this service, depending on the request.

For more information about configuring your PC for Online Housecall:

- In the U.S., call 1-800-772-2227.
- In Canada, call 1-800-565-3344.
- In all other countries, contact your IBM reseller or IBM marketing representative.

Getting help by telephone

During the warranty period, you can get help and information by telephone through the IBM PC HelpCenter.

Please have the following information ready when you call:

- Machine Type and Model
- Serial numbers of your computer, monitor, and other components, or your proof of purchase
- Description of the problem
- Exact wording of any error messages
- Hardware and software configuration information for your system

If possible, be at your computer when you call.

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.[4]

Country		Telephone number
Austria	Österreich	01-24 692 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	35 25 02 91
Finland	Suomi	09-22 931 840
France	France	01 69 32 40 40

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[4] Response time will vary depending on the number and complexity of incoming calls.

Country		Telephone number
Germany	Deutschland	069-6654 9040
Ireland	Ireland	01-815 9200
Italy	Italia	02-4827 5040
Luxembourg	Luxembourg	298-977 5063
Netherlands	Nederland	020-504 0501
Norway	Norge	23 05 32 40
Poland	Polska	00800-441 2261
Portugal	Portugal	21-791 51 47
Spain	España	91-662 49 16
Sweden	Sverige	08-751 52 27
Switzerland	Schweiz/Suisse/ Svizzera	0848-80 52 52
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, contact your IBM reseller or IBM marketing representative.

Getting help around the world

If you travel with your computer or need to move it to another country, you can register for International Warranty Service. When you register with the International Warranty Service Office, you will receive an International Warranty Service Certificate that is honored virtually worldwide, wherever IBM or IBM resellers sell and service IBM PC products.

For more information or to register for International Warranty Service:

- In the U.S. or Canada, call 1-800-497-7426.
- In Europe, call 44-1475-893638 (Greenock, U.K.).
- In Australia and New Zealand, call 61-2-9354-4171.

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

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 name might vary by country.

Enhanced PC support line

Enhanced PC Support is available for desktop and mobile IBM computers that are not connected to a network. Technical support is provided for IBM computers and IBM or non-IBM options, operating systems, and application programs on the Supported Products list.

This service includes technical support for:

- Installing and configuring your out-of-warranty IBM computer
- Installing and configuring non-IBM options in IBM computers
- Using IBM operating systems in IBM and non-IBM computers
- Using application programs and games
- Tuning performance
- Installing device drivers remotely
- Setting up and using multimedia devices
- Identifying system problems
- Interpreting documentation

You can purchase this service on a per-call basis, as a multiple-incident package, or as an annual contract with a 10-incident limit. For more information about purchasing Enhanced PC Support, see "Ordering support line services" on page 170.

900-number operating system and hardware support line

In the U.S., if you prefer to obtain technical support on a pay-as-you-go basis, you can use the 900-number support line. The 900-number support line provides support for IBM PC products that are out of the warranty period.

To access this support, call 1-900-555-CLUB (2582). You will be notified of the charge per minute.

Network and server support line

Network and Server Support is available for simple or complex networks made up of IBM servers and workstations using major network operating systems. In addition, many popular non-IBM adapters and network interface cards are supported.

This service includes all of the features of the Enhanced PC Support Line, plus:

- Installing and configuring client workstations and servers
- Identifying system problems and correcting problems on the client or the server
- Using IBM and non-IBM network operating systems
- Interpreting documentation

You can purchase this service on a per-call basis, as a multiple-incident package, or as an annual contract with a 10-incident limit. For more information about purchasing Network and Server Support, see "Ordering support line services" on page 170.

Ordering support line services

Enhanced PC Support Line and Network and Server Support Line services are available for products on the Supported Products list. To receive a Supported Products list:

- In the U.S.:

  1. Call 1-800-426-3395.
  2. Select document number 11683 for Network and Server support.
  3. Select document number 11682 for Enhanced PC support.

- In Canada, contact IBM Direct at 1-800-465-7999, or:

  1. Call 1-800-465-3299.
  2. Select the HelpWare catalog.

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

For more information or to purchase these services:

- In the U.S., call 1-800-772-2227.
- In Canada, call 1-800-465-7999.
- In all other countries, contact your HelpCenter.

Warranty and repair services

You can upgrade your standard hardware warranty service or extend the service beyond the warranty period.

Warranty upgrades in the U.S. include:

- Carry-in service to on-site service

  If your warranty provides carry-in repair service, you can upgrade to on-site repair service, either standard or premium. The standard upgrade provides a trained servicer within the next business day (9 a.m. to 5 p.m., local time, Monday though Friday). The premium upgrade provides 4-hour average response, 24 hours a day, 7 days a week.

- On-site service to premium on-site service

  If your warranty provides for on-site service, you can upgrade to premium on-site service (4-hour average on-site response, 24 hours a day, 7 days a week).

You also can extend your warranty. Warranty and Repair Services offers a variety of post-warranty maintenance options, including ThinkPad EasyServ Maintenance Agreements. Availability of the services varies by product.

For more information about warranty upgrades and extensions:

- In the U.S., call 1-800-426-4968.
- In Canada, call 1-800-465-7999.
- In all other countries, contact your IBM reseller or IBM marketing representative.

Ordering publications

Additional publications are available for purchase from IBM. For a list of publications available in your country:

- In the U.S., Canada, and Puerto Rico, call 1-800-879-2755.
- In other countries, contact your IBM reseller or IBM marketing representative.

Appendix A. Product warranties and notices

This chapter contains warranty and emission notices. It also contains trademarks and general-information notices.

Warranty Statements

The warranty statements consist of two parts: Part 1 and Part 2. Part 1 varies by country. Part 2 is the same for both statements. Be sure to read both the Part 1 that applies to your country and Part 2.

- **United States, Puerto Rico, and Canada (Z125-4753-05 11/97)**
  (Part 1 - General Terms on page 173)
- **Worldwide except Canada, Puerto Rico, Turkey, and United States (Z125-5697-01 11/97)**
  (Part 1 - General Terms on page 175)
- **Worldwide Country-Unique Terms**
  (Part 2 - Country-Unique Terms on page 177)

IBM Statement of Limited Warranty for United States, Puerto Rico, and Canada (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 may 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 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.*

Machine -   IBM @server xSeries 370

Warranty Period* -   Three Years

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

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. 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.

During the warranty period IBM or your reseller, if approved by IBM to provide warranty service, will provide repair and exchange service for the Machine, without charge, under the type of service designated for the Machine and will manage and install engineering changes that apply to the Machine.

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. The replacement may not be new, but will be in good working order.

Extent of Warranty

The warranty does not cover the repair or exchange of a Machine resulting from misuse, accident, modification, unsuitable physical or operating environment, improper maintenance by you, or failure caused by a product for which IBM is not responsible. The warranty is voided by removal or alteration of Machine or parts identification labels.

THESE WARRANTIES ARE YOUR EXCLUSIVE WARRANTIES AND REPLACE ALL OTHER WARRANTIES OR CONDITIONS, EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OR CONDITIONS OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. THESE WARRANTIES GIVE YOU SPECIFIC LEGAL RIGHTS AND YOU MAY ALSO HAVE OTHER RIGHTS WHICH VARY FROM JURISDICTION TO JURISDICTION. SOME JURISDICTIONS DO NOT ALLOW THE EXCLUSION OR LIMITATION OF EXPRESS OR IMPLIED WARRANTIES, SO THE ABOVE EXCLUSION OR LIMITATION MAY NOT APPLY TO YOU. IN THAT EVENT, SUCH WARRANTIES ARE LIMITED IN DURATION TO THE WARRANTY PERIOD. NO WARRANTIES APPLY AFTER THAT PERIOD.

Items Not Covered by Warranty

IBM does not warrant uninterrupted or error-free operation of a Machine.

Unless specified otherwise, IBM provides non-IBM machines **WITHOUT WARRANTIES OF ANY KIND.**

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 the Machine, contact your reseller or IBM. In the United States, call IBM at 1-800-772-2227. In Canada, call IBM at 1-800-565-3344. (In Toronto, call 416-383-3344.) You may be required to present proof of purchase.

IBM or your reseller provides certain types of repair and exchange service, either at your location or at a service center, 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. IBM may repair the failing Machine or exchange it at its discretion.

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.

Any feature, conversion, or upgrade IBM or your reseller services must be installed on a Machine which is 1) for certain Machines, the designated, serial-numbered Machine and 2) at an engineering-change level compatible with the feature, conversion, or upgrade. 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.

Production Status
Each IBM Machine is manufactured from new parts, or new and used parts. In some cases, the Machine may not be new and may have been previously installed. Regardless of the Machine's production status, IBM's appropriate warranty terms apply.

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), 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 greater of U.S. $100,000 (or equivalent in local currency) or the charges (if recurring, 12 months' charges apply) for the Machine that is the subject of the claim.

   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 (INCLUDING LOST PROFITS OR 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.

IBM Statement of Warranty Worldwide except Canada, Puerto Rico, Turkey, United States (Part 1 - General Terms)

This Statement of Warranty includes Part 1 - General Terms and Part 2 - Country-unique Terms. **The terms of Part 2 may replace or modify those of Part 1**. *The warranties provided by IBM in this Statement of 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 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.*

Machine - IBM @server xSeries 370

Warranty Period* - Three Years

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

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. 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.

During the warranty period IBM or your reseller, if approved by IBM to provide warranty service, will provide repair and exchange service for the Machine, without charge, under the type of service designated for the Machine and will manage and install engineering changes that apply to the Machine.

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. The replacement may not be new, but will be in good working order.

Extent of Warranty

The warranty does not cover the repair or exchange of a Machine resulting from misuse, accident, modification, unsuitable physical or operating environment, improper maintenance by you, or failure caused by a product for which IBM is not responsible. The warranty is voided by removal or alteration of Machine or parts identification labels.

THESE WARRANTIES ARE YOUR EXCLUSIVE WARRANTIES AND REPLACE ALL OTHER WARRANTIES OR CONDITIONS, EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OR CONDITIONS OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. THESE WARRANTIES GIVE YOU SPECIFIC LEGAL RIGHTS AND YOU MAY ALSO HAVE OTHER RIGHTS WHICH VARY FROM JURISDICTION TO JURISDICTION. SOME JURISDICTIONS DO NOT ALLOW THE EXCLUSION OR LIMITATION OF EXPRESS OR IMPLIED WARRANTIES, SO THE ABOVE EXCLUSION OR LIMITATION MAY NOT APPLY TO YOU. IN THAT EVENT, SUCH WARRANTIES ARE LIMITED IN DURATION TO THE WARRANTY PERIOD. NO WARRANTIES APPLY AFTER THAT PERIOD.

Items Not Covered by Warranty

IBM does not warrant uninterrupted or error-free operation of a Machine.

Unless specified otherwise, IBM provides non-IBM machines **WITHOUT WARRANTIES OF ANY KIND.**

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 the Machine, contact your reseller or IBM. You may be required to present proof of purchase.

IBM or your reseller provides certain types of repair and exchange service, either at your location or at a service center, 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. IBM may repair the failing Machine or exchange it at its discretion.

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.

Any feature, conversion, or upgrade IBM or your reseller services must be installed on a Machine which is 1) for certain Machines, the designated, serial-numbered Machine and 2) at an engineering-change level compatible with the feature, conversion, or upgrade. 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 fulfil 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.

Production Status
Each IBM Machine is manufactured from new parts, or new and used parts. In some cases, the Machine may not be new and may have been previously installed. Regardless of the Machine's production status, IBM's appropriate warranty terms apply.

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), 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 greater of U.S. $100,000 (or equivalent in local currency) or the charges (if recurring, 12 months' charges apply) for the Machine that is the subject of the claim.

   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 (INCLUDING LOST PROFITS OR 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.

Part 2 - Worldwide Country-Unique Terms

<u>ASIA PACIFIC</u>

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 legislation and are only limited to the extent permitted by the applicable legislation.

Extent of Warranty: The following replaces the first and second sentences of this Section:
The warranty does not cover the repair or exchange of a Machine resulting from misuse, accident, modification, unsuitable physical or operating environment, operation in other than the Specified Operating Environment, improper maintenance by you, or failure caused by a product for which IBM is not responsible.

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, 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.

PEOPLE'S REPUBLIC OF CHINA: Governing Law: The following is added to this Statement:
The laws of the State of New York govern this Statement.

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 Warranty, IBM's liability will be limited to the charge paid by you for the individual Machine that is the subject of the claim.

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.

EUROPE, MIDDLE EAST, AFRICA (EMEA)

The following terms apply to all EMEA countries.

The terms of this Statement of Warranty apply to Machines purchased from an IBM reseller. If you purchased this Machine from IBM, the terms and conditions of the applicable IBM agreement prevail over this warranty statement.

Warranty Service
If you purchased 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 purchased 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.

The applicable laws, Country-unique terms and competent court for this Statement are those of the country in which the warranty service is being provided. However, the laws of Austria govern this Statement if the warranty service is provided in Albania, Armenia, Belarus, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Federal Republic of Yugoslavia, Georgia, Hungary, Kazakhstan, Kirghizia, Former Yugoslav Republic of Macedonia (FYROM), Moldova, Poland, Romania, Russia, Slovak Republic, Slovenia, and Ukraine.

The following terms apply to the country specified:

EGYPT: Limitation of Liability: The following replaces item 2 in this Section:
2. 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.

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).

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 are 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.

Production Status: The following paragraph replaces this Section:
Each Machine is newly manufactured. It may incorporate in addition to new parts, re-used parts as well.

Limitation of Liability: The following is added to this Section:
The limitations and exclusions specified in the Statement of Warranty will not apply to damages caused by IBM with fraud or gross negligence and for express warranty.

In item 2, replace "U.S. $100,000" with "1.000.000 DEM."

The following sentence is added to the end of the first paragraph of item 2:
IBM's liability under this item is limited to the violation of essential contractual terms in cases of ordinary negligence.

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 the greater of Irish Pounds 75,000 or 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: (item 1 unchanged) 2)as to any other actual damage arising in all situations involving non-performance 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 second 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.

TURKIYE: Production Status: The following replaces this Section:
IBM fulfils customer orders for IBM Machines as newly manufactured in accordance with IBM's production standards.

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 the greater of Pounds Sterling 150,000 or 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 will be limited to damages.

NORTH AMERICA

CANADA: Warranty Service: The following is added to this Section:
To obtain warranty service from IBM, call **1-800-565-3344**. In Toronto, call **416-383-3344**.

UNITED STATES OF AMERICA: Warranty Service: The following is added to this Section:
To obtain warranty service from IBM, call **1-800-772-2227**.

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 legislation and are only limited to the extent permitted by the applicable legislation.

Extent of Warranty: The following replaces the first and second sentences of this Section:
The warranty does not cover the repair or exchange of a Machine resulting from misuse, accident, modification, unsuitable physical or operating environment, operation in other than the Specified Operating Environment, improper maintenance by you, or failure caused by a product for which IBM is not responsible.

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, 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.

PEOPLE'S REPUBLIC OF CHINA: Governing Law: The following is added to this Statement:
The laws of the State of New York govern this Statement.

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 Warranty, IBM's liability will be limited to the charge paid by you for the individual Machine that is the subject of the claim.

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.

EUROPE, MIDDLE EAST, AFRICA (EMEA)

The following terms apply to all EMEA countries.

The terms of this Statement of Warranty apply to Machines purchased from an IBM reseller. If you purchased this Machine from IBM, the terms and conditions of the applicable IBM agreement prevail over this warranty statement.

Warranty Service
If you purchased 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 purchased 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.

The applicable laws, Country-unique terms and competent court for this Statement are those of the country in which the warranty service is being provided. However, the laws of Austria govern this Statement if the warranty service is provided in Albania, Armenia, Belarus, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Federal Republic of Yugoslavia, Georgia, Hungary, Kazakhstan, Kirghizia, Former Yugoslav Republic of Macedonia (FYROM), Moldova, Poland, Romania, Russia, Slovak Republic, Slovenia, and Ukraine.

The following terms apply to the country specified:

EGYPT: Limitation of Liability: The following replaces item 2 in this Section:
2. 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.

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).

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 are 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.

Production Status: The following paragraph replaces this Section:
Each Machine is newly manufactured. It may incorporate in addition to new parts, re-used parts as well.

Limitation of Liability: The following is added to this Section:
The limitations and exclusions specified in the Statement of Warranty will not apply to damages caused by IBM with fraud or gross negligence and for express warranty.

In item 2, replace "U.S. $100,000" with "1.000.000 DEM."

The following sentence is added to the end of the first paragraph of item 2:
IBM's liability under this item is limited to the violation of essential contractual terms in cases of ordinary negligence.

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 the greater of Irish Pounds 75,000 or 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: (item 1 unchanged) 2)as to any other actual damage arising in all situations involving non-performance 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 second 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.

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