IBM® xSeries 150

User's Reference

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User's Reference

NOTE

Before using this information and the product it supports, be sure to read the general information in "Appendix B. Product warranties and notices," on page 143.

First Edition (October 2000)

Safety

Before installing this product, read the Safety Information book.

مج، يجب قراءة دات السلامة

Antes de instalar este produto, leia o Manual de Informações sobre Segurança.

安装本产品前请先阅读《安全信息》手册。

Prije instalacije ovog proizvoda pročitajte priručnik sa sigurnosnim uputama.

Před instalací tohoto produktu si přečtěte příručku bezpečnostních instrukcí.

Læs hæftet med sikkerhedsforskrifter, før du installerer dette produkt.

Lue Safety Information -kirjanen, ennen kuin asennat tämän tuotteen.

Avant de procéder à l'installation de ce produit, lisez le manuel Safety Information.

Vor Beginn der Installation die Broschüre mit Sicherheitshinweisen lesen.

Πριν εγκαταστήσετε αυτό το προϊόν, διαβάστε το εγχειρίδιο Safety Information.

לפני שתתקינו מוצר זה, קראו את הוראות הבטיחות.

Przed zainstalowaniem tego produktu należy przeczytać broszurę Informacje Dotyczące Bezpieczeństwa.

Prima di installare questo prodotto, leggere l'opuscolo contenente le informazioni sulla sicurezza.

本製品を導入する前に、安全情報資料を御読みください。

이 제품을 설치하기 전에, 안전 정보 책자를 읽어보십시오.

Пред да го инсталирате овој производ прочитајте ја книгата со безбедносни информации.

Lees voordat u dit product installeert eerst het boekje met veiligheidsvoorschriften.

Les heftet om sikkerhetsinformasjon (Safety Information) før du installerer dette produktet.

Prije instalacije ovog proizvoda pročitajte priručnik sa sigurnosnim uputama.

Antes de instalar este produto, leia o folheto Informações sobre Segurança.

Перед установкой продукта прочтите брошюру по технике безопасности (Safety Information).

Pred inštaláciou tohto produktu si pre ítajte Informa nú brožúrku o bezpe nosti.

Preden namestite ta izdelek, preberite knjižico Varnostne informacije.

Antes de instalar este producto, lea la Información de Seguridad.

Läs säkerhetsinformationen innan du installerar den här produkten.

在安裝本產品之前，也請先閱讀「安全性資訊」小冊子。

Installálás el tt olvassa el a Biztonsági el írások kézikönyvét !

Statement 1

Danger

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

To avoid a shock hazard:

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

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

Statement 2

CAUTION:

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

Do not:

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

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

Statement 3

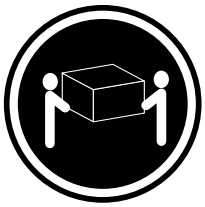
CAUTION:
When laser products (such as CD-ROMs, DVD drives, fiber optic devices, or transmitters) are installed, note the following:

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

Danger

Some laser products contain an embedded Class 3A or Class 3B laser diode. Note the following. Laser radiation when open. Do not stare into the beam, do not view directly with optical instruments, and avoid direct exposure to the beam.

Statement 4

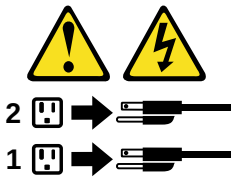


≥18 kg (37 lbs) ≥32 kg (70.5 lbs) ≥55 kg (121.2 lbs)

CAUTION:
Use safe practices when lifting.

Statement 5

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



Contents

Chapter 1. Introducing the IBM xSeries 150

Your IBM® @server xSeries150 server is a high-performance, symmetric multiprocessing (SMP) server. It is ideally suited for networking environments that require superior microprocessor performance, efficient memory management, flexibility, and large amounts of reliable data storage.

Your IBM xSeries 150 server comes with a three-year limited warranty and 90-Day IBM Start Up Support. If you have access to the World Wide Web, you can obtain up-to-date information about your xSeries 150 model and other IBM server products at the following World Wide Web address:

`http://www.ibm.com/pc/us/netfinity/`

Your server serial number and model number are located on labels on the rear of the server and on the front below the bezel.

Note: The information label containing the serial number, machine type, model number, and agency marks for your server is located as follows:

Tower model On the bottom of the server

Rack model On the side of the server

For service, assistance, or additional information on 90-Day IBM Start Up Support and the World Wide Web, see “Getting help, service, and information” on page 115.

Features and specifications

Table 1 on page 2 provides a summary of the features and specifications for your xSeries 150 server.

Table 1. Features and Specifications

Microprocessor:

- 1 or 2 Intel® Pentium® III microprocessors with MMX™ technology and SIMD extensions, depending on model
- 256 KB Level-2 cache (min.)
- Supports up to two microprocessors

Memory:

- Standard: 256 MB or 1 GB, depending on model
- Maximum: 4 GB
- Type: 133 MHz, ECC, SDRAM, Registered DIMMs
- Slots: 4 dual inline slots

Drives standard:

- 3 or 6 Hard Disk Drives, depending on model
- Diskette: 1.44 MB
- CD-ROM: 40X IDE

Expansion bays:

- Hot-swap: six slim high or three half high
- Non-hot-swap: Three 5.25-inch (one used by CD-ROM drive)

PCI expansion slots:

- Three 33 MHz / 64-bit
- Two 33 MHz / 32-bit

Power supplies:

250 watt (115-230 Vac)

- Standard: One
- Maximum: Three, only with optional power backplane that enables multiple power supplies and hot-swappability

Video:

- S3 video controller (integrated on system board)
- Compatible with SVGA and VGA
- 8 MB SDRAM video memory

Size (Rack Model 5U)

- Height: 220 mm (8.7 in.)
- Depth: 630 mm (24.8 in.)
- Width: 440 mm (17.3 in.)
- Weight: approximately 35.38 Kg (78 lb.) when fully configured

Size (Tower Model)

- Height: 440 mm (17.3 in.)
- Depth: 660 mm (26.0 in.)
- Width: 220 mm (8.7 in.)
- Weight: approximately 36.74 Kg (81 lb.) when fully configured

Integrated functions:

- Netfinity Advanced System Management processor
- ServeRAID 4L / 4H PCI adapter
- Dual channel Ultra3 SCSI controller
- One integrated 10BASE-T / 100BASE-TX AMD Ethernet controller
- 1 or 3 Netfinity 10 / 100 Ethernet Adapter 2s, depending on model
- Two serial ports
- One parallel port
- Two Universal Serial Bus (USB) ports
- Keyboard port
- Mouse port
- Video port

Acoustical noise emissions:

- Sound power, idling: 6.0 bel maximum
- Sound power, operating: 6.0 bel maximum
- Sound pressure, operating: 45 dBa maximum

Environment:

- Air temperature:
  - — Server on: 10° to 35° C (50.0° to 95.0° F). Altitude: 0 to 914 m (2998.7 ft.)
  - — Server on: 10° to 32° C (50.0° to 89.6° F). Altitude: 914 m (2998.7 ft.) to 2133 m (6998.0 ft.)
  - — Server off: 10° to 43° C (50.0° to 109.4° F). Maximum altitude: 2133 m (6998.0 ft.)
- Humidity:
  - — Server on: 8% to 80%
  - — Server off: 8% to 80%

Heat output:

Approximate heat output in British Thermal Units (BTU) per hour

- Minimum configuration: 683 BTU (200 watts)
- Maximum configuration: 2048 BTU (600 watts)

Electrical input:

- Sine-wave input (50-60 Hz) required
- Input voltage low range:
  - — Minimum: 100 V ac
  - — Maximum: 127 V ac
- Input voltage high range:
  - — Minimum: 200 V ac
  - — Maximum: 240 V ac
- Input kilovolt-amperes (kVA) approximately:
  - — Minimum: 0.08 kVA
  - — Maximum: 0.52 kVA

Notices used in this book

This information product contains notices that relate to a specific topic. The Caution and Danger notices also appear in the multilingual safety booklet that came with your xSeries product. Each notice is numbered for easy reference to the corresponding notices in the safety booklet.

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 descriptions of potentially hazardous procedure steps or situations.
- **Danger:** These notices indicate situations that can be potentially lethal or extremely hazardous to you. A danger notice is placed just before descriptions of potentially lethal or extremely hazardous procedure steps or situations.

What your IBM xSeries 150 offers

The unique design of your server takes advantage of advancements in symmetric multiprocessing (SMP), data storage, and memory management. Your server combines:

- Impressive performance using an innovative approach to SMP

  Your server supports up to two Pentium III microprocessors. Your server comes with one microprocessor installed; you can install an additional microprocessor to enhance performance and provide SMP capability.

- Large data-storage and hot-swap capabilities

  All models of the server support up to six hot-swap hard disk drives. This *hot-swap* feature enables you to remove and replace hard disk drives without turning off the server.

- Redundant power capabilities

  The standard 250-watt power supply in your server can handle a load of up to 250 watts. By replacing the power backplane with the power backplane option, you can install a second, optional power supply. This provides a full 500 watts of power. If the average load on your server is less than 250 watts and a problem occurs with one of the power supplies, the other power supply can handle the load (redundant power). If the average load on your server is greater than 250 watts, and you have installed a second power supply, you can install a third, optional power supply to provide redundancy.

  The NON light emitting diode (LED) on the system board is lit when the power load is 250 watts or greater with two power supplies, or when the power load is 500 watts or greater with three power supplies.

- Large system memory

  The memory bus in your server supports up to 4gigabytes (GB) of system memory. The memory controller provides error correcting code (ECC) support for up to four industry standard PC133, 3.3 V, 168-pin, 8-byte, registered, synchronous-dynamic-random access memory (SDRAM) dual inline memory modules (DIMMs).

- System-management capabilities

  Your server comes with a Netfinity Advanced System Management Processor on the system board. This processor enables you to manage the functions of the server locally and remotely. The Netfinity Advanced System Management Processor also provides system monitoring, event recording, and dial-out alert capability.

  Note: The Netfinity Advanced System Management Processor is sometimes referred to as the service processor.

- Integrated network environment support

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

- Redundant network-interface card

  The addition of an optional, redundant network interface card (NIC) provides a failover capability to a redundant Ethernet connection. If a problem occurs with the primary Ethernet connection, all Ethernet traffic associated with this primary connection is automatically switched to the redundant NIC. This switching occurs without data loss and without user intervention.

- Optional digital linear tape drive

  The addition of an optional digital linear tape drive (DLT) allows quick backup of large amounts of data.

Reliability, availability, and serviceability features

Three of the most important features 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, you can easily diagnose and repair the failure with minimal inconvenience.

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

- Menu-driven setup, system configuration, RAID configuration, and diagnostic programs
- Power-on self-test (POST)
- Integrated Netfinity Advanced System Management Processor
- Predictive failure alerts
- Remote system problem-analysis support
- Power and temperature monitoring
- Hot-swap drive bays
- Error codes and messages
- System error logging
- Upgradable BIOS, diagnostics, and Netfinity Advanced System Management Processor code
- Automatic restart after a power failure
- Parity checking on the PCI buses
- CRC checking on the SCSI buses
- Error checking and correcting (ECC) memory
- Redundant hot-swap power supply option
- Redundant Ethernet capabilities (with optional adapter)
- Vital Product Data (VPD) on system board, power backplane, SCSI backplane, and each power supply

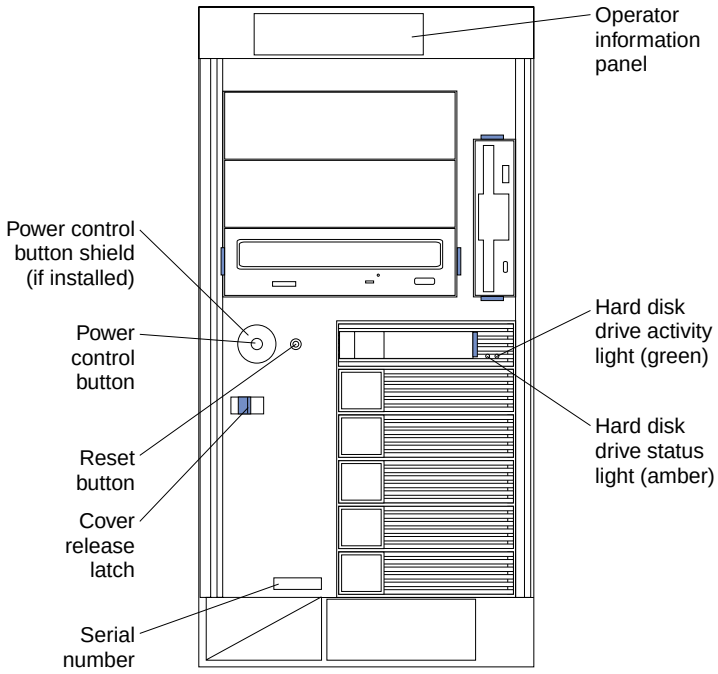
- Operator information panel
- Diagnostic LEDs on the system board
- Customer support center 24 hours per day 7 days a week[1]

1.Service availability will vary by country. Response time will vary depending on the number and nature of incoming calls.

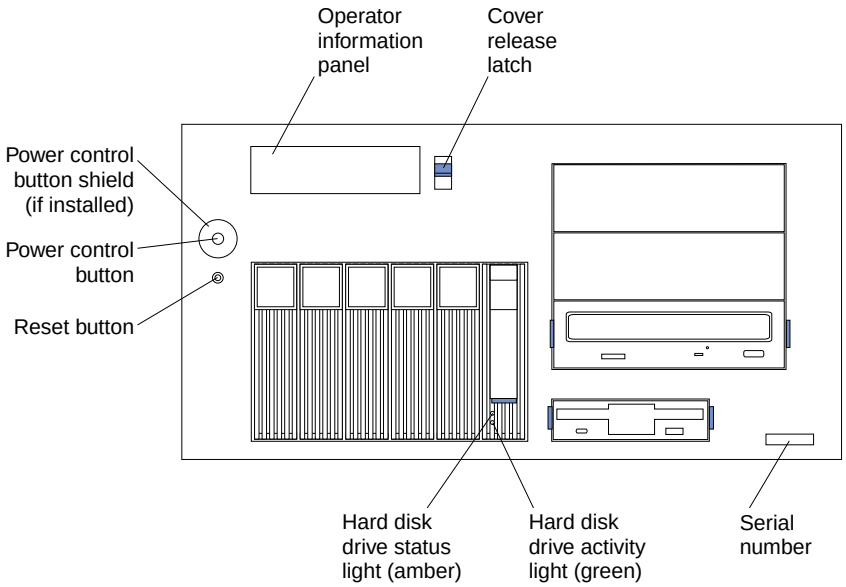
Server controls and indicators

The following illustrations show the controls and indicators on the front of the server.

Tower model



Rack model



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

Power control button shield: You can install this circular disk over the power control button to prevent accidental manual power-off. This disk is provided with your server.

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

Operator information panel: The lights on this panel give status information for your server.

Cover release latch: Slide this lever to release the cover.

Serial number: This number uniquely identifies your server.

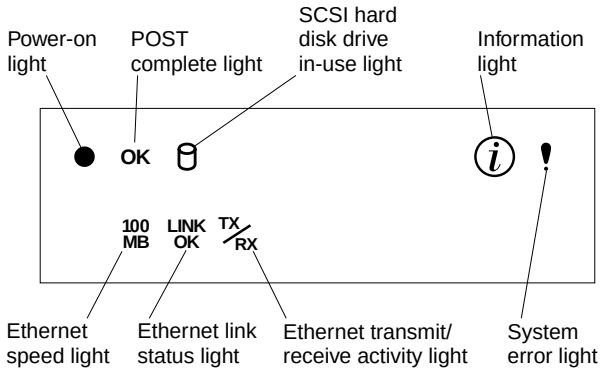
Hard disk drive status light: Each of the hot-swap drives has a hard disk drive status light. When this amber light is on continuously, the drive has failed.

Hard disk drive activity light: Each of the hot-swap drives has a hard disk drive activity light. When this green light is flashing, the controller is accessing the drive.

If a ServeRAID adapter is installed and this light flashes slowly (one flash per second), the drive is being rebuilt. When the light flashes rapidly (three flashes per second), the controller is identifying the drive.

Operator information panel

The following illustration shows the location of the status lights on the operator information panel on the front of the server (see “Server controls and indicators” on page 6).



Power-on light

This green LED lights when system power is present in the server. When this light flashes, the server is in standby mode (the system power supply is turned off and AC current is present). If this light is not on, the power cord is not connected, the power supply has failed, or this LED has failed.

POST complete light

This green LED lights when the server completes the power-on self-test (POST) without any errors.

SCSI hard disk drive in-use light

This green LED lights when there is activity on a hard disk drive.

Information light

This amber LED lights when the information log contains information about certain conditions in your server that might affect performance. For example, the light will be on if your server has multiple power supplies and does not have redundant power. An LED on the diagnostic panel on the system board will also be on.

System error light

This amber LED lights when a system error occurs. An LED on the diagnostic panel on the system board will also be on to further isolate the error. Refer to the "Problem solving" section of the *User's Reference* on the *IBM xSeries Documentation* CD for detailed information on using the diagnostic panel (light path diagnostics).

Ethernet speed light

This green LED lights when the Ethernet LAN speed is 100 Mbps.

Ethernet link status light

This green LED lights when there is an active connection on the Ethernet port.

Ethernet transmit/receive activity light

This green LED lights when there is transmit or receive activity to or from the server.

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.

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

Dust buildup compounds problems that are associated with glare. Remember to clean your monitor screen periodically using a soft cloth that is 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; usually, 15 cm (6 inches) of air space is sufficient. Also, make sure that the vented air is not blowing on someone else.

Electrical outlets and cable lengths

The location of electrical outlets and the length of power cords and cables that connect to the monitor, printer, and other devices might determine the final placement of 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, refer to the power cord information in this on-line publication.

Chapter 3. 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.

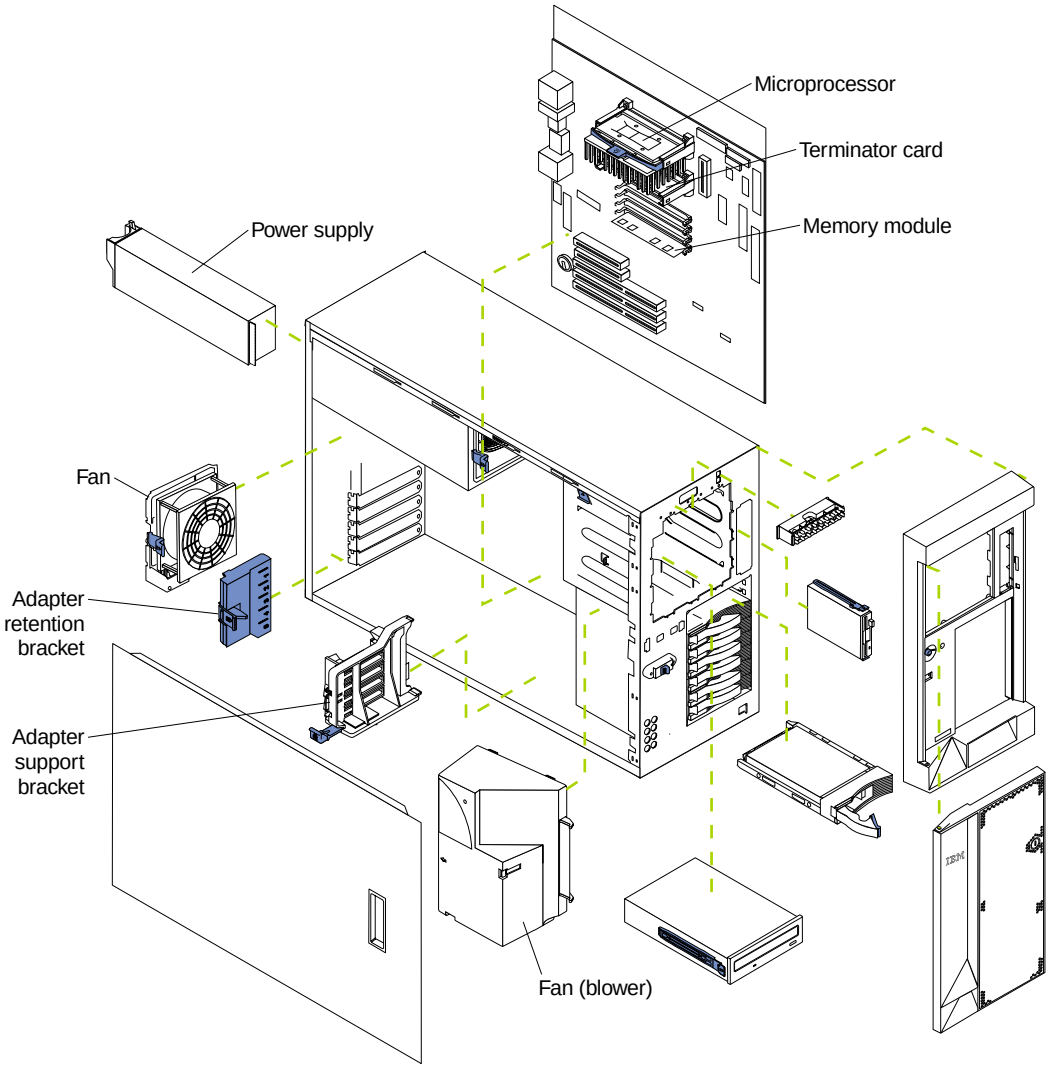
Major components of the xSeries 150 server

The orange color on components and labels in your server identifies hot-swap 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 information about installing or removing a hot-swap component, see the detailed procedures in this chapter.

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

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

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



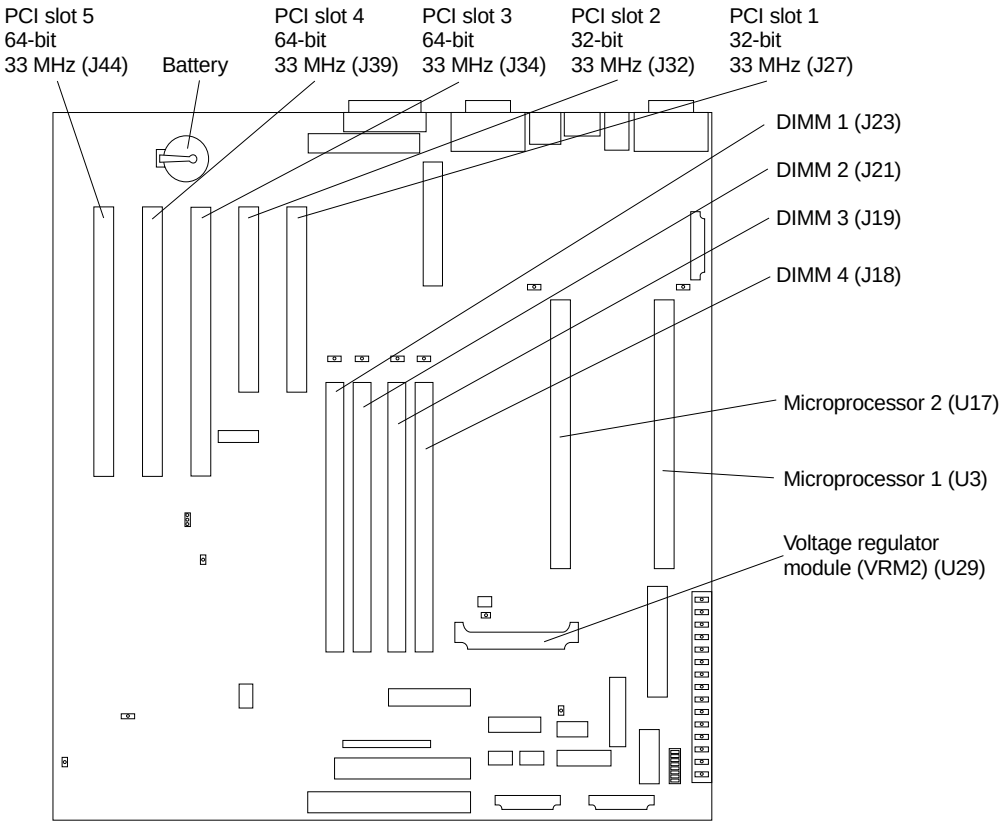
System board

The illustrations in the following sections show the components on the system board.

System board options connectors

The following illustration identifies system-board connectors for user-installable options.

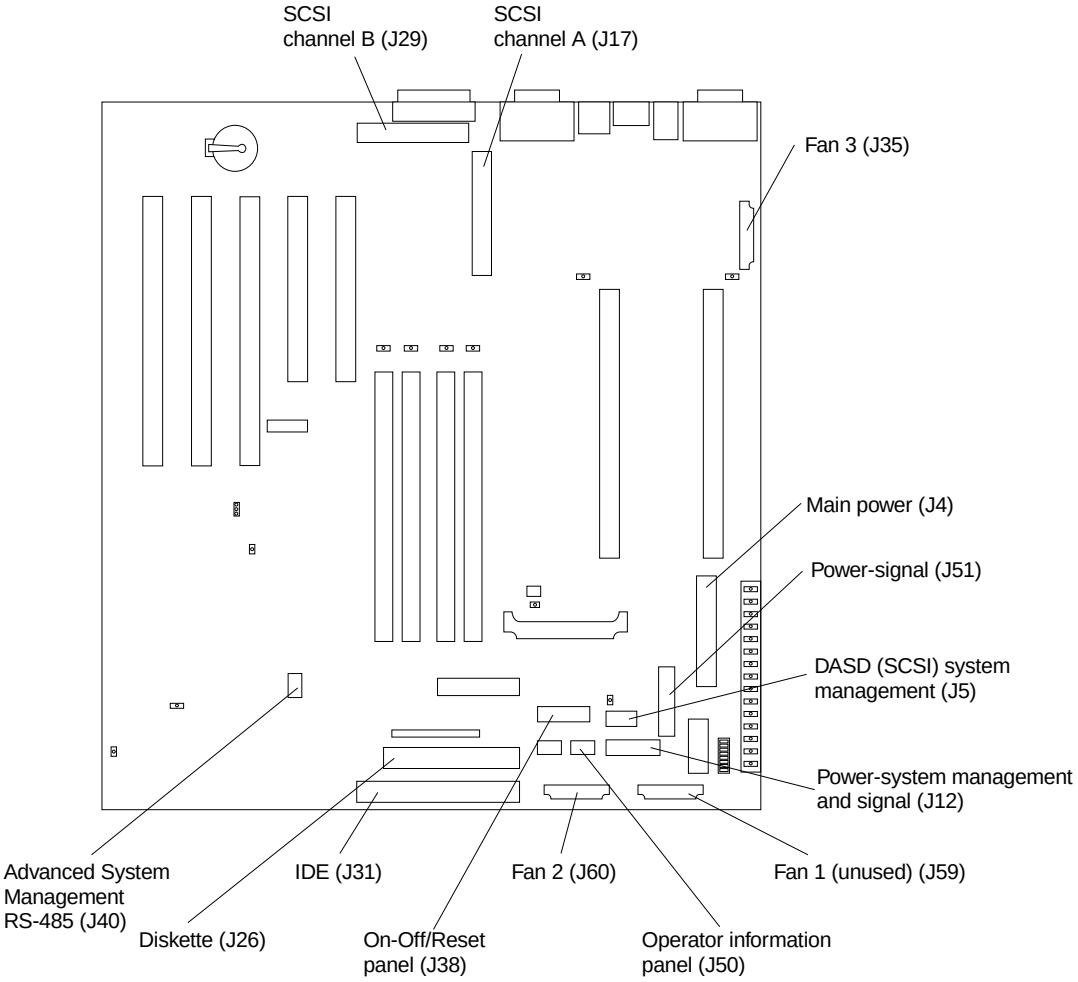
Note: The illustrations in this document might differ slightly from your hardware.


PCI slot 5
64-bit
33 MHz (J44)
Battery
PCI slot 4
64-bit
33 MHz (J39)
PCI slot 3
64-bit
33 MHz (J34)
PCI slot 2
32-bit
33 MHz (J32)
PCI slot 1
32-bit
33 MHz (J27)
DIMM 1 (J23)
DIMM 2 (J21)
DIMM 3 (J19)
DIMM 4 (J18)
Microprocessor 2 (U17)
Microprocessor 1 (U3)
Voltage regulator
module (VRM2) (U29)

System board internal cable connectors

The following illustration identifies system-board connectors for internal cables.

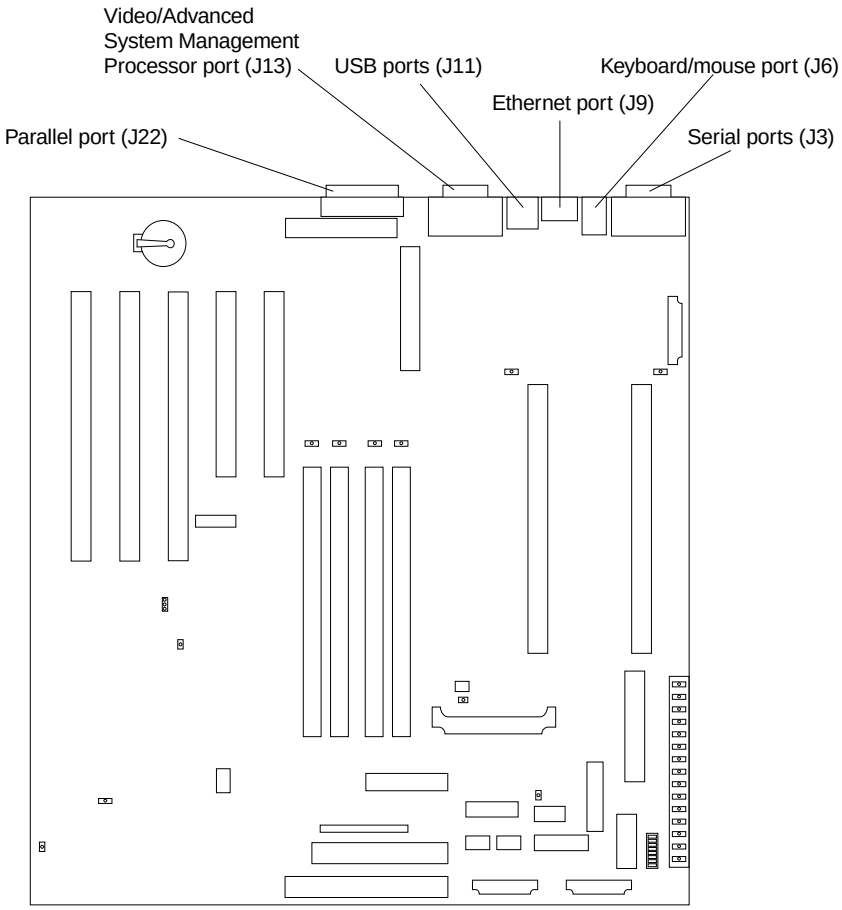
Note: The illustrations in this document might differ slightly from your hardware.



System board external port connectors

The following illustration identifies system-board connectors for external devices.

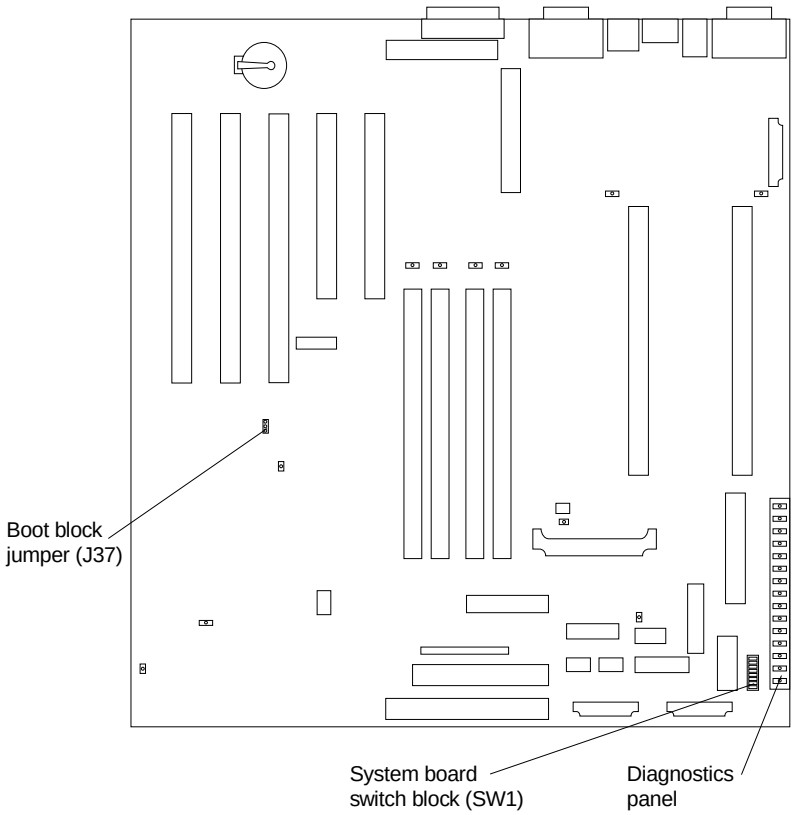
Note: The illustrations in this document might differ slightly from your hardware.



System board switches and jumpers

The following illustration identifies the switches and jumpers on the system board.

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



System board jumper blocks

Any jumper blocks on the system board that are not shown in the illustration are reserved. For normal operation of the system, no jumpers should be installed on any of the jumper blocks. See “Recovering BIOS” on page 94 for information about the boot block jumper.

System board switch block

The switch block contains microswitches 1-8. As pictured in this illustration, switch 8 is at the top of the switch block and switch 1 is at the bottom. The Off position for each switch is the side nearer the diagnostics panel.

The following table describes the function for each switch.

Table 2. Switches 1-8

Switch number	Switch description
8	Bypass power-on password. The default setting is Off. When toggled to the On position and back to Off, clears the power-on password, if one is set.
7	Reserved. The default setting is Off.
6	Clock frequency selection. The default setting is Off. When On, sets the host bus speed to 100 MHz. When Off, the host bus speed is 133 MHz.

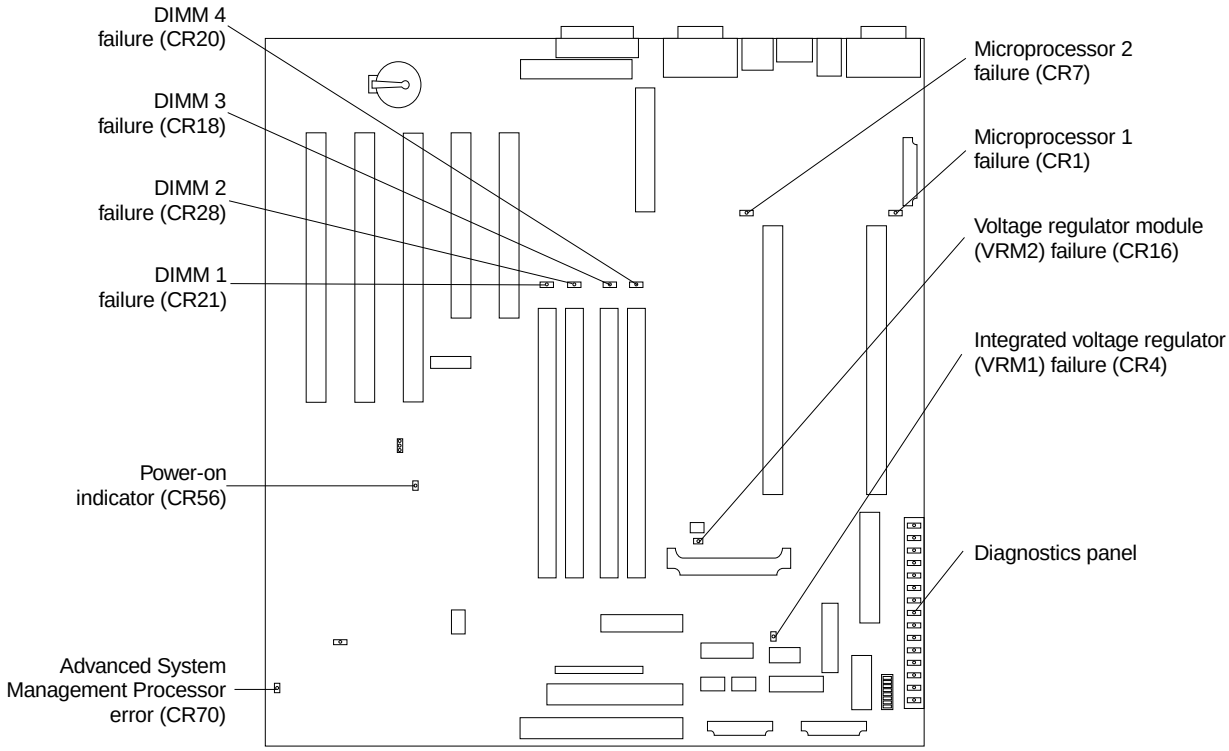
Table 2. Switches 1-8

Switch number	**Switch description**
5	Power-on override. The default setting is Off (disabled). When On, overrides the power-on switch and forces power-on mode. The system will always boot without the use of the power-on switch.
4	Reserved.
3	Reserved.
2	Reserved.
1	Reserved.

System board LED locations

The following illustration identifies system-board LEDs. You might need to refer to this figure when troubleshooting a problem.

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



Note: The power-on indicator (CR56) lights when system power is present in the server. When this light flashes, the server is in standby mode (the system power supply is turned off and current is present).

Diagnostics panel LEDs:

PS1 Power supply 1 failure.

PS2 Power supply 2 failure.

PS3 Power supply 3 failure.

NON Non-redundant power.

OVER Overspec. The system has exceeded the power capabilities of the installed power supply units.

NMI Non-maskable-interrupt occurred.

TEMP System temperature exceeded maximum rating.

FAN A fan failed or is operating slowly.

MEM Memory failure. One or more memory DIMMS have failed.

CPU Microprocessor failure. One or both microprocessors have failed.

PCI A Error on PCI channel A or system board.

Note: PCI bus A is often referred to as PCI bus 0.

PCI B Error on PCI channel B or system board.

Note: PCI bus B is often referred to as PCI bus 1.

VRM Error on voltage regulator module or on integrated voltage regulator.

DASD1 A hot-swap disk drive, backplane, or other part of SCSI channel A has failed.

DASD2 A SCSI device on SCSI channel B has failed.

Before you begin

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

- Become familiar with the safety and handling guidelines specified under "Handling static sensitive devices" on page 20, and read the safety statements in "Safety information" on page 20. These guidelines will help you work safely while working with your server or options.
- You do not need to turn off the server to install or replace hot-swap power supplies, or hot-swap drives.
- The orange color on components and labels in your server indicates hot-swap 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 component, see the information provided in this chapter.
- The blue color on components and labels identifies touch points where a component can be gripped, a latch moved, and so on.
- 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.
- Back up all important data before you make changes to disk drives.
- Have a small, flat-blade screwdriver available.
- For a list of supported options for your server, refer to http://www.ibm.com/pc/us/compat on the World Wide Web.

System reliability considerations

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

- Each of the drive bays has either a drive or a filler panel installed.
- Each of the power supply bays has either a power supply or a filler panel installed.
- The cover is in place during normal operations, or is removed for no longer than 30 minutes while the server is operating.

  Note: The front door (tower model) can be removed permanently without affecting system reliability.
- There is space around the server to allow the server cooling system to work properly.
  - — On a tower model, leave about 127 mm (5 in.) of space around the front and rear of the server.
  - — On a rack model, refer to the documentation that comes with the rack.
- A removed hot-swap drive is replaced within two minutes of removal.

- Cables for optional adapters are routed according to the instructions provided with the adapters.
- A failed fan is replaced within 48 hours.

Working inside a server with power on

Your server is designed to operate safely while turned on with the cover removed. Follow these guidelines when you work inside a server that is turned on:

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

Handling static sensitive devices

When you handle Electrostatic Discharge-Sensitive devices (ESD), take precautions to avoid damage from static electricity. For details on handling these devices, refer to the following Web site and use a search term of ESD: http://www.ibm.com/

Safety information

Before installing this product, read the Safety Information book.

مج، يجب قراءة دات السلامة

Antes de instalar este produto, leia o Manual de Informações sobre Segurança.

安装本产品前请先阅读《安全信息》手册。

Prije instalacije ovog proizvoda pročitajte priručnik sa sigurnosnim uputama.

Před instalací tohoto produktu si přečtěte příručku bezpečnostních instrukcí.

Læs hæftet med sikkerhedsforskrifter, før du installerer dette produkt.

Lue Safety Information -kirjanen, ennen kuin asennat tämän tuotteen.

Avant de procéder à l'installation de ce produit, lisez le manuel Safety Information.

Vor Beginn der Installation die Broschüre mit Sicherheitshinweisen lesen.

Πριν εγκαταστήσετε αυτό το προϊόν, διαβάστε το εγχειρίδιο Safety Information.

.לפני שתתקינו מוצר זה, קראו את הוראות הבטיחות

Przed zainstalowaniem tego produktu należy przeczytać broszurę Informacje Dotyczące Bezpieczeństwa.

Prima di installare questo prodotto, leggere l'opuscolo contenente le informazioni sulla sicurezza.

本製品を導入する前に、安全情報資料を御読みください。

이 제품을 설치하기 전에, 안전 정보 책자를 읽어보십시오.

Пред да го инсталирате овој производ прочитајте ја книгата со безбедносни информации.

Lees voordat u dit product installeert eerst het boekje met veiligheidsvoorschriften.

Les heftet om sikkerhetsinformasjon (Safety Information) før du installerer dette produktet.

Prije instalacije ovog proizvoda pročitajte priručnik sa sigurnosnim uputama.

Antes de instalar este produto, leia o folheto Informações sobre Segurança.

Перед установкой продукта прочтите брошюру по технике безопасности (Safety Information).

Pred inštaláciou tohto produktu si pre ítajte Informa nú brožúrku o bezpe nosti.

Preden namestite ta izdelek, preberite knjižico Varnostne informacije.

Antes de instalar este producto, lea la Información de Seguridad.

Läs säkerhetsinformationen innan du installerar den här produkten.

在安裝本產品之前，也請先閱讀「安全性資訊」小冊子。

Installálás el tt olvassa el a Biztonsági el írások kézikönyvét !

Statement 1

Danger

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

To avoid a shock hazard:

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

To connect:	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.	

Statement 2

CAUTION:

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

Do not:

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

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

Statement 3

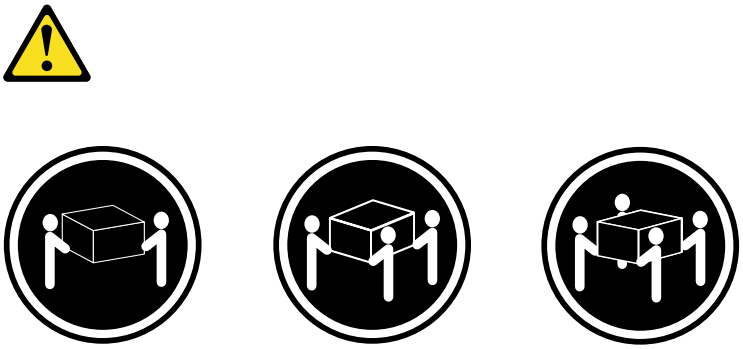
CAUTION:
When laser products (such as CD-ROMs, DVD drives, fiber optic devices, or transmitters) are installed, note the following:

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

Danger

Some laser products contain an embedded Class 3A or Class 3B laser diode. Note the following. Laser radiation when open. Do not stare into the beam, do not view directly with optical instruments, and avoid direct exposure to the beam.

Statement 4

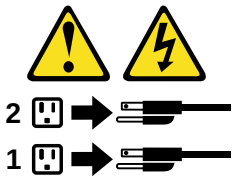


≥18 kg (37 lbs) ≥32 kg (70.5 lbs) ≥55 kg (121.2 lbs)

CAUTION:
Use safe practices when lifting.

Statement 5

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



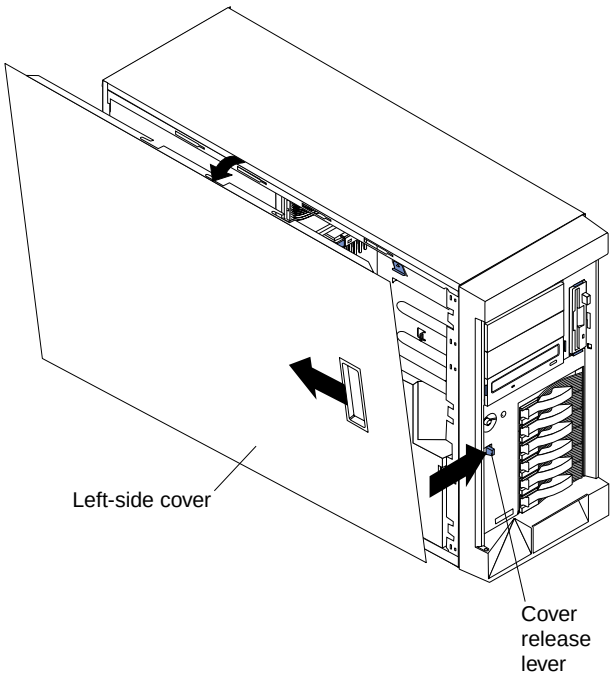
Removing the cover, door, and bezel

The following sections describe how to remove the cover, the door (for tower models), and the bezel.

Removing the left-side cover (tower model)

Notes:

1. To remove or install a hot-swap hard disk drive or hot-swap power supply, it is not necessary to remove the cover.
2. The illustrations in this document might differ slightly from your hardware.



To remove the left-side cover of the tower model:

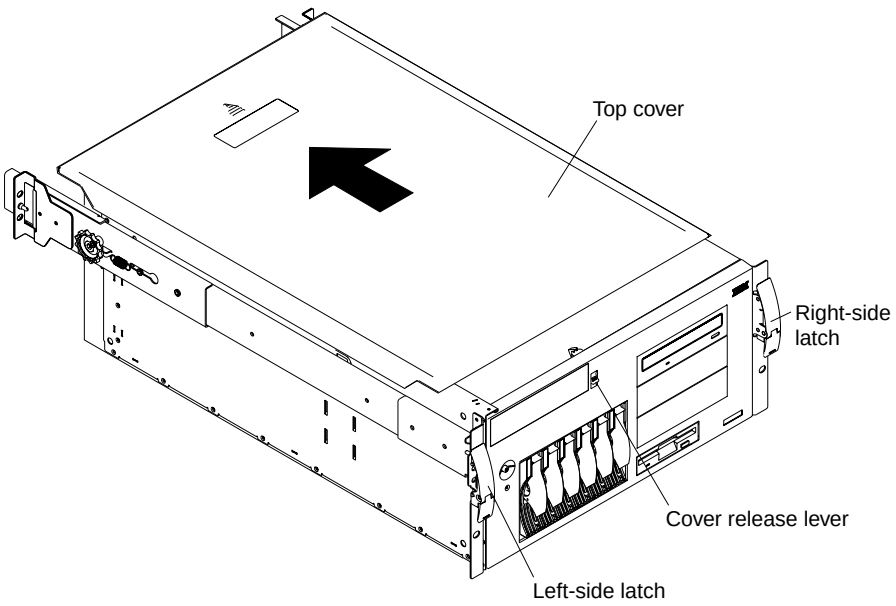
1. Review the information in “Before you begin” on page 19.
2. If you are planning to install or remove any part other than a hot-swap hard disk drive or hot-swap power supply, turn off the server and all attached devices and disconnect all external cables and power cords.
3. Slide the cover-release lever on the front of the server to release the cover; then, slide the cover toward the rear of the server about 25 mm (1 inch). Move the top edge of the cover out from the server; then, lift the cover off the server. Set the cover aside.

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

Removing the cover (rack model)

Notes:

1. To remove or install a hot-swap hard disk drive or hot-swap power supply, it is not necessary to remove the cover.
2. The illustrations in this document might differ slightly from your hardware.



To remove the server top cover:

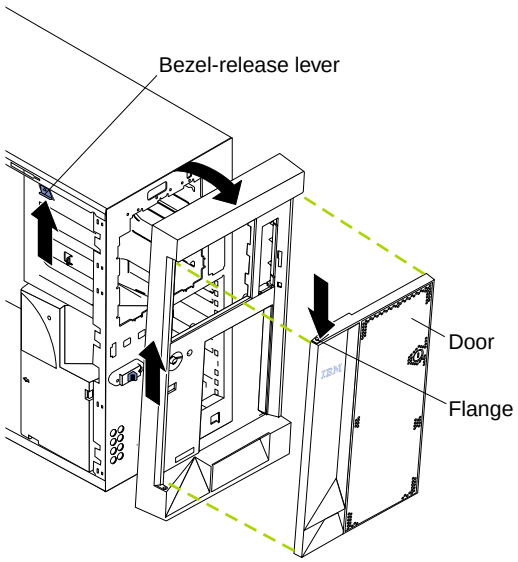
1. Review the information in “Before you begin” on page 19.
2. If you are planning to install or remove any part other than a hot-swap hard disk drive or hot-swap power supply, turn off the server and all attached devices and disconnect all external cables and power cords.
3. Release the left and right side latches and pull the server out of the rack enclosure until both slide rails lock.

   Note: When the server is in the locked position, you can reach the cables on the back of the server.
4. Move the cover-release lever down while sliding the top cover toward the rear of the server about 25 mm (1 inch). Lift the cover off the server and set the cover aside.

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

Removing the server door and bezel (tower model)

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



To remove the server door:

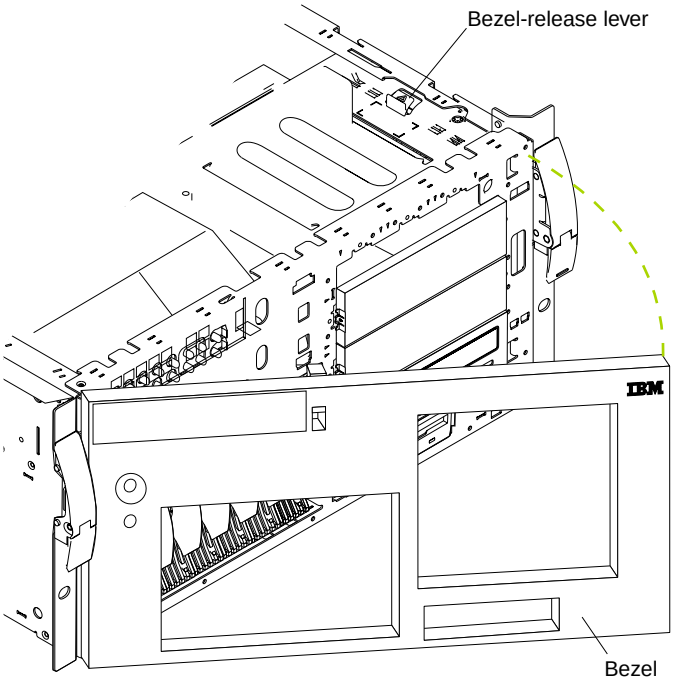
1. Unlock and open the server door.
2. Locate the flange on the top edge of the door.
3. Press down on the flange while pressing out on the door; then, lift the server door up and off the hinge. Set the door aside in a safe place.

To remove the bezel:

1. Move the blue bezel-release lever, following the curve of the lever opening.
2. Lift the bezel tabs out of the slots and pull the bezel away from the server front. Store the bezel in a safe place.

Removing the bezel (rack model)

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



To remove the bezel:

1. Move the blue bezel-release lever, following the curve of the lever opening.
2. Lift the bezel tabs out of the slots and pull the bezel away from the server front. Store the bezel in a safe place.

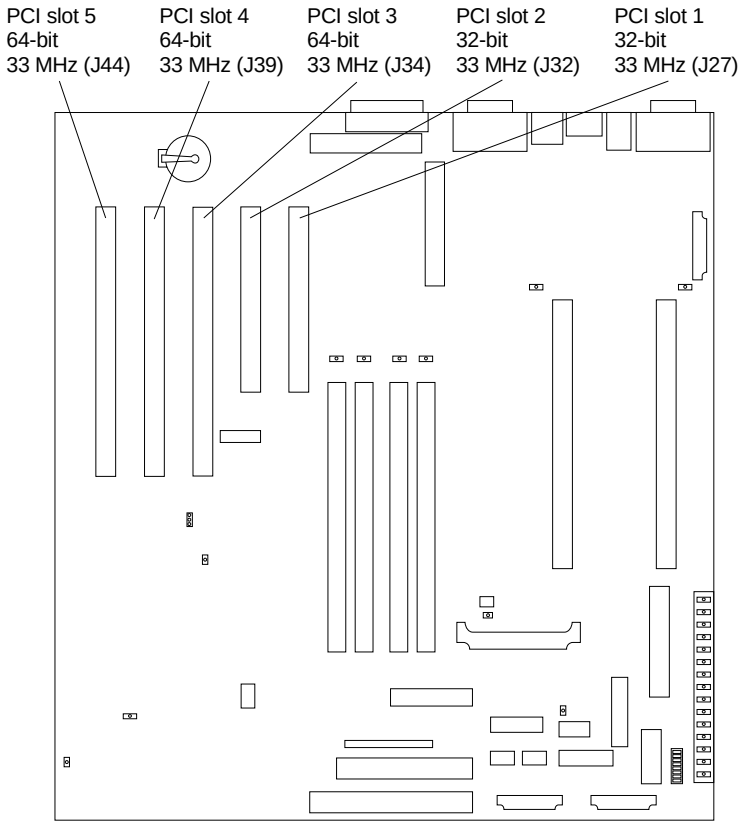
Working with adapters

You can install up to five peripheral component interconnect (PCI) adapters in the expansion connectors, called slots, on the system board of your server.

Your server comes with an integrated video controller, which is a component on the system board. When you install a video adapter, the server BIOS automatically disables the integrated video controller.

The following illustration shows the location of the 33 MHz PCI expansion slots on the system board.

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



Adapter considerations

Before you install adapters, review the following:

- Locate the documentation that comes with the adapter and follow those instructions in addition to the instructions 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.
- You can install full-length adapters in all expansion slots.
- You can install a 32-bit adapter in any of the PCI slots, but you might want to install it in a 32-bit slot and use the 64-bit slots for 64-bit adapters.
- Your server supports 5.0V and universal PCI adapters; it does not support 3.3V adapters.
- You might require additional power supplies if adapters are added that have electrical current requirements that exceed the installed power supply capabilities.
- Your server uses a rotational interrupt technique to configure PCI adapters. Because of this technique, you can install a variety of PCI adapters that currently do not support sharing of PCI interrupts.
- PCI slots 1 and 2 are on PCI bus A and PCI slots 3, 4, and 5 are on PCI bus B.

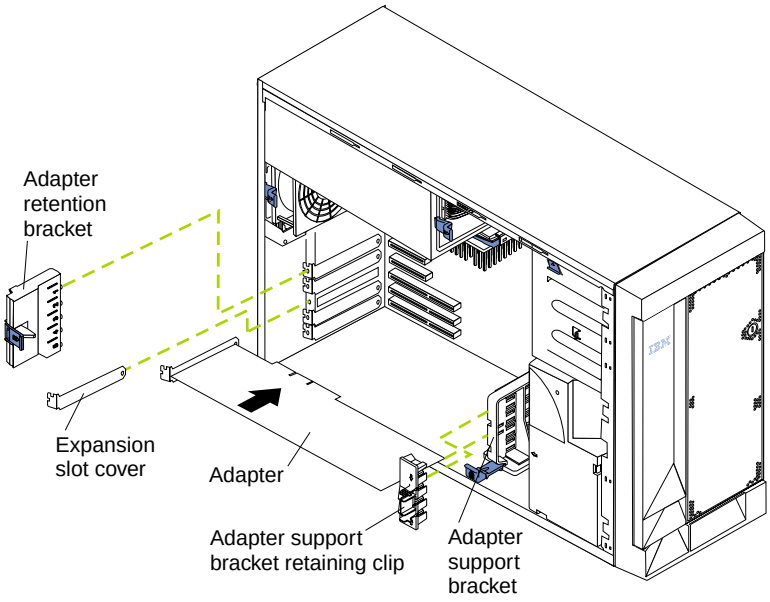
  Note: PCI bus A is often referred to as bus 0; PCI bus B is often referred to as bus 1.

  The system scans PCI slots 1 through 5 to assign system resources; then the system starts (boots) the PCI devices in the following order, if you have not

changed the default boot precedence:PCI slots 1 and 2, system board SCSI devices, and then PCI slots 3 through 5.

Installing an adapter

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



To install an adapter:

Attention: When you handle Electrostatic Discharge-Sensitive devices (ESD), take precautions to avoid damage from static electricity. For details on handling these devices, refer to the following Web site and use a search term of ESD: http://www.ibm.com/

1. Review the safety precautions listed in Statement 1 and Statement 5 in “Safety information” on page 20.
2. Turn off the server and peripheral devices and disconnect all external cables and power cords; then, remove the cover. See “Removing the cover, door, and bezel” on page 26 for details.
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. Remove the expansion-slot cover:
   a. Press the arrow on the adapter-retention bracket release tab and remove the bracket.
   b. Slide the expansion-slot cover out of 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.
5. Refer to the documentation that comes with your adapter for any cabling instructions. It might be easier for you to route any cables before you install the adapter.

6. Remove the adapter from the static-protective package.

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

7. Place the adapter, component-side up, on a flat, static-protective surface.
8. Set any jumpers or switches as described by the adapter manufacturer.
9. Install the adapter:
   a. If necessary, remove the adapter support bracket retaining clip.
   b. Carefully grasp the adapter by its top edge or upper corners, and align it with the expansion slot on the system board.
   c. Press the adapter *firmly* into the expansion slot.

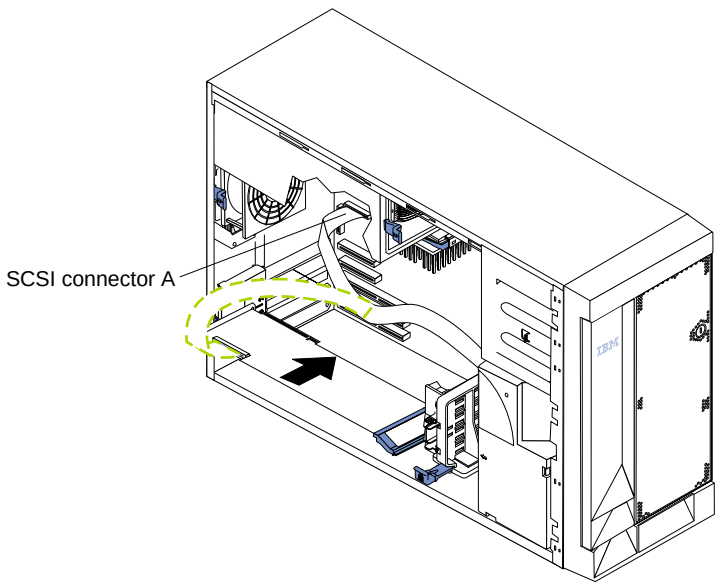
      Attention: When you install an adapter in the server, be sure that it is completely and correctly seated in the system-board connector before you apply power. Incomplete insertion might cause damage to the system board or the adapter.

   d. Replace the retaining clip on the adapter support bracket, if you opened it.
   e. Align the bottom tabs of the adapter retention bracket with the holes at the top of the expansion slots, and press the adapter retention bracket toward the back of the server until it clicks into the locked position.
10. Connect any needed cables to the adapter.

    Attention: Route cables so that they do not block the flow of air from the fans.

    The following illustration shows the rerouting of the SCSI cable if you install a ServeRAID adapter (remove the cable from SCSI connector A (J17) on the system board and connect it to the RAID adapter).

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



11. If you have other options to install or remove, do so now; otherwise, go to “Installing the cover” on page 49.

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 (already installed)
- Hard disk
- CD-ROM (already installed)
- Tape, including DLT

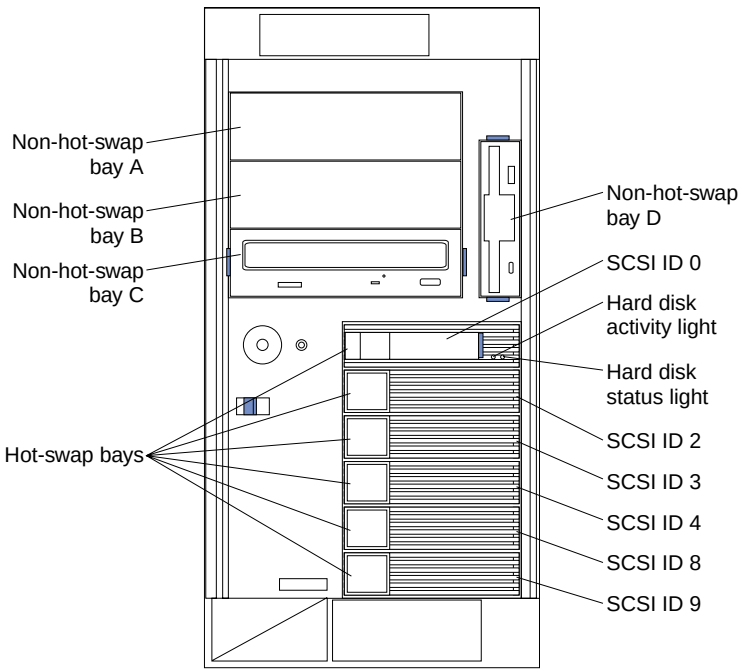
Internal drive bays

Internal drives are installed in *bays*. The bays of the xSeries 150 are in the front of the server, as shown in the following illustrations.

Attention: If you are going to install additional drives in the non-hot-swap bays, you must install the power supply backplane option and additional power supplies.

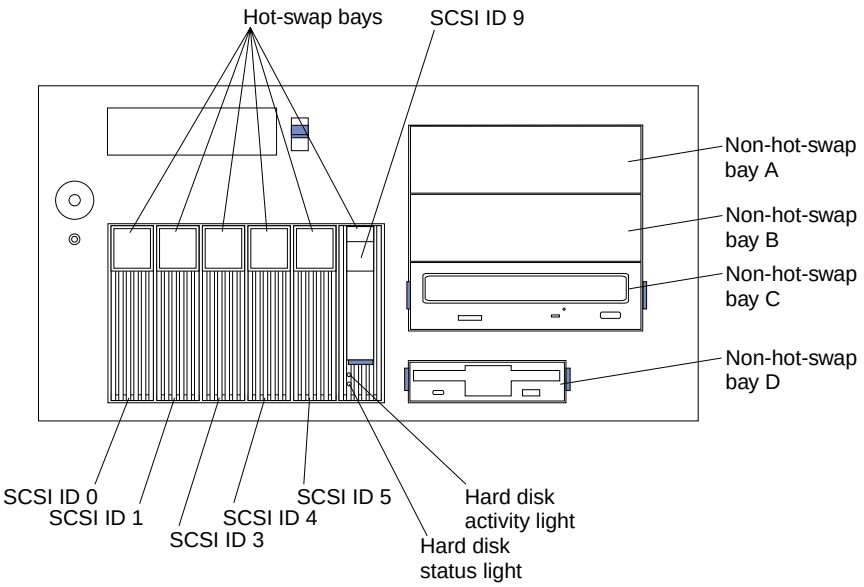
Note: The illustrations in this document might differ slightly from your hardware.

Tower model



Note: The SCSI IDs for the slim-high and half-high hot-swap drives are on a label on the bezel, immediately adjacent to the hot-swap drive bays.

Rack model



Hot-swap drives

Your server contains hardware that lets you 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.

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 supports six slim (1-inch) or three half-high (1.6-inch), 3.5-inch hot-swap hard disk drives in the hot-swap bays.
- The hot-swap bays connect to a SCSI *backplane*. This backplane is the printed circuit board behind the bay.
- The backplane controls the SCSI IDs for the hot swap drives.

Non-hot-swap drives

Diskette drives, tape drives, and CD-ROM drives are non-hot-swap drives. To remove or install a non-hot swap drive, you must turn off the server first. Non-hot-swap drives are installed in bays A, B, C, and D only.

- Your server comes with a preinstalled 3.5-inch, 1.44 MB diskette drive in bay D and a preinstalled IDE CD-ROM drive in bay C.
- The xSeries 150 server supports only one diskette drive.
- The diskette drive uses 1 MB and 2 MB diskettes. For optimum use, format 1 MB diskettes to 720 KB and format 2 MB diskettes to 1.44 MB.
- Bays A and B come without a device installed. These bays are for 5.25-inch, half-high, removable-media drives, such as tape backup drives. You can combine bays A and B into a single full-high bay.
- If you are installing a device with a 50-pin connector in one of the empty non-hot-swap bays (bays A–B), you need a 68-pin to 50-pin converter. To order the converter, contact your IBM reseller or IBM marketing representative.

Note: The server's electromagnetic interference (EMI) integrity and cooling are both protected by having bays A and B covered or occupied. When you install a drive, save the filler panel from the bay, in case you later remove the drive and do not replace it with another.

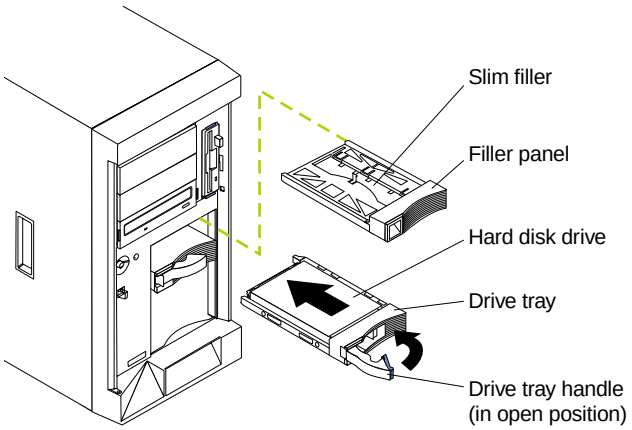
Preinstallation steps (all bays)

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. Read "Safety" on page iii, "Handling static sensitive devices" on page 20, and the documentation that comes with your drive.
2. Choose the bay in which you want to install the drive.
3. Check the instructions that come with the drive to see if you need to set any switches or jumpers on the drive.
4. To install the drive, go to "Installing a hot-swap drive" or to "Installing a non-hot-swap drive" on page 38, as appropriate.

Installing a hot-swap drive

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



To install a drive in a hot-swap drive bay:

Attention:

- To maintain proper system cooling, do not operate the server for more than two minutes without either a drive or a filler panel installed for each bay.
- When you handle Electrostatic Discharge-Sensitive devices (ESD), take precautions to avoid damage from static electricity. For details on handling these devices, refer to the following Web site and use a search term of ESD: http://www.ibm.com/

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

   Note: If you are installing a half-high hard disk drive, you will need to remove two adjacent filler panels. The two filler panels should be from either the top pair of bays, the middle pair of bays, or the bottom pair of bays.

2. Install the hard disk drive in the hot-swap bay:
   a. Ensure the tray handle is open (that is, perpendicular to the drive).
   b. Align the rails on the drive assembly with the guide rails in the drive bay.
   c. Gently push the drive assembly into the bay until the drive connects to the backplane.
   d. Push the tray handle toward the closed position until it locks the drive in place.
3. If you installed a half-high hard disk drive, install a slim filler in the gap above the drive:
   a. Locate the slim filler that is designed for use with these half-high drives. It is stored on the empty tray of the filler panel that you removed earlier in this procedure.
   b. Pull the slim filler off the filler panel.
   c. Gently push the slim filler into place in the gap above the drive.
4. Check the hard disk drive status indicators to verify that the hard disk drives are operating properly (see "Server controls and indicators" on page 6 for the location of the status indicators).
   - When the amber light is on continuously, the drive has failed.
   - If you have a RAID adapter installed:
     — When the green light flashes slowly (one flash per second), the drive is being rebuilt.
     — When the green light flashes rapidly (three flashes per second), the controller is identifying the drive.

Note: If your server has a RAID adapter installed, refer to the information provided with the RAID adapter for information about adding a drive.

Replacing a drive in a hot-swap bay

You do not have to turn off the server to remove or install the hot-swap drives.

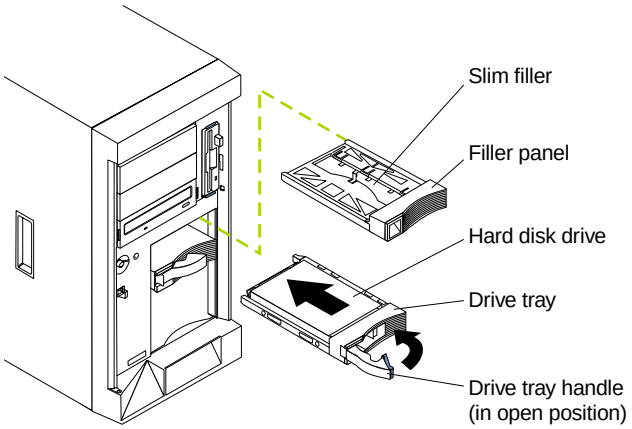
Attention:

1. Before you remove a hot-swap hard disk drive that is not defective, back up all important data.
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). Handle the drive carefully.
3. Before you replace a hot-swap drive, make sure it is defective. If you partially or completely remove a good drive instead of a defective one, your server might lose valuable data.

   This situation is especially relevant if your server has a RAID adapter installed and you assigned RAID level 1 or 5 to the logical drives in your disk array. The RAID adapter can rebuild the data that you need, provided that certain conditions are met. Refer to the information provided with the RAID adapter for further details.

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

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



To replace a drive in a hot-swap bay:

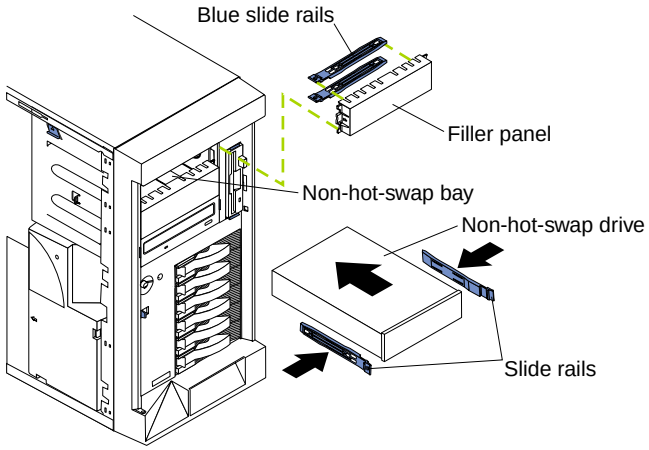
1. Before you begin, do the following:
   - Read the documentation that comes with your drive.
   - If your server has a RAID adapter installed, review the information provided with the RAID adapter for information about replacing a drive.
2. If your server is a tower model, unlock and open the server door.

   Attention: To maintain proper system cooling, do not operate the server for more than two minutes without either a drive or a filler panel installed for each bay.
3. Locate the defective drive (look for an amber Hard Disk Status light on the front of the drive).
4. Remove the defective hard disk drive: move the handle on the drive to the open position (perpendicular to the drive) and pull the hot-swap drive assembly from the bay.
5. Install the hard disk drive in the hot-swap bay:
   a. Ensure the tray handle is open (that is, perpendicular to the drive).
   b. Align the rails on the drive assembly with the guide rails in the drive bay.
   c. Gently push the drive assembly into the bay until the drive connects to the backplane.
   d. Push the tray handle toward the closed position until it locks the drive in place.
6. Check the hard disk drive status indicators to verify that the hard disk drive is installed properly (see “Server controls and indicators” on page 6 for the location of the status indicators).
   - When the amber light is on continuously, the drive has failed.
   - If you have a RAID adapter installed:
     — When the green light flashes slowly (one flash per second), the drive is being rebuilt.
     — When the green light flashes rapidly (three flashes per second), the controller is identifying the drive.
7. If your server is a tower model, close and lock the server door.

Installing a non-hot-swap drive

Notes:

1. The server's electromagnetic interference (EMI) integrity and cooling are both protected by having the non-hot-swap bays covered or occupied. When you install a drive, save the filler panel from the bay, in case you later remove the drive and do not replace it with another.
2. The illustrations in this document might differ slightly from your hardware.



To install a non-hot-swap drive (5.25-inch, removable media) in one of the non-hot-swap bays:

1. Read the information in "Preinstallation steps (all bays)" on page 35.
2. Turn off the server and peripheral devices and then remove the cover and the bezel (see "Removing the cover, door, and bezel" on page 26 for details).
3. Remove the filler panel from the bay opening by pulling the filler panel away from the server. You do not need the filler panel when you have a drive installed in the bay.
4. If the drive is a laser product, observe the following safety precaution:

Statement 3

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

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

Statement 3

5. Touch the static-protective bag containing the drive to any unpainted metal surface on the server; then, remove the drive from the bag and place it on a static-protective surface.
6. Set any jumpers or switches on the drive according to the documentation that comes with the drive.
7. Install rails on the drive.
   - If you are installing a standard-size drive:
     a. Pull the blue slide rails off the back of the filler panel.
     b. Clip the rails onto the sides of the drive.
   - If you are installing a digital linear tape (DLT) backup drive, the slide rails and screws are included in the optional power supply backplane kit (an additional power supply is needed to support the DLT).
8. Align the rails on the drive with the guide rails in the drive bay.
9. Push the drive into the bay until it clicks into place.
10. If the drive is an IDE device:
    - Make sure the drive is not a hard disk drive.
    - Plug a connector on the IDE cable into the back of the drive.
    - Make sure the other end of the IDE cable is plugged into the IDE connector on the system board.
    - Go to step 12..
11. If the drive is a SCSI device:
    a. Make sure the drive is not a hard disk drive.
    b. Obtain a 16-bit SCSI cable to connect the device to the connector for SCSI channel B on the system board, or to an optional SCSI adapter. A suitable cable usually comes with your SCSI device.
    c. Connect one of the connectors on the SCSI cable to the back of the drive.
    d. Connect the other end of the SCSI cable to the SCSI channel B connector on the system board, or to an optional SCSI adapter, as appropriate. See “System board internal cable connectors” on page 14 for the location of the SCSI connectors. See also “SCSI ports” on page 59 for information about SCSI connections and devices.
12. Connect a power cable to the back of the drive. Power cables for non-hot-swap drives come installed in your server. The connectors are keyed and can be inserted only one way.
13. If you are installing another non-hot-swap drive, do so at this time. Otherwise, continue with the next step.
14. If you have other options to install or remove, do so now; otherwise, replace the cover (see “Installing the cover” on page 49 for details).

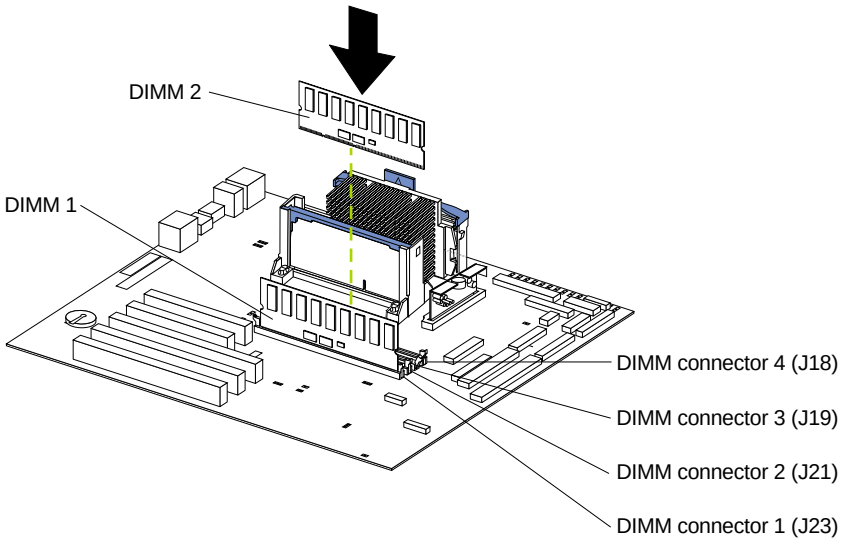
Installing memory modules

Adding memory to your server is an easy way to make programs run faster. You can increase the amount of memory in your server by installing options called *memory-module kits*. Each kit contains one industry-standard, dual-inline memory module (DIMM). Your server uses a noninterleaved memory configuration.

Your server comes with a dual inline memory module (DIMM) installed on the system board in connector J23.

Notes:

1. Install additional DIMMs in the order specified in the documentation that comes with your option. (See the following illustration for memory connector locations.)
2. Your xSeries 150 server supports 128 MB, 256 MB, 512 MB, and 1 GB DIMMs. Your server supports a minimum of 128 MB and a maximum of 4 GB of system memory. See the ServerProven list at http://www.ibm.com/pc/netfinity for a list of memory modules for use with your server.
3. Installing or removing DIMMs changes the configuration information in the server. Therefore, after installing or removing a DIMM, you must save the new configuration information by using the Configuration/Setup Utility program. When you restart the server, the system displays a message indicating that the memory configuration has changed. Start the Configuration/Setup Utility program and select **Save Settings.**
4. The illustrations in this document might differ slightly from your hardware.



To install a DIMM:

Attention: When you handle Electrostatic Discharge-Sensitive devices (ESD), take precautions to avoid damage from static electricity. For details on handling these devices, refer to the following Web site and use a search term of ESD: http://www.ibm.com/

1. Review the safety precautions listed in Statement 1 and Statement 5 in "Safety information" on page 20.
2. Review the information in "Before you begin" on page 19 and the documentation that comes with your option.

3. Turn off the server and peripheral devices and disconnect all external cables and power cords; then, remove the cover (see “Removing the cover, door, and bezel” on page 26 for details).
4. Touch the static-protective package containing the DIMM to any unpainted metal surface on the server. Then, remove the DIMM from the package.

   Note: To avoid breaking the retaining clips or damaging the DIMM connectors, handle the clips gently.
5. Install the DIMM:
   a. Turn the DIMM so that the pins align correctly with the connector.
   b. Insert the DIMM into the connector by pressing on one edge of the DIMM and then on the other edge of the DIMM. Be sure to press straight into the connector. Be sure that the retaining clips snap into the closed positions.
   c. Make sure the retaining clips are in the closed position. If a gap exists between the DIMM and the retaining clips, the DIMM has not been properly installed. In this case, open the retaining clips and remove the DIMM; then, reinsert the DIMM.
6. If you have other options to install or remove, do so now; otherwise, go to “Installing the cover” on page 49.

Installing a microprocessor

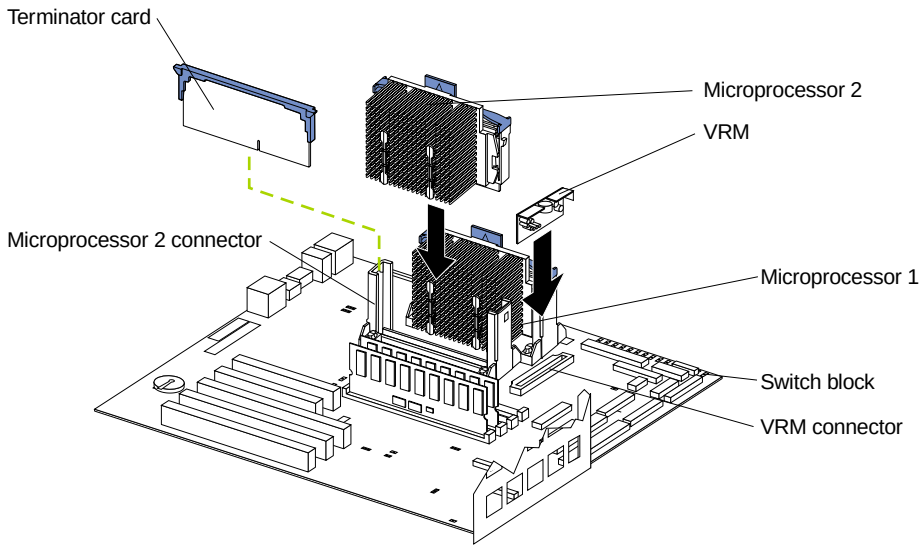
Your server comes with one microprocessor installed on the system board. If you install an additional microprocessor, your server can operate as a symmetric multiprocessing (SMP) server. With SMP, certain operating systems and application programs can distribute the processing load between the microprocessors. This enhances performance for database and point-of-sale applications, integrated manufacturing solutions, and other applications.

Notes:

1. Before you install a new microprocessor, review the documentation that comes with the microprocessor, so that you can determine whether you need to update the server basic input/output system (BIOS). The latest level of BIOS for your server is available through the World Wide Web and the IBM Bulletin Board System (BBS). Refer to “Service support” on page 116 for the appropriate World Wide Web addresses and bulletin-board telephone numbers.
2. Obtain an SMP-capable operating system (optional). For a list of supported operating systems, see http://www.ibm.com/pc/us/compat/ on the World Wide Web.
3. Your server comes with one microprocessor installed in the microprocessor connector (U3) that is closest to the power supply. This is the startup (boot) microprocessor. A microprocessor installed in connector U17 is microprocessor 2. If more than one microprocessor is installed, the microprocessor installed in microprocessor connector U17 is the startup processor and the microprocessor installed in U3 is the application processor.

Attention: To avoid damage and ensure proper server operation when you install a new or an additional microprocessor, use microprocessors that have the same cache size and type, and the same clock speed. Microprocessor internal clock frequencies and external clock frequencies must be identical. See the ServerProven list at http://www.ibm.com/pc/netfinity for a list of microprocessors for use with your server.

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



To install an additional microprocessor:

Attention: When you handle Electrostatic Discharge-Sensitive devices (ESD), take precautions to avoid damage from static electricity. For details on handling these devices, refer to the following Web site and use a search term of ESD: http://www.ibm.com/

1. Review the safety precautions listed in Statement 1 and Statement 5 in "Safety information" on page 20.
2. Turn off the server and peripheral devices and disconnect all external cables and power cords; then remove the cover (see "Removing the cover, door, and bezel" on page 26 for details).
3. Remove the terminator card from the microprocessor connector. Store the terminator card in a safe place in the static-protective package that your new microprocessor is shipped in; you will need to install it again if you ever remove the microprocessor and do not replace the microprocessor.
4. Install the microprocessor:
   a. Touch the static-protective package containing the new microprocessor to any *unpainted* metal surface on the server; then, remove the microprocessor from the package.
   b. Center the microprocessor over the microprocessor connector and carefully press the microprocessor into the connector.

   Note: To remove a microprocessor, pull upward on the microprocessor handle tab.
5. Install the voltage regulator module (VRM) included in the microprocessor kit.

   Attention: Use of other VRMs might cause your server to overheat.

   a. Center the VRM over the VRM connector. Make sure that the VRM is oriented and aligned correctly.
   b. Press the VRM into the connector.

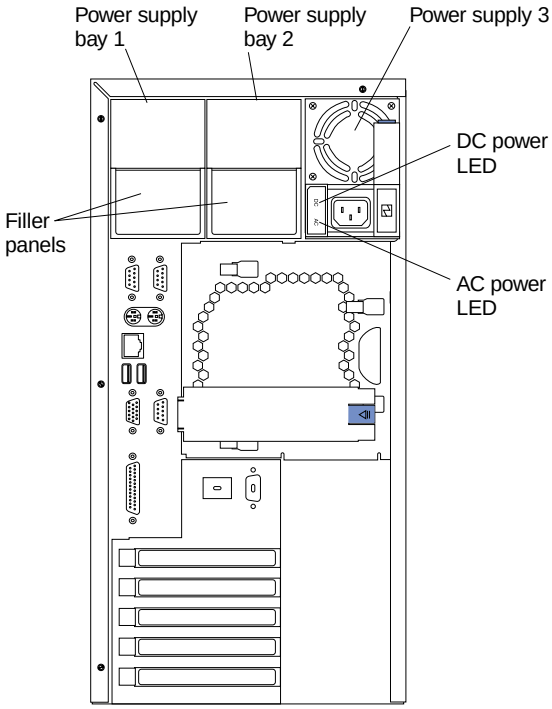
   Note: If you remove the microprocessor later, remember to install the terminator card in the appropriate microprocessor connector and to remove the VRM.

6. If you have other options to install or remove, do so now; otherwise, go to "Installing the cover" on page 49.

Installing or removing a power supply

Your server comes with one power supply, installed in bay 3. You can replace the power supply backplane with an optional backplane that will enable you to add a second power supply, which gives redundancy and will make the power supplies hot-swappable. You can also add a third power supply for additional capacity. Each power supply has two status indicators; see the following illustration for information about the status indicators and power supply bay locations.

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



Filler panels

To maintain proper airflow, keep filler panels in place on empty power supply bays.

Power supply bay 1

If you install an optional power supply in this bay, LED PS1 on the system board diagnostics panel refers to this power supply. See "System board LED locations" on page 18 for more information about the diagnostics panel.

Power supply bay 2

If you install an optional power supply in this bay, LED PS2 on the system board diagnostics panel refers to this power supply. See "System board LED locations" on page 18 for more information about the diagnostics panel.

Power supply 3

Your server comes with this power supply installed in this bay. LED PS3 on the system board diagnostics panel refers to this power supply. See "System board LED locations" on page 18 for more information about the diagnostics panel.

AC power LED

This light provides status information about the power supply. During normal operation, both the AC and DC power LEDs are on. See “Power supply LEDs” on page 95 for more information.

DC power LED

This light provides status information about the power supply. During normal operation, both the AC and DC power LEDs are on. See “Power supply LEDs” on page 95 for more information.

Statement 8

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

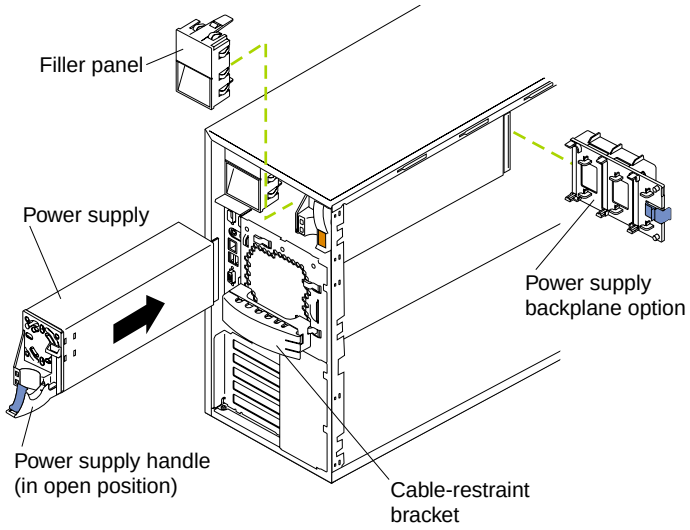
Hazardous voltage, current, and energy levels are present inside any component that has this label attached. There are no serviceable parts inside these components. If you suspect a problem with one of these parts, contact a service technician.

Adding a power supply

If you replace the power supply backplane with the power supply backplane option, you can replace the power supply backplane with an optional backplane that will enable you to add a second power supply, which gives redundancy and will make the power supplies hot-swappable. You can also add a third power supply for additional capacity. After you install a power supply, verify that the power-supply status indicators (AC Power light and DC Power light) are lit, indicating that the power supply is operating properly.

Notes:

1. You do not need to turn off the power to the server to install hot-swap power supplies.
2. The illustrations in this document might differ slightly from your hardware.



To install a hot-swap power supply:

1. Remove the filler panel from the empty power supply bay by inserting your finger into the depression on the filler panel and pulling it away from the server. Save the filler panel in case you remove the power supply at a later time.

   Note: During normal operation, each power-supply bay must have either a power supply or filler panel installed for proper cooling.

2. Install the power supply in the bay:

   a. Place the handle on the power supply in the open position (that is, perpendicular to the power supply) and slide the power supply into the chassis.

   b. Gently close the handle to seat the power supply in the bay.

3. Plug the power cord for the added power supply into the power cord connector.
4. Route the power cord through the cable-restraint bracket.
5. Plug the power cord into a properly grounded electrical outlet.
6. Verify that the DC Power light and AC Power light on the power supply are lit, indicating that the power supply is operating correctly.
7. If you have other options to install or remove, do so now; otherwise, go to“Installing the cover” on page 49.

Removing a power supply

If you have installed the power supply backplane option and have installed additional power supplies, you normally have power redundancy and hot-swappability. However, if the load on your server requires the capacity of all installed power supplies, you do not have redundancy or hot-swappability and must turn off the server before removing any of your power supplies.

Attention: If you remove a power supply while the system is running, when you do not have power redundancy, your system will abruptly cease to function.

To remove a power supply:

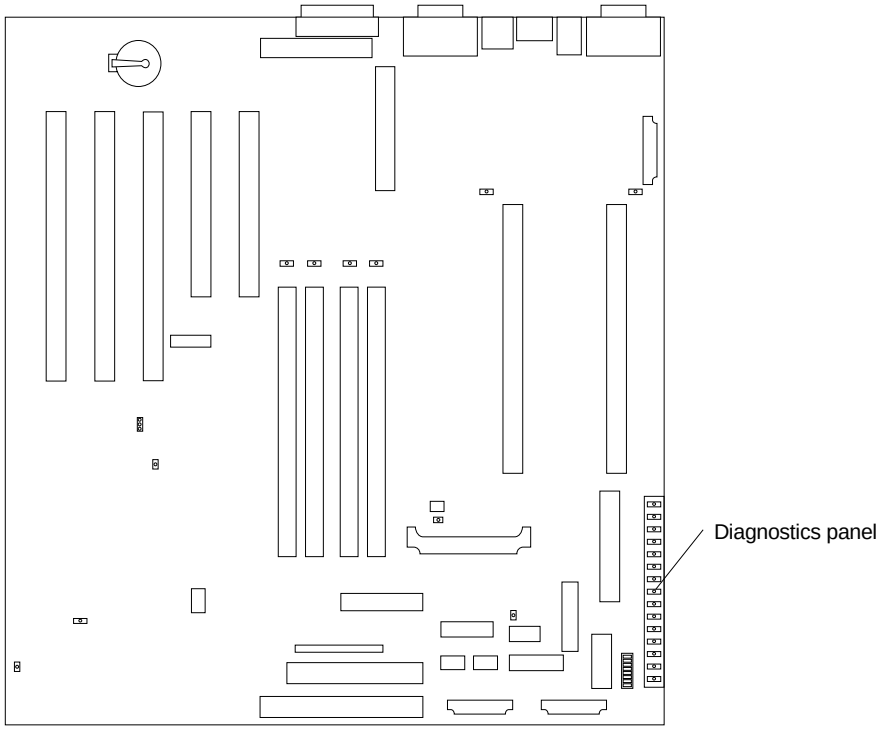
1. Check the LEDs on the diagnostics panel on the system board.

a. If the NON (non-redundant) LED is lit, you do not have redundancy: *turn off the server* and peripheral devices; then, continue with step 2..

Note: The Information light on the operator information panel on the front of the server also will be on. See for the location and contents of the operator information panel.

b. If the NON LED is not lit, you have redundancy and do not need to turn off the server. Continue with step 2..

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



2. Unplug the power cord from the power supply.

Attention: Be careful when you remove the power supply; the power supply might be too hot to handle comfortably.

Statement 12

CAUTION:
The following label indicates a hot surface nearby.

3. Remove the defective power supply.

4. Install a replacement power supply.
5. Plug the power cord for the power supply into the power cord connector.
6. Verify that the AC Power light and DC Power light are lit, indicating that the power supply is operating correctly.
7. If you turned the server off in step a on page 46, turn on the server and peripheral devices.

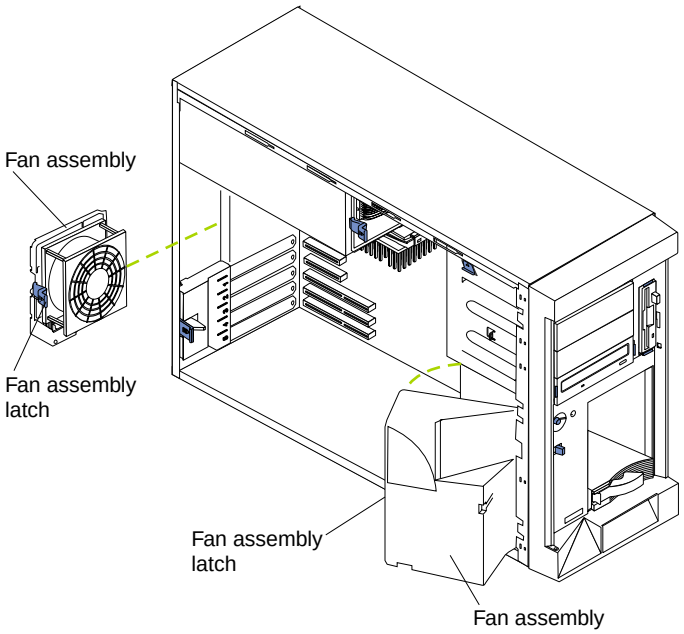
Replacing a fan assembly

Your server comes with two fan assemblies.

Attention: Replace a fan that has failed within 48 hours to help ensure proper cooling.

The following illustration shows the replacement of a fan assembly.

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



To replace the fan assembly:

1. Review the safety precautions listed in Statement 1 and Statement 5 in “Safety information” on page 20.
2. Turn off the server and peripherals.
3. Remove the cover. See “Removing the cover, door, and bezel” on page 26 for details.
4. Determine which fan assembly to replace by checking the LED on each fan; a lit LED indicates the fan to replace.
5. Remove the fan assembly from the server:
   a. Disconnect the fan cable from the system board.
   b. Press the blue release latch for the fan and pull the fan away from the server.
6. Slide the replacement fan assembly into the server until it clicks into place.
7. Connect the fan cable to the system board.

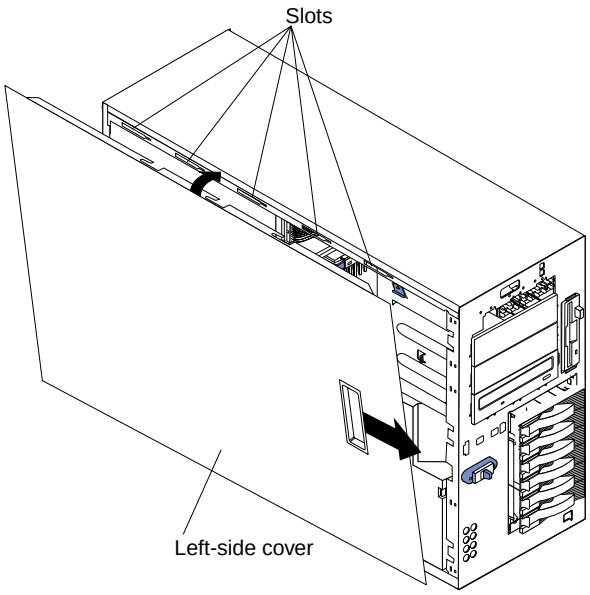
8. Verify that the FAN LED on the diagnostic panel is not lit. If the FAN LED is lit, reseat the fan.
9. If you have other options to install or remove, do so now; otherwise, go to“Installing the cover” on page 49.

Installing the cover

If you have a tower model, continue with “Installing the cover (tower)”. If you have a rack model, go to “Installing the cover (rack)” on page 51.

Installing the cover (tower)

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

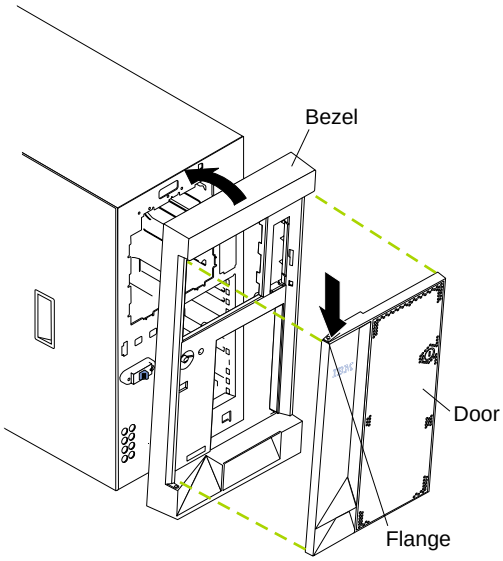


To install the server left-side cover:

1. Align the cover with the left side of the server, about 25 mm (1 inch) from the front of the server; place the bottom of the cover on the bottom rail of the chassis.
2. Insert the tabs at the top of the cover into the slots at the top of the server.
3. Hold the cover against the server and slide the cover toward the front of the server until the cover clicks into place.

Installing the bezel and front door

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



To install the bezel:

1. Place the tabs at the bottom edge of the bezel in the slots at the bottom front of the server.
2. Press the top of the bezel toward the server until it clicks into place.

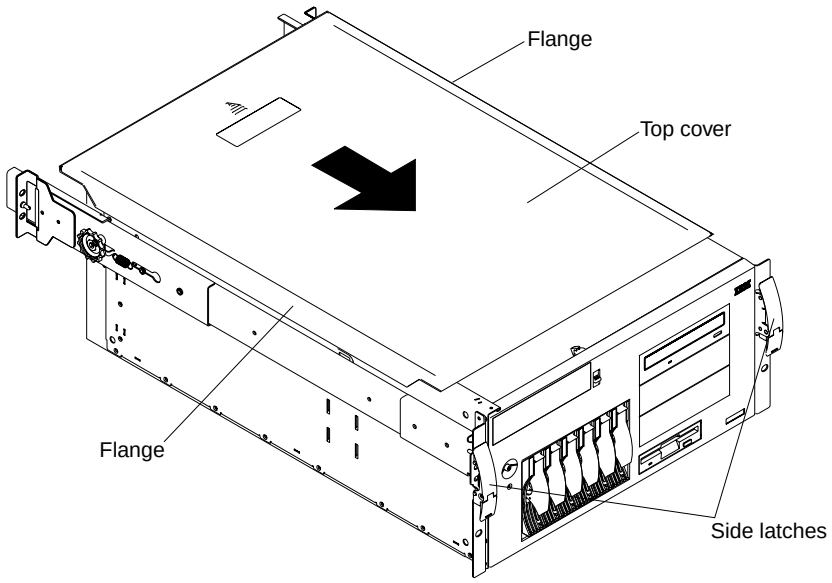
To install the server door:

1. Set the door on the bottom hinge.
2. Press the flange downward while pressing the top of the door toward the server, until the flange connects with the top hinge. Then, release the flange.
3. Close and lock the server door.

   Attention: Be sure to maintain a clearance of at least 127 mm (5 inches) on the front and rear of the server to allow for air circulation.

Installing the cover (rack)

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

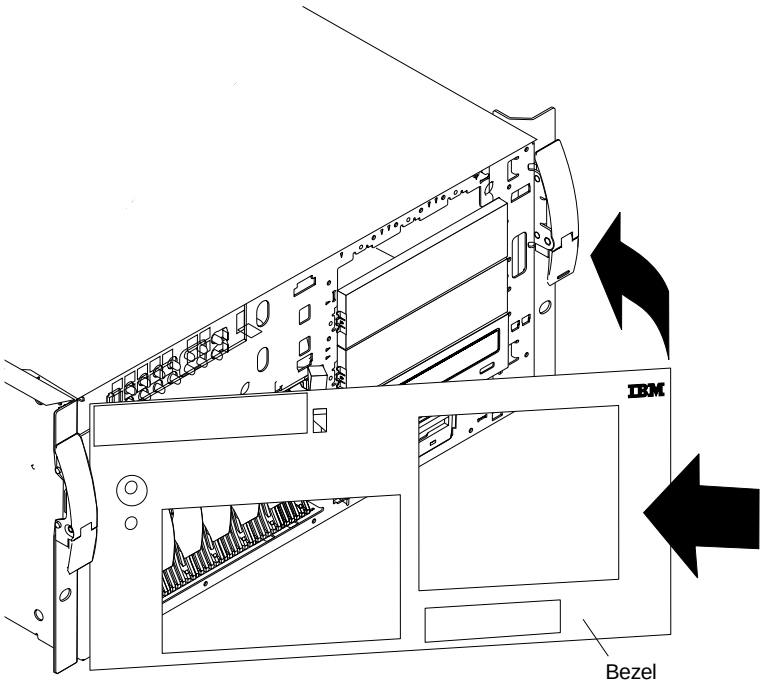


To install the server top cover:

1. Align the top cover with the top of the server, about 25 mm (1 inch) from the front of the server; the flanges on the left and right sides of the cover should be on the outside of the server chassis.
2. Hold the cover against the server and slide the cover toward the front of the server until the cover clicks into place.

Installing the bezel

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



To install the bezel:

1. Place the tabs on the left side of the bezel in the slots at the left front of the server.
2. Press the right end of the bezel toward the server until the bezel clicks into place.

Connecting external options

If you install a SCSI adapter, you can attach a SCSI storage expansion enclosure to your server.

Installation procedure

To attach an external device:

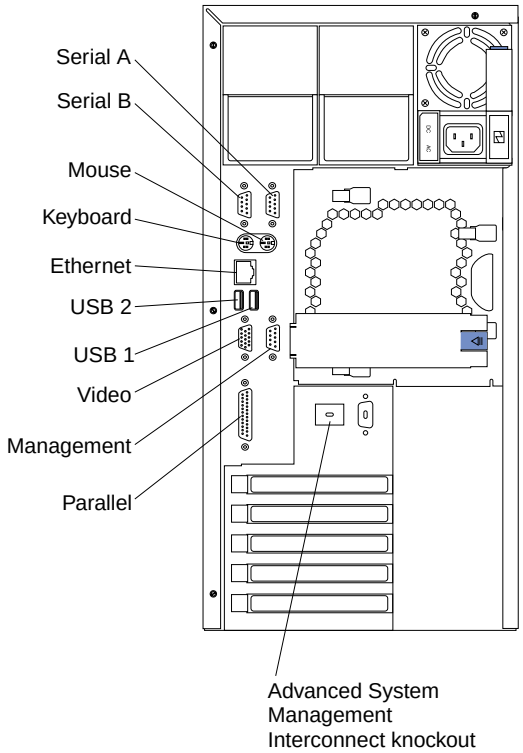
1. Read “Before you begin” on page 19 and the documentation that comes with your options.
2. Turn off the server and all attached devices.
3. Follow the instructions that come with the option to prepare it for installation and to connect it to the server.

   Note: If you are attaching a SCSI device, see “SCSI ports” on page 59 for SCSI ID and cabling information.

I/O connector locations

The following illustration shows the input/output connectors (ports) and the expansion slots on the rear of the server. For pin assignments and other details about these connectors, see “Input/Output ports” on page 54.

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



Note: The Management connector is dedicated for use by the Advanced System Management processor.

Input/Output ports

This section provides information about the input/output (I/O) ports on your server. These ports include the following:

- One parallel port
- One video port
- Two Ultra3 SCSI ports
- One keyboard port
- One auxiliary pointing device (mouse) port
- Two serial ports
- Two Universal Serial Bus (USB) ports
- One Ethernet port
- One Advanced System Management port

Parallel port

Your server has one parallel port. This port supports three standard Institute of Electrical and Electronics Engineers (IEEE) 1284 modes of operation: Standard Parallel Port (SPP), Enhanced Parallel Port (EPP), and Extended Capability Port (ECP).

Viewing or changing the parallel-port assignments

You can use the built-in Configuration/Setup Utility program to 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 the ECP and EPP modes.

To view or change the parallel-port assignment:

1. Restart the server and watch the monitor screen.
2. When the message `Press F1 for Configuration/Setup` appears, press F1.

   Note: The Devices and I/O Ports choice appears only on the full configuration menu. If you set two levels of passwords, you must enter the administrator password to access the full configuration menu.
3. From the main menu, select **Devices and I/O Ports**; then, press Enter.
4. Select the parallel port; then, use the arrow keys to advance through the settings available.

   Note: When you configure the parallel port as bidirectional, use an IEEE 1284-compliant cable. The maximum length of the cable must not exceed 3 meters (9.8 feet).
5. Select **Save Settings**; then, select **Exit Setup** to exit from the Configuration/Setup Utility main menu.

Parallel port connector

The following table shows the pin-number assignments for the 25-pin, female D-shell parallel-port connector on the rear of your server.

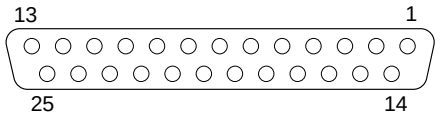


Table 3. Parallel-port connector pin-number assignments

Pin	I/O	SPP/ECP Signal	EPP Signal
1	O	-STROBE	-WRITE
2	I/O	Data 0	Data 0
3	I/O	Data 1	Data 1
4	I/O	Data 2	Data 2
5	I/O	Data 3	Data 3
6	I/O	Data 4	Data 4
7	I/O	Data 5	Data 5
8	I/O	Data 6	Data 6
9	I/O	Data 7	Data 7
10	I	-ACK	-ACK
11	I	BUSY	-WAIT
12	I	PE (paper end)	PE (paper end)
13	I	SLCT (select)	SLCT (select)
14	O	-AUTO FD (feed)	-AUTO FD
15	I	-ERROR	-ERROR
16	O	-INIT	-INIT
17	O	-SLCT IN	-SLCT IN
18	-	Ground	Ground
19	-	Ground	Ground
20	-	Ground	Ground
21	-	Ground	Ground
22	-	Ground	Ground
23	-	Ground	Ground
24	-	Ground	Ground
25	-	Ground	Ground

Serial ports

Your server has two standard serial ports: Serial port A and Serial port B. The operating system can use both serial ports; it shares Serial port A with the integrated Netfinity Advanced System Management Processor. A third serial port is used by only the integrated Netfinity Advanced System Management Processor.

Some application programs require specific ports, and some modems function properly only at certain communication port addresses. You might need to use the

Configuration/Setup Utility program to change communication port address assignments to prevent or resolve address conflicts.

Viewing or changing the serial-port assignments

To view or change the serial-port assignments:

1. Restart the server and watch the monitor screen.
2. When the message `Press F1 for Configuration/Setup` appears, press F1.
3. From the main menu, select **Devices and I/O Ports**; then, press Enter.

   Note: The Devices and I/O Ports choice appears only on the full configuration menu. If you set two levels of passwords, you must enter the administrator password to access the full configuration menu.
4. Select the serial port; then, use the arrow keys to advance through the settings available.
5. Select **Save Settings**; then, select **Exit Setup** to exit from the Configuration/Setup Utility main menu.

Serial-port connectors

The following table shows the pin-number assignments for the 9-pin, male D-shell serial-port connectors on the rear of your server. These pin-number assignments conform to the industry standard.

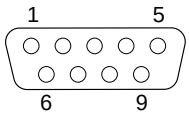


Table 4. Serial-port connectors pin-number assignments

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		

Universal Serial Bus ports

Your server has two Universal Serial Bus (USB) ports, which configure automatically. USB is an emerging serial interface standard for telephony and multimedia devices. It uses Plug and Play technology to determine the type of device attached to the connector.

Notes:

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

USB cables and hubs

You need a 4-pin cable to connect devices to USB 1 or USB 2. If you plan to attach more than two USB devices, you must use a hub to connect the devices. The hub provides multiple connectors for attaching additional external USB devices.

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

USB-port connectors

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

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

Table 5. USB-port connector pin-number assignments

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

Keyboard port

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

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

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

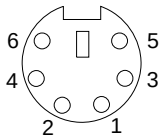


Table 6. Keyboard connector pin-number assignments

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

Auxiliary-device (pointing device) port

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

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

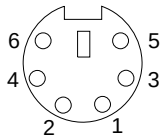


Table 7. Auxiliary-device connector pin-number assignments

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

Video port

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

Note: If you install a PCI video adapter, the server BIOS will automatically disable the integrated video controller.

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

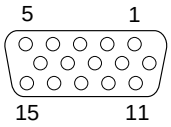


Table 8. Video-port connector pin-number assignments

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

Table 8. Video-port connector pin-number assignments

Pin	Signal	Pin	Signal	Pin	Signal
5	Ground	10	Ground	15	DDC SCL

SCSI ports

Your server has an integrated dual-channel Ultra3 small computer system interface (SCSI) controller. This controller supports two independent Ultra 160/m SCSI channels, both internal. Each of these channels supports up to 15 SCSI devices. In addition, this controller uses:

- Double-transition clocking to achieve high transfer rates
- Domain name validation to negotiate compatible data transfer speeds with each device
- Cyclic-redundancy checking (CRC), instead of the usual parity checking, to significantly improve data reliability
- An active terminator on the system board for SCSI bus termination

A SCSI cable connects the SCSI channel A connector to the hot-swap drive backplane. If you obtain an additional SCSI cable, the SCSI channel B connector is available for connecting non-hot-swap SCSI drives in the 5.25-in. bays.

If you install a SCSI adapter in your server, you can use its SCSI connector to connect different types of small computer system interface (SCSI) devices.

Note: If you install a PCI RAID adapter to configure and manage the internal hot-swap drives, you must move the SCSI cable from the system-board SCSI connector to an internal channel connector on the RAID adapter.

SCSI cabling requirements

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

For information about the maximum length of SCSI cable between the terminated ends of the cable, refer to the ANSI SCSI standards. Adhering to these standards will help ensure that your server operates properly.

Setting SCSI IDs

Each SCSI device connected to a SCSI controller must have a unique SCSI ID. This ID enables the SCSI controller to identify the device and ensure that different devices on the same SCSI channel do not attempt to transfer data simultaneously. SCSI devices that are connected to different SCSI channels can have duplicate SCSI IDs.

The hot-swap-drive backplane controls the SCSI IDs for the internal hot-swap drive bays. However, when you attach SCSI devices to the external SCSI connector, you must set a unique ID for the device. Refer to the information that is provided with the device for instructions to set its SCSI ID.

SCSI connector pin-number assignments

The following table shows the pin-number assignments for the 68-pin SCSI connectors.

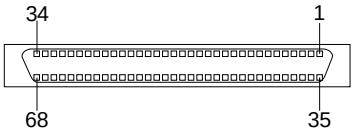


Table 9. 68-pin SCSI connector pin-number assignments

Pin	Signal	Pin	Signal
1	+Data 12	35	-Data 12
2	+Data 13	36	-Data 13
3	+Data 14	37	-Data 14
4	+Data 15	38	-Data 15
5	+Data P1	39	-Data P1
6	+Data 0	40	-Data 0
7	+Data1	41	-Data 1
8	+Data 2	42	-Data 2
9	+Data 3	43	-Data 3
10	+Data 4	44	-Data 4
11	+Data 5	45	-Data 5
12	+Data 6	46	-Data 6
13	+Data 7	47	-Data 7
14	+Data P	48	-Data P
15	Ground	49	Ground
16	DIFFSENS	50	Ground
17	Term power	51	Term power
18	Term power	52	Term power
19	Reserved	53	Reserved
20	Ground	54	Ground
21	+Attention	55	-Attention
22	Ground	56	Ground
23	+Busy	57	-Busy
24	+Acknowledge	58	-Acknowledge
25	+Reset	59	-Reset
26	+Message	60	-Message
27	+Select	61	-Select
28	+Control/Data	62	-Control/Data
29	+Request	63	-Request
30	+Input/Output	64	-Input/Output
31	+Data 8	65	-Data 8
32	+Data 9	66	-Data9

Table 9. 68-pin SCSI connector pin-number assignments

Pin	Signal	Pin	Signal
33	+Data 10	67	-Data 10
34	+Data 11	68	-Data 11

Ethernet port

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

To access the Ethernet port, connect a Category 3, 4 or 5 unshielded twisted-pair (UTP) cable to the RJ-45 connector on the rear of your server.

Notes:

1. The 100BASE-TX Fast Ethernet standard requires that the cabling in the network be Category 5 or higher.
2. If you plan to use the IBM Advanced Appliance Configuration Utility to configure and manage your appliance, be sure to connect the built-in Ethernet connector to the same physical network as your systems management console.

Configuring the Ethernet controller

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

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

Failover for redundant Ethernet

The IBM Netfinity 10/100 Fault Tolerant Adapter is an optional redundant network interface card (NIC adapter) that you can install in your server. If you install this NIC adapter and connect it to the same logical segment as the primary Ethernet controller, you can configure the server to support a *failover* function. You can configure either the integrated Ethernet controller or the NIC adapter as the primary Ethernet controller. In failover mode, if the primary Ethernet controller detects a link failure, all Ethernet traffic associated with it is switched to the redundant (secondary) controller. This switching occurs without any user intervention. When the primary link is restored to an operational state, the Ethernet traffic switches back to the primary Ethernet controller. The switch back to the primary Ethernet controller can be automatic or manually controlled, depending on the setup and operating system.

Note that only one controller in the redundant pair is active at any given time. For example, if the primary Ethernet controller is active, then the secondary Ethernet controller cannot be used for any other network operation.

Note: Your operating system determines the maximum number of IBM Netfinity 10/100 Fault Tolerant Adapters that you can install in your server. See the documentation that comes with the adapter for more information.

Configuring for failover: The failover feature currently is supported by Windows NT Server, and IntraNetWare. The setup required for each operating system follows.

Windows NT Server : To install the IBM Netfinity 10/100 Fault Tolerant Adapter device drivers:

1. Add the redundant NIC adapter according to the instructions that are provided with the adapter.
2. Use the ServerGuide CDs to install the AMD PCNet Ethernet Family adapter device driver.
3. Do not select the Grouping box at this point; you must first restart the machine.
4. From the Windows NT Server desktop, select **Control Panel**, then select the **Network** icon, then select the **Adapters** tab.
5. Highlight one of the adapters that will be in the redundant pair and then click the **Properties...** button.
6. Check the Grouping box. This will show the possible combinations for redundant pairs.
7. Select the adapter pair you want and then select **OK**. Note that the integrated Ethernet controller is located at PCI bus A, slot 2.
8. Select **Close** to exit from the Network setup.

   When you restart the server, the failover function will be in effect.

If a failover occurs, a message is written to the NT Event Viewer log.

IntraNetWare:

1. Add the redundant NIC adapter according to the instructions that are provided with the adapter.
2. Load the device driver by using the following command:

   `LOAD d:\path\PCNTNW.LAN PRIMARY=x SECONDARY=y`

   where *d* and *path* are the drive and path where the driver is located, and *x* and *y* are the PCI slot numbers where the redundant pair is located.

   The slot number associated with the integrated Ethernet controller can vary depending on the configuration of the server. To determine the slot number, load the driver with no parameters. The driver will display the available slot numbers. The slot number that is greater that 10000 will be the slot number of integrated Ethernet controller. When the slot number of the integrated Ethernet controller is determined, reload the driver with the appropriate parameters.
3. When the driver is loaded, bind it to a protocol stack.

The failover function is now enabled. If a failover occurs:

- The operating system console generates a message.
- The custom counters for the device driver contain variables that define the state of the failover function and the location of the redundant pair. You can use the NetWare Monitor to view the custom counters.

Ethernet port connector

The following table shows the pin-number assignments for the RJ-45 connector. These assignments apply to both 10BASE-T and 100BASE-TX devices.

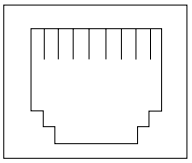


Table 10. Ethernet RJ-45 connector pin-number assignments.

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

Advanced System Management ports

Your server has one communication port dedicated to the Netfinity Advanced System Management Processor. This port uses a standard D-shell serial-port connector, labeled Management.

You can attach a dedicated modem to the D-shell system-management connector on the rear of your server to communicate with the integrated Netfinity Advanced System Management Processor.

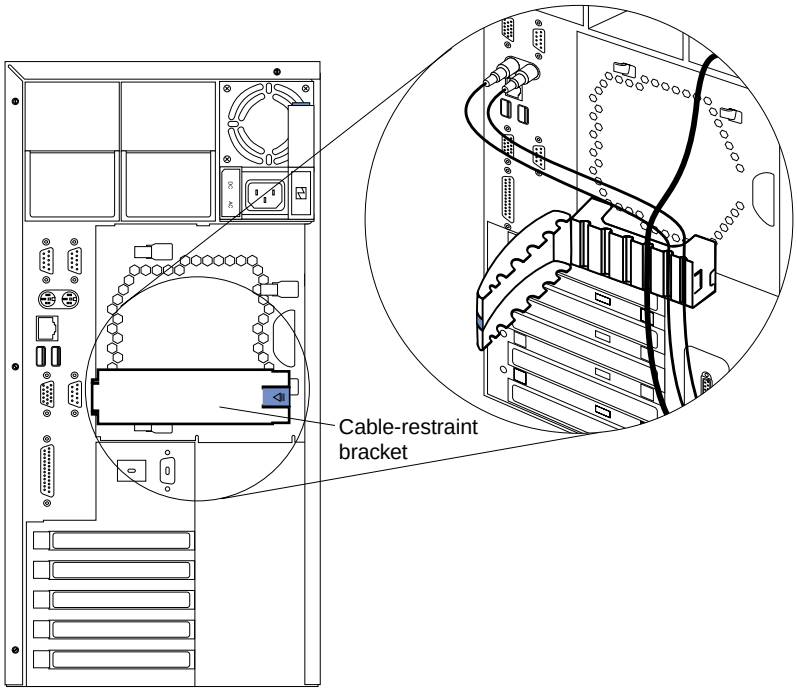
If you install the Advanced System Management Interconnect cable option, it provides two additional ports, which are used for the RS-485 function. These two ports use a dual RJ-45 connector. The RS-485 function enables you to connect the Advanced System Management Processors of several rack-mounted servers so that they can communicate with each other in half-duplex mode.

Note: When using the RS-485 function, at least one of the servers in the group that is connected together must have an IBM Netfinity Advanced Systems Management PCI Adapter installed.

Cabling the server

When you cable the server, be sure to route the power cables and mouse and keyboard cables through the cable-restraint bracket on the rear of the server.

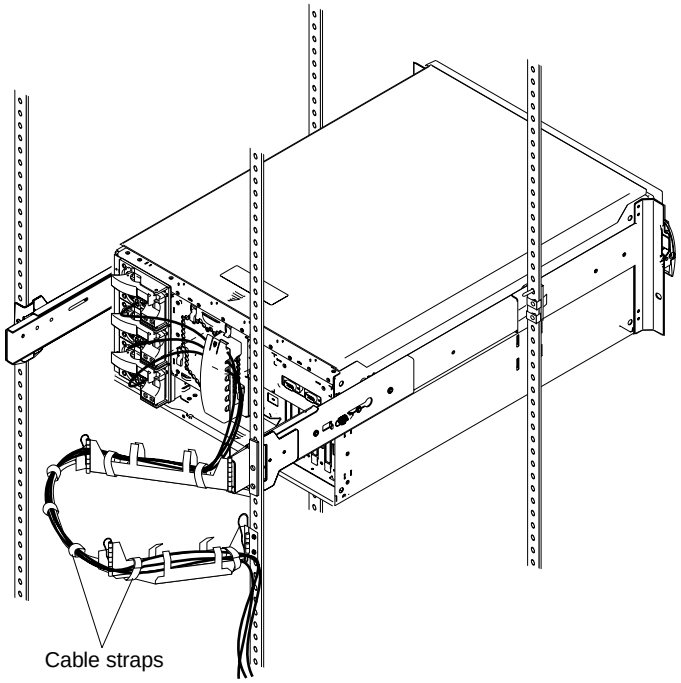
Note: The illustrations in this document might differ slightly from your hardware.



Additionally, for rack models, be sure to route the cables through the cable-management assembly on the rack (see page 65).

Routing cables through cable-management assembly

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



Chapter 4. Solving Problems

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

If you cannot locate and correct the problem using the information in this section, refer to “Getting help, service, and information” on page 115 for more information.

Note: The IBM xSeries 150 is a preloaded appliance server. Changing the preloaded software configuration in any way, including applying or installing unauthorized service packs or updates to preinstalled software, or installing additional software products that are not included in either the preloaded image or on the Supplementary CD is not supported and could cause unpredictable results. To correct problems with a preloaded software component, you must backup your user and system data; then, use the Recovery CD to restore the preloaded software image. You can obtain IBM authorized updates for this preloaded appliance from the following site:

`http://www.ibm.com/eserver/xseries`

Diagnostic tools overview

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

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

  The power-on self-test (POST) generates beep codes and messages to indicate successful test completion or the detection of a problem. See “POST” on page 70 for more information.

- **Light path diagnostics**

  Your server has light-emitting diodes (LEDs) to help you identify problems with server components. These LEDs are part of the light-path diagnostics that are built into your server. By following the *path of lights*, you can quickly identify the type of system error that occurred. See “Light path diagnostics” on page 95 for more information.

- **Diagnostic programs and error messages**

  The server diagnostic programs are stored in upgradable read-only memory (ROM) on the system board. These programs are the primary method of testing the major components of your server. See “Diagnostic programs and error messages” on page 83 for more information.

- **Troubleshooting charts**

  These charts list problem symptoms, along with suggested steps to correct the problems. See the “Troubleshooting charts” on page 99 for more information.

- **Customized support page**

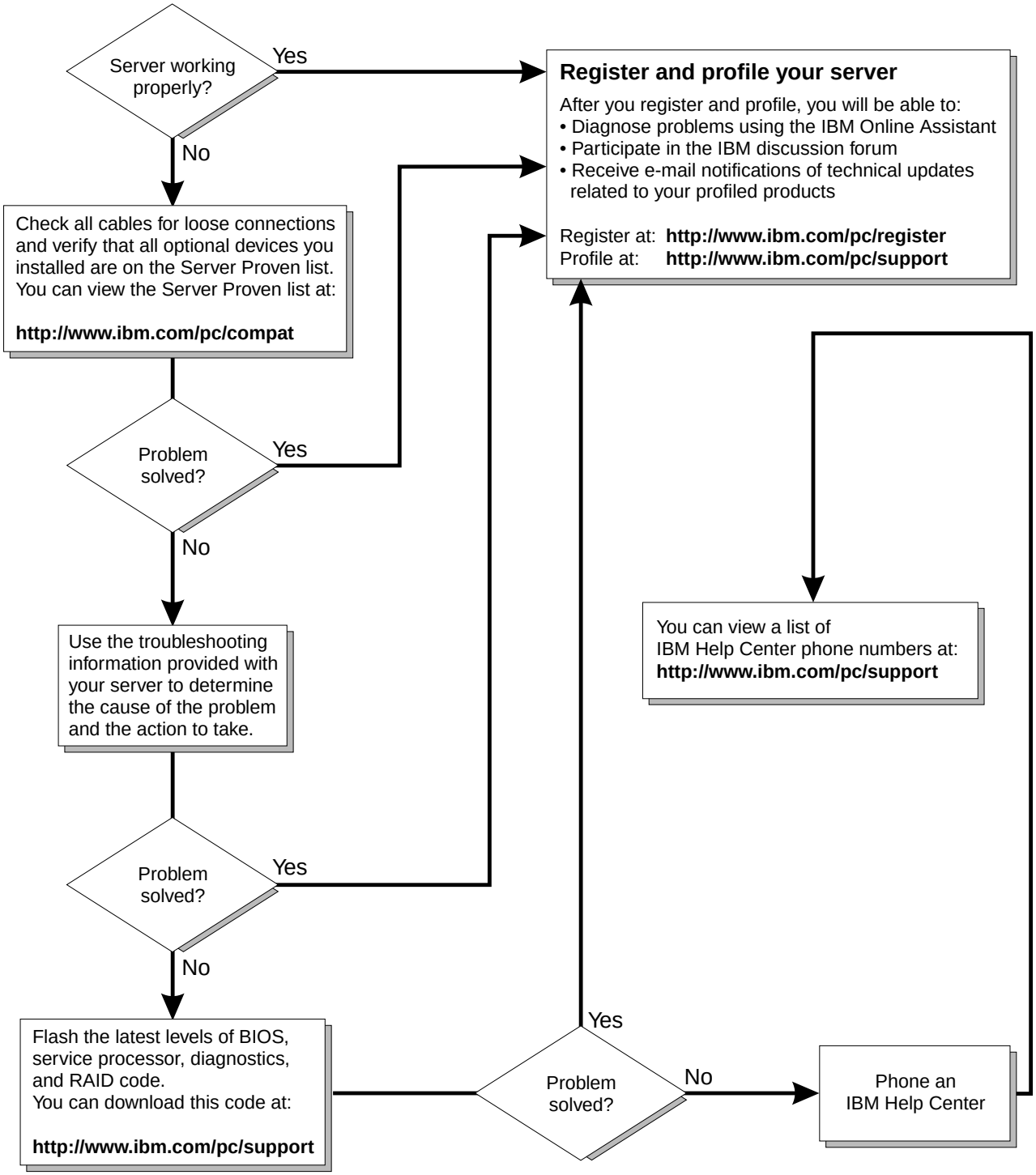
  You can create a customized support page that is specific to your hardware, complete with Frequently Asked Questions, Parts Information, Technical Hints and Tips, and Downloadable files. In addition, you can choose to receive electronic mail (e-mail) notifications whenever new information becomes available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

  After you register and profile your xSeries products, you can diagnose problems using the IBM Online Assistant and you can participate in the IBM discussion

forum. For more detailed information about registering and creating a customized profile for your IBM products, visit the following addresses on the Web:

— http://www.ibm.com/pc/register
— http://www.ibm.com/pc/support

Server Support



POST

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

If POST finishes without detecting any problems, a single beep sounds, the first screen of your operating system or application program appears, and the System POST Complete (OK) light is illuminated on the operator information panel.

If POST detects a problem, more than one beep sounds and an error message appears on your screen. See “POST beep code descriptions” and “POST error messages” on page 73 for more information.

Notes:

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

POST beep code descriptions

Beep codes are sounded in a series of 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.

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

No beeps If no beep occurs after your server completes POST (that is, after the System POST Complete (OK) light on the operator information panel is illuminated), call for service.

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

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

Two short beeps
POST encountered an error. The Configuration/Setup Utility program will display additional information; follow the instructions that appear on the screen. See “POST error messages” on page 73 for descriptions of the text messages that might appear.

Three short beeps
A system memory error has occurred. This combination occurs only if the video Basic Input/Output System (BIOS) cannot display the error message. Replace the failing memory module.

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

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 error message remains, call for service.

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

One long and one short beep

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

One long and two short beeps

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

One long and three short beeps

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

Two long and two short beeps

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

POST beep codes

Table 11. POST beep codes

Beep code	Description	Action
1-1-2	Microprocessor register test has failed.	Call for service.
1-1-3	CMOS write/read test has failed.	
1-1-4	BIOS ROM checksum has failed.	
1-2-1	Programmable Interval Timer test has failed.	
1-2-2	DMA initialization has failed.	
1-2-3	DMA page register write/read test has failed.	
1-4-3	Interrupt vector loading 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 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.	Call for service.
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 operable.	
3-1-1	Timer tick interrupt test has failed.	
3-1-2	Interval timer channel 2 test has failed.	
3-1-3	RAM test has failed above address hex 0FFFF.	
3-1-4	Time-of-Day clock test has failed.	
3-2-1	Serial port test has failed.	
3-2-2	Parallel port test has failed.	
3-2-3	Math Coprocessor test has failed.	
3-2-4	Comparison of CMOS memory size against actual has failed.	
2-3-1 3-3-2	Screen initialization has failed. I2C bus has failed.	Turn off the server and then restart the server. If the problem persists, call for service.

Table 11. POST beep codes

1-2-4	RAM refresh verification has failed.	Reseat the memory modules or install a memory module. If the problem persists, call for service.
1-3-1	First 64 Kb RAM test has failed.	
1-3-2	First 64 Kb RAM parity test has failed.	
3-3-1	A memory size mismatch has occurred.	
3-3-3	No memory has been detected in the system.	

POST error messages

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

Table 12. POST error messages

POST message	Description
062	The server failed to boot on three consecutive attempts. All caches are disabled. Repeatedly turning the server on and then off or resetting the server might cause this problem. **Action:** Start the Configuration / Setup Utility program and verify that all settings are correct. Use the **Cache Control** selection in the Advanced Setup menu of the Configuration / Setup Utility program to enable the caches. If the problem persists, call for service. When the problem is corrected, be sure to enable the caches.
101 102 106	An error occurred during the system board and microprocessor test. **Action:** Call for service.
114	An adapter read-only memory (ROM) error occurred. **Action:** Remove the options. If you can start the server without the options installed, reinstall each option one at a time and retest after each is reinstalled. When an option fails, replace it. If you cannot isolate and correct the problem, call for service.
129	An error was detected in the L1 cache of one of the microprocessors. **Action:** 1. If you just installed a microprocessor, verify that the microprocessor is installed and seated correctly. 2. If the problem persists, check to see if the system has isolated the problem to a microprocessor: • If the System Error light on the operator information panel is on, check to see if the CPU LED on the diagnostic LED panel is on. If it is on, check the Microprocessor Error LEDs next to the microprocessor sockets. — If a Microprocessor LED is on, run the diagnostic program for the microprocessor indicated by the LED. If the tests fail, replace the indicated microprocessor. — If the microprocessor tests do not fail, call for service. • If no error LED is on, the error logs in the Configuration / Setup Utility program might provide additional information about the microprocessor error. If the problem persists, call for service.

Table 12. POST error messages

POST message	Description
151	A real-time clock (RTC) error occurred. **Action:** Call for service.
161	The real-time clock battery has failed. **Action:** Replace the battery yourself or call for service. 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.
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 program might isolate the failing device. If you cannot isolate and correct the problem, call for service.
163	The time of day has not been set. **Action:** Set the correct date and time. If the date and time are set correctly and saved, but the 163 error message reappears, call for service. You can use the server until the system is serviced, but any application programs that use the date and time will be affected.

Table 12. POST error messages

POST message	Description
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 just installed or removed memory, run the Configuration / Setup Utility program; then, exit, saving the new configuration settings. If the message appears again, shutdown the server, reseat the memory modules, and restart the server. 3. If the problem persists, check to see if the system has isolated the problem to a memory module: • If the System Error light on the operator information panel is on, check to see if the MEM LED on the diagnostic LED panel is on. If it is on, check the DIMM Error LEDs next to the memory sockets. If a DIMM Error LED is on, run the diagnostic program for the memory. — If the tests fail, replace the DIMM. If the problem persists after you replace the DIMM, call for service. — If the memory tests do not fail, call for service. • If no error LED is on, the error logs in the Configuration / Setup Utility program might provide additional information on the memory error. If the problem persists, call for service.
175	A vital product data (VPD) error occurred. **Action:** Call for service.
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, call for service.
184	The power-on password information stored in your server has been removed. **Action:** From the Configuration / Setup Utility program main menu, select **System Security.** Then, follow the instructions on the screen. If this information cannot be restored, call for service.
185	A power failure damaged the stored information about the drive-startup sequence. **Action:** From the Configuration / Setup Utility program main menu, select **Start Options**; then, follow the instructions on the screen. If this information cannot be restored, call for service.
186	A system board or hardware error occurred. **Action:** Call for service.
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 system board has been replaced, the system serial number will be invalid and should be set. From the main menu of the Configuration / Setup Utility program, select **System Information**, then select **Product Data.**If the problem persists, call for service.
188	A vital product data (VPD) error occurred. **Action:** Call for service.

Table 12. POST error messages

POST message	Description
189	An attempt has been made to access the server with invalid passwords. After three incorrect attempts, the server locks up; that is, the logon data fields are no longer available to the user.
201	An error occurred during the memory controller test. This error can be caused by: • Incorrectly installed memory • A failing memory module • A processor-board problem • A system board problem **Action:** 1. If you just installed memory, verify that the new memory is correct for your server. Also verify that the memory is installed and seated correctly. 2. If the problem persists, check to see if the system has isolated the problem to a memory module: • If the System Error light on the operator information panel is on, check to see if the MEM LED on the diagnostic LED panel is on. If it is on, check the DIMM Error LEDs next to the memory sockets. If a DIMM Error LED is on, run the diagnostic program for the memory. • If the tests fail, replace the DIMM. If the problem persists after you replace the DIMM, call for service. • If the memory tests do not fail, call for service. 3. If no error LED is on, the error logs in the Configuration/Setup Utility program might provide additional information on the memory error. If the problem persists, call for service.
229	An error was detected in the L2 cache of one of the microprocessors. **Action:** 1. If you just installed a microprocessor, verify that the microprocessor is installed and seated correctly. 2. If the problem persists, check to see if the system has isolated the problem to a microprocessor: • If the System Error light on the operator information panel is on, check to see if the CPU LED on the diagnostic LED panel is on. If it is on, check the Microprocessor Error LEDs next to the microprocessor sockets. — If a Microprocessor LED is on, run the diagnostic program for the microprocessor indicated by the LED. (If the Secondary Microprocessor Error LED is on, run the "Alt CPU" diagnostic program.) If the tests fail, replace the microprocessor. — If the microprocessor tests do not fail, call for service. • If no error LED is on, the error logs in the Configuration/Setup Utility program might provide additional information on the microprocessor error. If the problem persists, call for service.
289	An error occurred during POST memory tests and a failing DIMM was disabled. **Note:** You can use the server with decreased memory. **Action:** 1. If you just installed memory, verify that the new memory is correct for your server. Also verify that the memory is installed and seated correctly. Start the Configuration/Setup Utility program and select **Memory Settings** from the Advanced Setup menu to enable the DIMM. 2. If the problem remains, replace the failing DIMM. If the problem persists, call for service.

Table 12. POST error messages

POST message	Description
301 303	An error occurred during the keyboard and keyboard controller test. These error messages also might be accompanied by continuous beeping. **Action:** 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 error message remains, call for service. **Note:** If you just connected a new mouse or other pointing device, turn off the server and disconnect that device. Wait at least 5 seconds; then, turn on the server. If the error message goes away, replace the device.
602	Invalid diskette boot record **Action:** 1. Replace the diskette. 2. If the problem persists, make sure that the diskette drive cables are correctly and securely connected. 3. If the problem remains, replace the diskette drive. If the problem persists, call for service.
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. If the diagnostic tests fail, call for service.
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. If the problem persists, call for service.
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. If the problem persists, call for service.
11*xx*	An error occurred during the system-board 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, call for service.

Table 12. POST error messages

POST message	Description
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. 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.
1301	Cable to Information LED panel not detected. **Action:** Make sure that the cable to the operator information panel is connected. If the problem persists, call for service.
1302	Cable to Power and Reset pushbuttons not detected. **Action:** Make sure that the cable to the Power and Reset pushbuttons is connected. If the problem persists, call for service.
1303	I2C cable to Power Backplane not detected. **Action:** Make sure that the cable to the power backplane is connected. If the problem persists, call for service.
1304	Cable to Diagnostic LED panel not detected. **Action:** Make sure that the cable to the diagnostic LED panel is connected. If the problem persists, call for service.
1600	The Netfinity Advanced System Management processor is not functioning. **Action:** 1. Verify that the jumpers for the system-management processor are set correctly. 2. Disconnect the server from all electrical sources, wait for 30 seconds, reconnect the server to the electrical sources, and restart the server. If the problem persists, call for service.
1601	The BIOS needs to be updated. **Action:** 1. Disconnect the server from all electrical sources, wait for 30 seconds, reconnect the server to the electrical sources, and restart the server. 2. If the problem persists, update the BIOS. If the problem persists, call for service.
1800	A PCI adapter has requested a hardware interrupt that is not available. **Action:** 1. Make sure that the PCI adapter and all other adapters are set correctly in the Configuration/Setup Utility program. If the interrupt resource settings are not correct, change the settings. 2. If all interrupts are being used by other adapters, you might need to remove an adapter to make an interrupt available to the PCI adapter, or force other adapters to share an interrupt.

Table 12. POST error messages

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 program main menu. If you are unable to set the startup sequence, call for service. 2. Check the list of startup devices in the **Startup device** data fields. Is the drive you want to start from in the startup sequence? **Yes** Exit from this screen; then, select **Exit Setup** to exit the Configuration/Setup menu. Go to step 3.. **No** Follow the instructions on the screen to add the drive; then, save the changes and exit the Configuration/Setup menu. Restart the server. 3. Is an operating system installed? **Yes** Turn off the server. Go to step 4.. **No** Install the operating system in your server; then, follow your operating system instructions to shut down and restart the server. 4. During server startup, watch for messages indicating a hardware problem. If the same error message appears, call for service.
2400	An error occurred during the testing of the video controller on the system board. This error can be caused by a failing monitor, a failing system board, or a failing video adapter (if one is installed). **Action:** Verify that the monitor is connected correctly to the video connector. If the monitor is connected correctly, call for service.
2462	A video memory configuration error occurred. **Action:** Make sure that the monitor cables are correctly and securely connected to the server. If the problem persists, call for service.
5962	An IDE CD-ROM configuration error occurred. **Action:** Check the signal and power cable connections to the CD-ROM drive. If the problem persists, call for service.
8603	An error occurred during the mouse (pointing device) controller test. The addition or removal of a mouse, or a failing system board can cause this error. **Note:** This error also can occur if electrical power was lost for a very brief period and then restored. In this case, turn off the server for at least 5 seconds; then, turn it back on. **Action:** Ensure that the keyboard and mouse (pointing device) are attached to the correct connectors. 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, replace the mouse or pointing device. If the POST error message reappears, run the diagnostic tests to isolate the problem. If the diagnostic tests do not find a problem and the POST error message remains, call for service.

Table 12. POST error messages

POST message	Description
00012000	Processor machine check. **Action:** 1. Update the system BIOS. 2. If the problem persists, replace the microprocessor.
00019501	Processor 1 is not functioning. **Action:** Replace microprocessor 1. (The Microprocessor 1 Error LED will be on.) If the problem persists, call for service.
00019502	Processor 2 is not functioning. **Action:** Replace microprocessor 2. (The Microprocessor 2 Error LED will be on.) If the problem persists, call for service.
00019701	Processor 1 failed the built-in self test. **Action:** Replace microprocessor 1. (The Microprocessor 1 Error LED will be on.) If the problem persists, call for service.
00019702	Processor 2 failed the built-in self-test. **Action:** Replace microprocessor 2. (The Microprocessor 2 Error LED will be on.) If the problem persists, call for service.
00180100	A PCI adapter has requested memory resources that are not available **Action:** 1. Make sure that the PCI adapter and all other adapters are set correctly in the Configuration/Setup Utility program. If the memory resource settings are not correct, change the settings. 2. If all memory resources are being used, you might need to remove an adapter to make memory available to the PCI adapter. Disabling the adapter BIOS on the adapter might correct the error. Refer to the documentation provided with the adapter.
00180200	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 address for the PCI adapter and all other adapters are set correctly in the Configuration/Setup Utility program. 2. If the I/O port resource settings are correct, the PCI adapter might be defective. Call for service.
00180300	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 address for all other adapters are set correctly in the Configuration/Setup Utility program. If the memory resource settings are not correct, change the settings. 2. If the memory resource settings are correct, the PCI adapter might be defective. Call for service.

Table 12. POST error messages

POST message	Description
00180400	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. Disabling the adapter BIOS on the adapter might correct the error. Refer to the documentation provided with the adapter.
00180500	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, call for service.
00180600	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, call for service.
00180700	*xxxxyyyy* Planar PCI device does not respond. (Where *xxxx* is the PCI vendor ID and *yyyy* is the PCI device ID.) **Action:** Call for service.
00180800	An unsupported PCI device is installed. **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 the problem persists, call for service.
00181000	PCI error. **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 the problem persists, call for service.
01295085	The ECC checking hardware test failed. **Action:** Call for service.
01298001	No update data is available for processor 1. **Action:** Update the system BIOS to a level that supports the microprocessors installed in the server.
01298002	No update data is available for processor 2. **Action:** Update the system BIOS to a level that supports the microprocessors installed in the server.
01298101	The update data for processor 1 is incorrect. **Action:** Update the system BIOS to a level that supports the microprocessors installed in the server.
01298102	The update data for processor 2 is incorrect. **Action:** Update the system BIOS to a level that supports the microprocessors installed in the server.

Table 12. POST error messages

POST message	Description
01298200	Microprocessor speed mismatch **Action:** The microprocessors installed do not run at the same speed; install microprocessors with identical speeds.
I9990301	A hard disk drive error occurred. **Action:** Call for service.
I9990305	POST could not find an operating system. **Action:** Install an operating system. If you have already installed the operating system, check the drive startup sequence. If the drive sequence is correct, run the diagnostic tests to verify that the hard disk drive is functioning correctly. If there is a problem with the hard disk drive (such as a bad sector), you might need to reinstall the operating system. If you cannot reinstall the operating system, call for service.
I9990650	AC power has been restored. **Action:** No action is required. This message appears 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.

Event/error logs

The POST error log contains the three most recent error codes and messages that the system generated during POST. The System Event / Error Log contains all error messages issued during POST and all system status messages from the Netfinity Advanced System Management Processor.

To view the contents of the error logs, start the Configuration / Setup Utility program; then, select **Event/Error Logs** from the main menu.

Small computer system interface messages

The following table lists actions to take if you receive a SCSI error message.

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.

Table 13. SCSI messages

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 server. • The cables for all external SCSI devices are connected correctly. • The last device in each SCSI chain is terminated properly. • The SCSI devices are configured correctly. If the above items are correct, run the diagnostic programs to obtain additional information about the failing device. If the error remains or recurs, call for service.

Diagnostic programs and error messages

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

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

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

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

The error code format is as follows:

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

where:

fff is the three-digit function code that indicates the function being tested when the error occurred. For example, function code 089 is for the microprocessor.

ttt is the three-digit failure code that indicates the exact test failure that was encountered. (These codes are for trained service personnel and are described in the *Hardware Maintenance Manual*.)

iii is the three-digit device ID. (These codes are for trained service personnel and are described in the *Hardware Maintenance Manual*.)

date is the date that the diagnostic test was run and the error recorded.

cc is the check digit that is used to verify the validity of the information.

text message
is the diagnostic message that indicates the reason for the problem.

Text messages

The diagnostic text message format is as follows:

```
Function Name: Result (test specific string)
```

where:

Function Name
is the name of the function being tested when the error occurred. This corresponds to the function code (fff) 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.

User Aborted
This result occurs when you stop the diagnostic test before it is complete.

Not Applicable
This result occurs when you specify a diagnostic test for a device that is not present.

Aborted This result occurs when the test could not proceed because of the system configuration.

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

Starting the diagnostic programs

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

To start the diagnostic programs:

1. Turn on the server and watch the screen.

   Note: To run the diagnostic programs, you must start the server with the highest level password that is set. That is, if an administrator password is set, you must enter the administrator password, not the power-on password, to run the diagnostic programs.

2. When the message `F2 for Diagnostics` appears, press F2.
3. Type in the appropriate password; then, press Enter.
4. Select either **Extended** or **Basic** from the top of the screen.
5. When the Diagnostic Programs screen appears, select the test you want to run from the list that appears; then, follow the instructions on the screen.

   Notes:

   a. If the server stops during testing and you cannot continue, restart the server and try running the diagnostic programs again. If the problem persists, call for service.

   b. The keyboard and mouse (pointing device) tests assume that a keyboard and mouse are attached to the server.

   c. If you run the diagnostic programs with no mouse attached to your server, you will not be able to navigate between test categories using the **Next Cat** and **Prev Cat** buttons. All other functions provided by mouse-selectable buttons are also available using the function keys.

   d. You can test the USB keyboard by using the regular keyboard test. The regular mouse test can test a USB mouse. Also, you can run the USB hub test only if there are no USB devices attached.

   e. You can view server configuration information (such as system configuration, memory contents, interrupt request (IRQ) use, direct memory access (DMA) use, device drivers, and so on) by selecting **Hardware Info** from the top of the screen.

When the tests have completed, you can view the Test Log by selecting **Utility** 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.

Viewing the test log

The test log will not contain any information until after the diagnostic program has run.

Note: If you already are running the diagnostic programs, begin with step 3.

To view the test log:

1. Turn on the server and watch the screen.

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

2. When the message `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.

3. When the Diagnostic Programs screen appears, select **Utility** from the top of the screen.
4. Select **View Test Log** from the list that appears; then, follow the instructions on the screen.

   The system maintains the test-log data while the server is powered on. When you turn off the power to the server, the test log is cleared.

Diagnostic error message tables

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

Attention: If diagnostic error messages appear that are not listed in the following tables, make sure that your server has the latest levels of BIOS, Advanced System Management Processor, ServeRAID, and diagnostics microcode installed.

Code	Function	Result	Text message	Action
001	Core system	Failed	Processor board, ECC Test	Call for service.
			System board	
005	Video port		Processor and system boards	
011	Serial port		Integrated serial port	
014	Parallel port		Integrated parallel port	
015	USB interface	Aborted	Can NOT test USB interface while it is in use. **Note:** If you have a USB keyboard or mouse attached, you cannot run the diagnostic program for the USB interface.	1. Turn off the server. 2. Replace the USB keyboard and mouse with a standard keyboard and mouse. 3. Turn on the server. 4. Run the diagnostic test again.
		Failed	System board	Call for service.
020	PCI interface	Failed	System board	Call for service.
			Tab on PCI Hot Swap slot #*n* is bad (where *n* is the number of the failing PCI slot) **Note:** For normal operation, the Power LED for the hot-plug PCI slot will be on and the Attention Led will be off.	Make sure the tab and latch on hot-plug PCI slot *n* are closed correctly. If the problem persists, call for service.
030	SCSI interface	Failed	SCSI adapter in slot *n* failed register / counter / power test (where *n* is the slot number of the failing adapter)	Refer to the information provided with the adapter for instructions. If the problem persists, call for service.
			SCSI controller on system board failed register / counter / power test	Call for service.

Code	Function	Result	Text message	Action
035	ServeRAID	Aborted	Test setup error: No ServeRAID adapter found on system board or PCI bus	Make sure the ServeRAID adapter is properly installed. If the problem remains, replace the ServeRAID adapter. If the problem persists, call for service.
		Failed	Adapter in slot *n*; adapter / drive configuration error (where *n* is the slot number of the failing adapter)	Run the ServeRAID Configuration Utility. If the problem remains, replace the ServeRAID adapter in slot *n*. If the problem persists, call for service.
			Adapter in slot *n*; internal error (where *n* is the slot number of the failing adapter)	
			Logical drive *m* on adapter in slot *n* (where *m* is the number of the failing logical drive and *n* is the slot number of the adapter)	
			On system board; internal error	Run the ServeRAID Configuration Utility. If the problem persists, call for service.
			On system board; adapter / drive configuration error	
			Logical drive on system board adapter	
			Adapter in slot *n*; memory allocation error (where *n* is the slot number of the failing adapter)	Call for service.
			On system board; memory allocation error	
			On system board; PCI configuration error	
			On system board; POST error	
			Adapter in slot *n*; POST error (where *n* is the slot number of the failing adapter)	Replace the ServeRAID adapter in slot *n*. If the problem persists, call for service.
			Adapter in slot *n*; PCI configuration error (where *n* is the slot number of the failing adapter)	
			SCSI drive on adapter in slot n, SCSI ID m (where *n* is the slot number of the adapter and m is the SCSI ID of the drive)	Check the cable and power connections on the drive. If the problem persists, call for service.
075	Power supply	Failed	Voltage sensed by the system is out of range	Call for service.

Code	Function	Result	Text message	Action
089	Microprocessor	Failed	Invalid microprocessor in slot *xyz* or BIOS setup problem (where *xyz* identifies the microprocessor that is causing the error message)	1. Check the system error log for the related error messages. 2. If your server does not have the latest level BIOS installed, update the BIOS. 3. If the problem remains, replace the *xyz* microprocessor and run the test again. If the problem persists, call for service.
			Processor in socket id *xyz* is installed but not functioning (where *xyz* identifies the microprocessor that is causing the error message)	
			Microprocessor in socket id *xyz* (where *xyz* identifies the microprocessor that is causing the error message) **Note:** The Microprocessor Error LED associated with the microprocessor will be lit.	1. Reseat the microprocessor. 2. If the problem remains, replace the microprocessor. If the problem persists, call for service.
			Processor in socket id *xyz* is defective (where *xyz* identifies the microprocessor that is causing the error message)	Replace the microprocessor. If the problem persists, call for service.

Code	Function	Result	Text message	Action
089	Microprocessor (continued)	Failed	Test setup error: Application microprocessor not installed or BIOS setup problem	1. Verify that the Application microprocessor is installed and seated correctly. 2. Check the system error log for related error messages. 3. If your server does not have the latest level BIOS installed, update the BIOS. 4. If the problem remains, replace the application microprocessor and run the test again. If the problem persists, call for service.
			VRM corresponding to Microprocessor in socket *xyz* is defective (where *xyz* identifies the microprocessor whose VRM is causing the error message)	Replace the VRM. If the problem remains, call for service.
			VRM corresponding to Microprocessor in socket id *xyz* is not installed (where *xyz* identifies the microprocessor whose VRM is causing the error message)	Install a VRM. If the problem persists, call for service.
165	Service processor	Failed	Netfinity Advanced System Management Processor on system board	Call for service.
175	System thermal	Failed	Fan # *n* (where *n*is the number of the failing fan) **Note:** The fan LED on the diagnostic LED panel will be lit.	Replace the indicated fan
			Temperature sensed on processor board is out of range	If one of the fan LEDs on the diagnostic LED panel is on, replace the indicated fan. If the problem persists, call for service.
180	Status display	Failed	Diagnostic LED panel	Call for service.
			Operator information panel	
			LED on hot-swap SCSI backplane	
			LED on processor board	
			LED on system board	

Code	Function	Result	Text message	Action
201	System memory	Failed	DIMMs in location DIMM *n* (where *n* is the number of the socket that contains the failing DIMM)	1. Reseat the failing DIMM. 2. If the problem remains, replace the DIMM. If the problem persists, call for service.
			Test setup error: Corrupt BIOS in ROM	If your server does not have the latest level BIOS installed, update the BIOS to the latest level. If the problem persists, call for service.
			Test setup error: Corrupt DMI BIOS, information in BIOS is not as expected	

Code	Function	Result	Text message	Action
202	System cache	Aborted	Test setup error: BIOS cannot access VPD information	If your server does not have the latest level BIOS installed, update the BIOS to the latest level and run the diagnostic program again. If the problem persists, call for service.
			Test setup error: Corrupt DMI BIOS. Information in BIOS is not as expected	
			Test setup error: No L2 cache detected on microprocessor socket id *xyz* or BIOS setup problem (where *xyz* identifies the microprocessor that is causing the error message)	1. If your server does not have the latest level BIOS installed, update the BIOS to the latest level 2. Run the diagnostic program again. 3. If the problem remains, replace the failing processor. If the problem persists, call for service.
			Test setup error: Unknown hardware problem associated with microprocessor in socket id *xyz*. (where *xyz* identifies the microprocessor that is causing the error message)	
		Failed	Microprocessor in socket ID *xyz* (where *xyz* identifies the microprocessor that is causing the error message) **Note:** The indicated microprocessor LED will be on.	1. Reseat the identified microprocessor. 2. If the problem remains, replace the microprocessor. If the problem persists, call for service.
		Warning	Test setup error: Cache is disabled. Use system setup to enable before retrying the test	Use the **Cache Control** choice from the Advanced Setup menu to enable the cache. If the problem persists, call for service.
206	Diskette drive	Failed	Internal diskette drive bay	Call for service.
215	CD-ROM	Aborted	The CD-ROM drive is not present.	Verify that the cables are properly connected to the CD-ROM. If the problem persists, call for service.
		Failed	On system board.	Call for service.
217	Hard disk drive	Failed	BIOS drive # *n* (where n is the drive bay number)	Call for service.

Code	Function	Result	Text message	Action
264	Magnetic tape drive	Aborted	Test setup error: No tape drive found	Check the cable and power connections to the drive. Refer to the information that is provided with the tape drive. If the problem persists, call for service.
		Failed	The load / mount test failed for device *n* on adapter *m* (where *n* is the number of the device and *m* is the adapter number)	Refer to the information provided with the tape drive. If the problem persists, call for service. **Note:** The push button test is applicable only to SCSI tape drives that have a push button.
			The Self-diagnostic failed for device *n* on adapter *m*. (where *n* is the number of the device and *m* is the adapter number)	
			The unload / eject test failed for device *n* on adapter *m* (where *n* is the number of the device and *m* is the adapter number)	
			The unload / eject push button test failed for device *n* on adapter *m* (where *n* is the number of the device and *m* is the adapter number)	
			The Read / Write Self-diagnostic failed for device *n* on adapter *m* (where *n* is the number of the device and *m* is the adapter number)	Insert a new tape cartridge; then, run the diagnostic test again. Refer to the information that is provided with the tape drive. If the problem persists, call for service.
301	Keyboard	Failed	On system board keyboard test failed	1. Verify that the keyboard cable is connected. 2. If the problem remains, replace the keyboard cable. If the problem persists, call for service.
302	Mouse	Failed	On system board pointing deice test failed.	Replace the pointing device. If the problem persists, call for service.
305	Video monitor		Any message	Refer to the information that came with the monitor.

Code	Function	Result	Text message	Action
405	Ethernet	Failed	In PCI slot *n* (where *n* is the PCI slot number in which the failing Ethernet adapter is installed)	Replace the Ethernet adapter in slot *n*. If the problem persists, call for service.
			On system board	Call for service.
415	Analog / digital modem	Not applicable	No modem was detected	1. Verify that the modem is properly attached to the server. 2. If the problem remains, replace the modem. If the problem persists, call for service.
			PCI modem detected but not enabled	1. Change the configuration to enable the modem. 2. If the problem remains, replace the modem. If the problem persists, call for service.
		Failed	Modem reset failed	Replace the modem. If the problem persists, call for service.
			No dialtone detected	1. Make sure that the phone line attached to the modem has a dial tone. (Connect a phone to the line and listen, if necessary.) If there is no tone, have the phone line serviced. 2. If the problem remains, replace the modem. If the problem persists, call for service.

Recovering BIOS

If the BIOS has become corrupted, such as from a power failure during a flash update, you can recover the BIOS using the recovery boot block and a BIOS flash diskette.

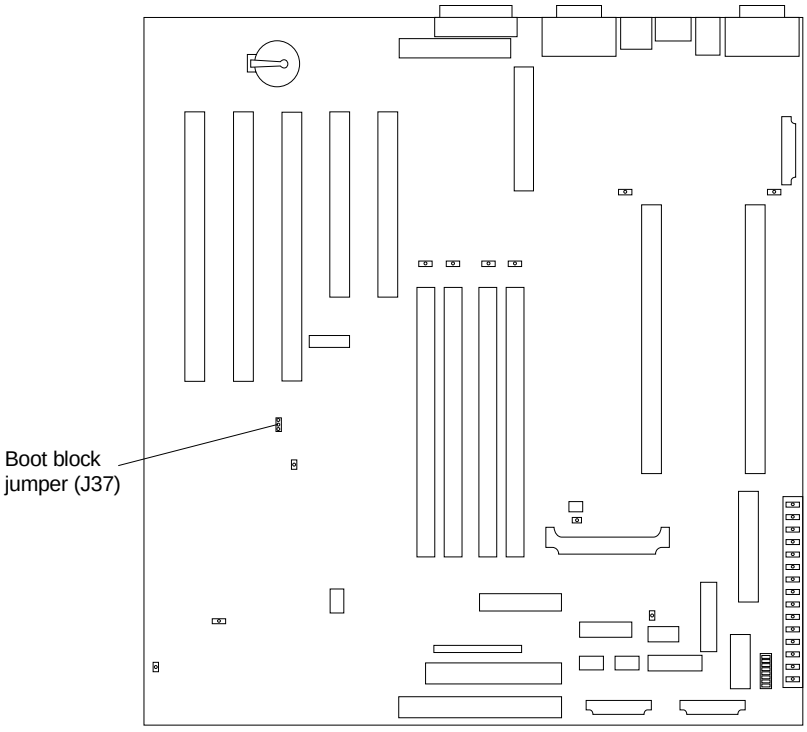
Note: You can obtain a BIOS flash diskette from one of the following sources:

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

The flash memory of your server contains a protected area that cannot be overwritten. The recovery boot block is a section of code in this protected area that enables the server to start up and to read a flash diskette. The flash utility recovers the system BIOS from the BIOS recovery files on the diskette.

To recover the BIOS:

1. Turn off the server and peripheral devices and disconnect all external cables and power cords; then, remove the cover.
2. Locate the boot block jumper block (J37) on the system board.



3. Place a jumper on pins 2 and 3 to enable BIOS recovery mode.
4. Insert the BIOS flash diskette into the diskette drive.
5. Restart the server.

   The Recovery Boot screen will appear. A progress report, `Loading data from diskette` *xx*%, is displayed. When programming is underway, a further progress report, `Programming block` *n of 7 yy*%, is displayed. When the procedure

complete, the message `Recovery complete, remove the diskette and return boot block switch to the off position before rebooting` is displayed.

6. Remove the flash diskette from the diskette drive.
7. Turn the server off.
8. Remove the jumper on the boot-block jumper block or move it to pins 1 and 2 to return to normal startup mode.
9. Restart the server. The system should start up normally.

Identifying problems using status LEDs

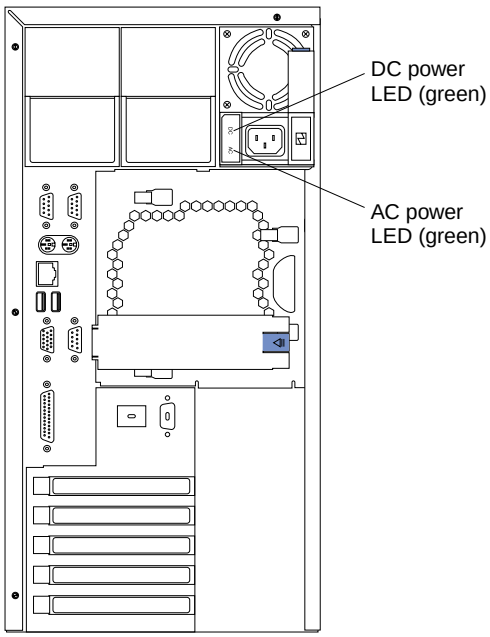
If the System Error light in the operator information panel on the front of the server is on, one or more LEDs inside the server or on the power supplies will be on. Use the light path diagnostics to identify the type of error that occurred.

Light path diagnostics

You can use the light path diagnostics built into your server to quickly identify the type of system error that occurred. Your server is designed so that any LEDs that are illuminated remain illuminated when the server shuts down as long as the AC power source is good and the power supplies can supply +5V dc current to the server. This feature helps you isolate the problem if an error causes the server to shut down. See “Light path diagnostics table” on page 97.

Power supply LEDs

The AC and DC Power LEDs on the power supply provide status information about the power supply.



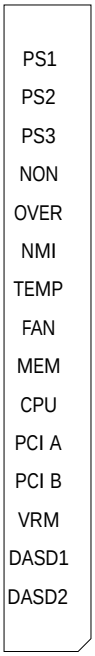
The following table describes the AC and DC Power LEDs.

Table 14. Power supply 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. **Action:** Press the Power Control button to start the server. 2. The power supply has failed. **Action:** Replace 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. **Actions:** Verify that: • The power cord is properly connected to the server. • The power outlet functions properly. 2. The power supply has failed. **Action:** Replace the power supply. If the problem persists, have the system serviced.

Diagnostics panel

The following illustration shows the LEDs on the diagnostics panel on the system board. See “Light path diagnostics table” on page 97 for information on identifying problems using these LEDs.



Light path diagnostics table

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

Table 15. Light path diagnostics

Lit LED on diagnostics panel	**Cause**	**Action**
None	The Advanced System Management Processor has failed.	Verify that the Advanced System Management Processor LED on the system board is on. Have the system serviced.
PS1	Power supply 1 has failed.	Replace power supply 1.
PS2	Power supply 2 has failed.	Replace power supply 2.
PS3	Power supply 3 has failed.	Replace power supply 3.
NON	Power supply redundancy has been lost. **Note:** This LED will not be lit if your server has only one power supply; however, the power is not redundant with only one power supply installed.	• Check the PS1, PS2, and PS3 LEDs and replace any indicated power supply. • Install an additional power supply or remove optional devices from the server.
OVER	The system has exceeded the power capabilities of the installed power supply.	Install an optional additional power supply, or remove optional devices from the server.

Table 15. Light path diagnostics

Lit LED on diagnostics panel	Cause	Action
NMI	A nonmaskable interrupt occurred.	1. If the PCI A or PCI B LED is on, follow the instructions for those LEDs. 2. If neither the PCI A or PCI B LED is on, restart the server. If the problem persists, have the system serviced.
TEMP	The system temperature has exceeded a threshold level.	1. Check to see if a fan has failed. If it has, replace the fan. 2. Make sure the room temperature is not too hot. (See "Features and specifications" on page 1.) If the problem persists, have the system serviced.
FAN	A fan has failed or is operating too slowly. **Note:** A failing fan can also cause the TEMP LED to be on.	Check the LEDs on the fan assemblies and replace the indicated fan assembly.
MEM	A memory error occurred.	1. Check the DIMM failure LEDs on the system board. 2. Replace the DIMM indicated by the lit DIMM failure LED.
CPU	One of the microprocessors has failed or a microprocessor is installed in the wrong connector.	1. Check the microprocessor failure LEDs on the system board. 2. If a microprocessor failure LED is on, make sure the microprocessor is installed correctly (see "Installing a microprocessor" on page 41) and seated correctly. 3. If the problem persists, replace the microprocessor. If the problem persists, have the system serviced.
PCI A	An error occurred on PCI bus A. An adapter in PCI slot 1 or 2 on the system board caused the error.	1. Check the error log for additional information. If the error log indicates a problem with the integrated Ethernet controller or the integrated SCSI controller, have your system serviced. 2. If you cannot isolate the failing adapter from the information in the error log, try to determine the failing adapter by removing one adapter at a time from PCI bus A (PCI slots 1 and 2) and restarting the server after each adapter is removed. If the problem persists, have the system serviced.

Table 15. Light path diagnostics

Lit LED on diagnostics panel	Cause	Action
PCI B	An error occurred on PCI bus B. An adapter in PCI slot 3, 4, or 5 caused the error, or the system board caused the error.	1. Check the error log for additional information. 2. If you cannot isolate the failing adapter from the information in the error log, try to determine the failing adapter by removing one adapter at a time from PCI bus B (PCI slots 3, 4, and 5) and restarting the server after each adapter is removed. If the problem persists, have the system serviced.
VRM	One of the VRMs on the system board has failed.	Check the VRM failure LEDs on the system board. • If the VRM1 Failure LED is on, have the system serviced. • If the VRM2 Failure LED is on: 1. Turn off the server, reseat the VRM, and restart the server. 2. If the problem persists, replace the VRM. If the problem still persists, have the system serviced.
DASD1	SCSI channel A has failed. (This is the SCSI channel for the hot-swap hard disk drives.)	1. If an amber LED on a hot-swap hard disk drive is on, replace the hard disk drive 2. Run the diagnostics programs. Replace any identified failing device. 3. If the error log indicates a temperature problem and the fans are working correctly, have the system serviced. If the problem persists, have the system serviced.
DASD2	SCSI channel B has failed. (This is the channel for optional SCSI devices installed in the non-hot-swap bays.)	1. Run the diagnostics programs. 2. If no failing device is identified by the diagnostics programs, try to determine the failing device by removing one device at a time from the channel and restarting the server after each device is removed. If the problem persists, have the system serviced.

Troubleshooting charts

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

Attention: If diagnostic error messages appear that are not listed in the following tables, make sure that your server has the latest levels of BIOS, Advanced System Management Processor, ServeRAID, and diagnostics microcode installed.

See “Starting the diagnostic programs” on page 84 to test the server. If you have run the diagnostic test programs or if running the tests does not reveal the problem, call for service.

Look for the symptom in the left column of the chart. Instructions and probable solutions to the problem are in the right column. If you have just added new software or a new option and your server is not working, do the following before using the troubleshooting charts:

- Remove the software or device that you just added.
- Run the diagnostic tests to determine if your server is running correctly.
- Reinstall the new software or new device.

Table 16. Troubleshooting charts

Device	Suggested action
CD-ROM drive	Verify that: 1. The primary IDE channel is enabled in the Configuration/Setup Utility program. 2. All cables and jumpers are installed correctly. 3. The correct device driver is installed for the CD-ROM drive.
CD-ROM drive is not recognized.	
Diskette drive	If there is a diskette in the drive, verify that: 1. The diskette drive is enabled in the Configuration/Setup Utility program. 2. The diskette is good and not damaged. (Try another diskette if you have one.) 3. The diskette contains the necessary files to start the server. 4. Your software program is OK. If the diskette drive in-use light stays on, or the system continues to bypass the diskette drive, call for service.
Diskette drive in-use light stays on, or the system bypasses the diskette drive.	
Expansion enclosure problems	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. 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.
The SCSI expansion enclosure used to work, but does not work now.	
General problems	Call for service.
Problems such as broken cover locks or indicator lights not working.	

Table 16. Troubleshooting charts

Device	Suggested action
Intermittent problems A problem occurs only occasionally and is difficult to detect.	Verify that: 1. All cables and cords are connected securely to the rear of the server and attached options. 2. When the server is turned on, air is flowing from the rear of the server at the fan grill. If there is no air flow, the fan is not working. This causes the server to overheat and shut down. 3. Ensure that the SCSI bus and devices are configured correctly and that the last external device in each SCSI chain is terminated correctly. If the items above are correct, call for service.
Keyboard, mouse, or pointing-device problems. All or some keys on the keyboard do not work.	1. Make sure that the keyboard cable is properly connected to the server. 2. Make sure that the server and the monitor are turned on. 3. Try using another keyboard. If the items above are correct, call for service.
The mouse or pointing device does not work.	1. Verify that the mouse or pointing-device cable is securely connected and the device drivers are installed correctly. 2. Try using another mouse or pointing device. If the problem remains, call for service.
Memory problems The amount of memory displayed is less than the amount of memory installed.	Verify that: 1. The memory modules are seated properly. 2. You have installed the correct type of memory. 3. If you changed the memory, you updated the memory configuration with the Configuration/Setup Utility program. 4. All banks of memory on the DIMMs are enabled. The server might have automatically disabled a DIMM bank when it detected a problem or a DIMM bank could have been manually disabled. If the above items are correct, run the memory diagnostic program. The system might have detected a bad memory module and automatically reallocated memory to enable you to continue to operate. If the memory tests fail, call for service or replace the failing DIMM.
Microprocessor problems The server emits a continuous tone during POST.	The startup (boot) microprocessor is not working properly. Verify that the startup microprocessor is seated properly. If it is, replace the startup microprocessor. If the problem remains, call for service.
Monitor problems Testing the monitor.	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, call for service.

Table 16. Troubleshooting charts

Device	Suggested action
The screen is blank.	Verify that: 1. The server power cord is plugged into the server and a working electrical outlet. 2. The monitor cables are connected properly. 3. The monitor is turned on and the Brightness and Contrast controls are adjusted correctly. If the items above are correct and the screen remains blank, call for service.
Only the cursor appears.	Call for service.
The monitor works when you turn on the server, but goes blank when you start some application programs.	Verify that: 1. The primary monitor cable is connected to the video port. 2. You installed the necessary device drivers for the applications. If the items above are correct and the screen remains blank, call for service.
Wavy, unreadable, rolling, distorted screen, or screen jitter.	If the monitor self-tests show 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. To prevent diskette drive read / write errors, be sure the distance between monitors and diskette drives is at least 76 mm (3 in.). 2. Non-IBM monitor cables might cause unpredictable problems. 3. An enhanced monitor cable with additional shielding is available for the 9521 and 9527 monitors. For information about the enhanced monitor cable, see your IBM reseller or IBM marketing representative. If the problem remains, call for service.
Wrong characters appear on the screen.	If the wrong language is displayed, update the BIOS with the correct language. If the problem remains, call for service.
Option problems	Verify that: 1. The option is designed for the server. Refer to the "Support for Netfinity Servers" flowchart for information about obtaining ServerProven™ compatibility information from the World Wide Web. 2. You followed the installation instructions that came with the option. 3. The option is installed correctly. 4. You have not loosened any other installed options or cables. 5. You updated the configuration information in the Configuration / Setup Utility program. Whenever memory or an option is changed, you must update the configuration. If the problem remains, call for service.
An IBM option that was just installed does not work.	

Table 16. Troubleshooting charts

Device	Suggested 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 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. 3. Any external SCSI option is turned on. You must turn on an external SCSI option before turning on the server. If the problem remains, call for service.
Parallel port 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 problem remains, call for service.
Power problems The server does not power on.	Verify that: 1. The power cables are properly connected to the server. 2. The electrical outlet functions properly. 3. The type of memory installed is correct. 4. If you just installed an option, remove it, and restart the server. If the server now powers on, you might have installed more options than the power supply supports. 5. The LEDs on the power supply are on. If the problem remains, call for service.
Printer problems 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 server. **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 documentation that comes with your printer. If the tests show that the printer is OK, call for service.

Table 16. Troubleshooting charts

Device	Suggested action
Serial port problems The number of serial ports identified by the operating system is less than the number of serial ports installed.	Verify that: 1. Each port is assigned a unique address by the Configuration/Setup Utility program and none of the serial ports are disabled. **Note:** The management C connector is the same as a serial port connector, but it is used only by the integrated Netfinity Advanced System Management Processor, and is not available for use by the operating system. This port does not appear in the Configuration/Setup Utility program menus; it can be configured using Netfinity Manager. 2. The serial-port adapter, if you installed one, is seated properly. If the problem still exists, call for service.
A serial device does not work.	Verify that: 1. The device is compatible with the server. 2. The serial port is enabled and is assigned a unique address. 3. Make sure that the device is not connected to the management port C. **Note:** The management C connector is the same as a serial port connector, but it is used only by the integrated Netfinity Advanced System Management Processor and is not available for use by the operating system. This port does not appear in the Configuration/Setup Utility program menus; it can be configured using Netfinity Manager. If the problem still exists, call for service.
Service processor problems Netfinity Service Processor Manager reports a general monitor failure	Disconnect the server from all electrical sources, wait for 30 seconds, reconnect the server to the electrical sources, and restart the server. If a problem remains, call for service.
Software problem Suspected software problem.	To determine if problems are caused by the software, verify that: 1. Your server has the minimum memory requirements needed to use the software. For memory requirements, refer to the information that comes with the software. **Note:** If you have just installed an adapter or memory, you might have a memory address conflict. 2. The software is designed to operate on your server. 3. Other software works on your server. 4. The software that you are using works on another system. If you received any error messages when using the software program, refer to the information that comes with the software for a description of the messages and solutions to the problem. If the items above are correct and the problem remains, contact your place of purchase.

Table 16. Troubleshooting charts

Device	Suggested action
Universal Serial Bus (USB) port problems 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. 3. Your operating system supports USB devices. If the problem still exists, call for service.

Troubleshooting the Ethernet controller

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

Network connection problems

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

- Make sure that the cable is installed correctly.

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

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

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

  Note: To determine whether a hub has an X port, check the port label. If the label contains an *X*, the hub has an X port.
- Determine if the hub supports auto-negotiation. If not, try configuring the integrated Ethernet controller manually to match the speed and duplex mode of the hub.
- Check the Ethernet controller lights on the operator information panel.

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

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

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

  — The Ethernet Speed 100 Mbps light illuminates when the Ethernet controller LAN speed is 100 Mbps.
- Make sure that you are using the correct device drivers, supplied with your server.
- Check for operating system-specific causes for the problem.
- Make sure that the device drivers on the client and server are using the same protocol.
- Test the Ethernet controller.

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

Ethernet controller troubleshooting chart

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

Table 17. Ethernet troubleshooting chart

Ethernet controller problem	Suggested Action
The server stops running when loading device drivers.	The PCI BIOS interrupt settings are incorrect. Check the following: • Determine if the interrupt (IRQ) setting assigned to the Ethernet controller is also assigned to another device in the Configuration/Setup Utility program. Although interrupt sharing is allowed for PCI devices, some devices do not function well when they share an interrupt with a dissimilar PCI device. Try changing the IRQ assigned to the Ethernet controller or the other device. For example, for NetWare Versions 3 and 4 it is recommended that disk controllers not share interrupts with LAN controllers. • Make sure that you are using the most recent device driver available from the World Wide Web. • Run the network diagnostic program. If the problem remains, call for service.
Ethernet Link Status light does not light.	Check the following: • Make sure that the hub is turned on. • Check all connections at the Ethernet controller and the hub. • Check the cable. A crossover cable is required unless the hub has an *X* designation. • Use another port on the hub. • If the hub does not support auto-negotiation, manually configure the Ethernet controller to match the hub. • If you manually configured the duplex mode, make sure that you also manually configure the speed. • Run diagnostics on the LEDs. If the problem remains, call for service.
The Ethernet Transmit/Receive Activity light does not light.	Check the following: **Note:** The Ethernet Transmit/Receive Activity LED illuminates only when data is sent to or by this Ethernet controller. • Make sure that you have loaded the network device drivers. • The network might be idle. Try sending data from this workstation. • Run diagnostics on the LEDs. • The function of this LED can be changed by device driver load parameters. If necessary, remove any LED parameter settings when you load the device drivers.
Data is incorrect or sporadic.	Check the following: • Make sure that you are using Category 5 cabling when operating the server at 100 Mbps. • Make sure that the cables do not run close to noise-inducing sources like fluorescent lights.

Table 17. Ethernet troubleshooting chart

Ethernet controller problem	Suggested Action
The Ethernet controller stopped working when another adapter was added to the server.	Check the following: • Make sure that the cable is connected to the Ethernet controller. • Make sure that your PCI system BIOS is current. • Reseat the adapter. • Determine if the interrupt (IRQ) setting assigned to the Ethernet adapter is also assigned to another device in the Configuration/Setup Utility program. Although interrupt sharing is allowed for PCI devices, some devices do not function well when they share an interrupt with a dissimilar PCI device. Try changing the IRQ assigned to the Ethernet adapter or the other device. If the problem remains, call for service.
The Ethernet controller stopped working without apparent cause.	Check the following: • Run diagnostics for the Ethernet controller. • Try a different connector on the hub. • Reinstall the device drivers. Refer to your operating-system documentation and to the ServerGuide information. If the problem remains, call for service.

Ethernet controller messages

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

- Novell NetWare™ or IntraNetWare Server ODI
- NDIS Adapter for level 2.01 (OS/2)
- NDIS Adapter for level 4.0 (Windows NT)
- SCO™ UNIX LLI

Novell NetWare or IntraNetWare server ODI driver messages

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

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

PCNTNW-NW-026	**The MSM is unable to parse a required custom keyword.** **Explanation:** The user entered an incorrect parameter keyword. **Action:** Reload the driver using the correct keyword.
PCNTNW-NW-054	**The adapter did not respond to the initialization command.** **Explanation:** The adapter did not respond when the driver tried to initialize it. **Action:** Verify that the Ethernet controller is enabled. If the Ethernet controller is enabled, go to “Starting the diagnostic programs” on page 84 to run the diagnostic programs.

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

PCNTNW-NW-058	**The adapter did not respond to the initialization command.** **Explanation:** The interrupt request (IRQ) setting might not be valid or the EEPROM information might be incorrect. **Action:** Make sure the IRQ settings are correct in the Configuration/Setup Utility program. for information on setting the interrupt requests. If the IRQ settings are correct, call for service.
PCNTNW-NW-066	**The cable might be disconnected from the adapter.** **Explanation:** The cable might be disconnected from the server Ethernet port. **Action:** Verify that a cable is connected to the Ethernet port.
PCNTNW-NW-071	**The matching virtual adapter could not be found.** **Explanation:** You tried to load another instance of the driver with a different I/O address. This new adapter could not be found. **Action:** Verify that you installed an IBM Netfinity 10/100 Fault Tolerant Adapter and make sure that the adapter is seated correctly. If the adapter is seated correctly, call for service.
PCNTNW-NW-072	**A resource tag is unavailable**. **Explanation:** The driver tried to allocate some resources that were not available. **Action:** Add more memory, or free some memory resources in the server. Then, restart the server.
PCNTNW-NW-073	**Unable to allocate memory** **Explanation:** The driver failed to allocate the memory needed for normal operation. **Action:** Add more memory, or free some memory resources in the server. Then, restart the server.
PCNTNW-NW-074	**The hardware interrupt cannot be set.** **Explanation:** An attempt was made to initialize a given hardware interrupt. The attempt was not successful. **Action:** Verify that the Ethernet controller is enabled. If the Ethernet controller is enabled, go to “Starting the diagnostic programs” on page 84 to run the diagnostic programs. If you have an Ethernet adapter installed, make sure that the adapter does not share an IRQ with any other device.
PCNTNW-NW-075	**The Multiple Link Interface Driver (MLID) cannot be registered with the Link Support Layer (LSL).** **Explanation:** An error occurred while the driver was trying to register with the LSL. **Action:** Check the version of the NetWare or IntraNetWare Operating System. Make sure that this driver is correct for the version of NetWare or IntraNetWare that you are using. Restart the server.
PCNTNW-NW-079	**The Multiple Link Interface Driver (MLID) did not initialize MSMTx Free Count.** **Explanation:** The MSMTx Free Count is not initialized correctly. **Action:** Restart the server. If the problem persists, call for service.
PCNTNW-NW-086	The driver parameter block is too small. **Explanation:** The driver parameter block is too small.**Action:** Restart the server. If the problem persists, call for service.
PCNTNW-NW-087	The media parameter block is too small. **Explanation:** The driver media parameter block is too small.**Action:** Restart the server. If the problem persists, call for service.

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

PCNTNW-NW-091	The hardware configuration conflicts. **Explanation:** You tried to load a new frame type for the existing controller. The hardware assumptions made in doing so are incorrect. This error can also occur if you try to specify a mode (such as, redundancy) that conflicts with another specified mode. **Action:** Make sure that your hardware configuration matches the software settings.
PCNTNW-NW-126	The group bit in the node address override was cleared. **Explanation:** The IEEE address has a group bit that indicates that an address belongs to a group of stations. This bit is used only as a destination address; it cannot be used as a source address. You tried to enter a source address with this bit set. The driver cleared the group bit of the source address. **Action:** None necessary, message is for information only.
PCNTNW-NW-127	The local bit in the node address override was set. **Explanation:** The local bit in the IEEE address format indicates that the addresses are being managed locally. If you use the node address override capabilities of this driver to enter a new address, the local bit must be set. You entered an address without the local bit set. The driver has set the local bit. **Action:** None necessary, message is for information only.
PCNTNW-NW-164	The device was not found. **Explanation:** The driver cannot find an Ethernet controller in the server. **Action:** Verify that the Ethernet controller is enabled. If the Ethernet controller is enabled, go to “Starting the diagnostic programs” on page 84 to run the diagnostic programs.
PCNTNW-NW-165	The device was not found at IOADDRESS. **Explanation:** The Ethernet controller cannot be found at the I/O address specified.**Action:** The Ethernet controller does not require a parameter for the I/O address. Remove the I/O address parameter.
PCNTNW-NW-167	PCI scan specified, device not found. **Explanation:** The driver cannot locate the Ethernet controller on the PCI bus. **Action:** Verify that the Ethernet controller is enabled. If the problem persists, go to “Starting the diagnostic programs” on page 84 to run the diagnostic programs.
PCNTNW-NW-180	The DMA parameter is not necessary for PCI device. **Explanation:** The Ethernet controller does not require a DMA setting.**Action:** None necessary, message is for information only.

Network driver interface specification 2.01 (OS/2) driver messages

This section provides explanations of the error messages for the NDIS 2.01 (OS/2) drivers, and suggested actions to resolve each problem.

Table 19. NDIS 2.01 (OS/2) driver messages for the Ethernet controller

PCNTND-1	**Unable to open the Protocol Manager**. **Explanation:** The NDIS stack is not configured correctly. **Action:** Check and correct your configuration.
PCNTND-6	Out of memory while allocating buffers. **Explanation:** The driver could not allocate the requested buffers. **Action:** Check your system configuration. Edit the PROTOCOL.INI file to reduce the number of Txbuffers and Rxbuffers specified for the driver.

Table 19. NDIS 2.01 (OS/2) driver messages for the Ethernet controller

PCNTND-7	A Protocol Manager device error occurred. **Explanation:** The NDIS stack is not configured correctly. **Action:** Check and correct your configuration.
PCNTND-8	Bad status for the Protocol Manager. **Explanation:** The NDIS stack is not configured correctly in the PROTOCOL.INI file. **Action:** Check and correct your configuration.
PCNTND-9	Cannot find the PROTOCOL.INI entry. **Explanation:** The NDIS stack is not configured correctly in the PROTOCOL.INI file. **Action:** Check and correct your configuration.
PCNTND-10	The Protocol Manager Input Output Control (IOCTL) failed. **Explanation:** The NDIS stack is not configured correctly in the PROTOCOL.INI file. **Action:** Check and correct your configuration.
PCNTND-11	Protocol Manager registration failed. **Explanation:** The NDIS stack is not configured correctly. **Action:** Check and correct your configuration.
PCNTND-15	Device not found. **Explanation:** The driver cannot find an Ethernet controller in the server. **Action:** Verify that the Ethernet controller is enabled. If the Ethernet controller is enabled, go to “Starting the diagnostic programs” on page 84 to run the diagnostic programs.
PCNTND-16	PCI scan specified, device not found. **Explanation:** The driver cannot locate the Ethernet controller on the PCI bus.**Action:** Verify that the Ethernet controller is enabled. If the Ethernet controller is enabled, go to “Starting the diagnostic programs” on page 84 to run the diagnostic programs.
PCNTND-21	The adapter failed the checksum test. **Explanation:** The driver cannot find an Ethernet controller.**Action:** Verify that the Ethernet controller is enabled. If the Ethernet controller is enabled, go to “Starting the diagnostic programs” on page 84 to run the diagnostic programs.
PCNTND-23	**WARNING: PCNET IRQ found =** *xx* **Explanation:** The interrupt request (IRQ) setting (*xx*) in the PROTOCOL.INI file does not match the hardware IRQ setting. **Action:** Remove the IRQ setting from the PROTOCOL.INI file or change the IRQ setting in the PROTOCOL.INI file to match the IRQ setting shown in the **PCI Slot/Device Information** selection of the Advanced Setup menu in the Configuration/Setup Utility program.
PCNTND-24	WARNING: PCNET IRQ does not match PROTOCOL.INI. **Explanation:** The interrupt request (IRQ) setting in the PROTOCOL.INI file does not match the hardware IRQ setting. **Action:** Remove the IRQ setting from the PROTOCOL.INI file or change the IRQ setting in the PROTOCOL.INI file to match the IRQ setting shown in the **PCI Slot/Device Information** selection of the Advanced Setup menu in the Configuration/Setup Utility program.
PCNTND-25	PCI scan specified, PCI bus not found! **Explanation:** The driver cannot locate the PCI bus. **Action:** Run the diagnostic programs.

Table 19. NDIS 2.01 (OS/2) driver messages for the Ethernet controller

PCNTND-29	WARNING: DMA number is not necessary for PCI device. **Explanation:** The Ethernet controller does not require a DMA setting.**Action:** Remove the DMA setting in the PROTOCOL.INI file.
PCNTND-33	PCNET device with specified IOBASE is already in use. **Explanation:** The specified I/O address number is already in use by another Ethernet controller or device. **Action**: Remove the I/O address setting in the PROTOCOL.INI file.

NDIS 4.0 (Windows NT) driver messages

This section contains the error messages for the NDIS 4.0 drivers. The explanation and recommended action are included with each message.

Table 20. NDIS (Windows NT) driver messages for the Ethernet controller

PermaNet™Server:	No Secondary Adapter Found. Grouping Mode is disabled. **Explanation:** The failover option requires an adapter that is compatible with the device driver of the Ethernet controller on the system board. No such adapter was found. **Action:** Make sure the correct adapter is installed.
PermaNet Server:	Problem Occurs on the Primary Adapter. Switching over to the Secondary Adapter. **Explanation:** The system detected a problem with the primary Ethernet connection and has transferred all network traffic to the secondary Ethernet controller. **Action:** Identify the cause of the failure on the primary Ethernet connection. Restoring the operational state of the primary connection will cause the network traffic to automatically transfer to the primary Ethernet controller.
PermaNet Server:	Switching back to Primary Adapter. **Explanation:** The primary Ethernet connection is now operating correctly. Network traffic will automatically transfer to the primary Ethernet controller. **Action**: None needed, message is for information only.

UNIX messages

This section provides descriptions of the Ethernet error messages for the SCO UNIX LLI driver, and suggested actions to resolve each problem.

Table 21. UNIX LLI driver messages for the Ethernet controller

pnt0-2	**PCI search specified, PCI device not found!** **Explanation**: The driver cannot locate the Ethernet controller on the PCI bus. **Action:** • Run the NETCONFIG program to search for another Ethernet controller • Verify that the Ethernet controller is enabled. If the Ethernet controller is enabled, run the diagnostic programs.
pnt0-6	Cannot allocate memory for the adapter during an interrupt. Please check your Streams parameters. **Explanation**: On a SunSoft Solaris system, this message indicates that the system is out of Streams memory blocks. **Action**: Use the CRASH utility to increase the number of Streams memory blocks. Modify the interrupt request (IRQ) settings in the Configuration/Setup Utility program, or run the NETCONFIG program to match the hardware settings.

Table 21. UNIX LLI driver messages for the Ethernet controller

pnt0-7	Cannot allocate memory for the adapter during reset. Please check your Streams parameters. **Explanation:** The system is out of Streams memory blocks. **Action:** Use the CRASH utility to increase the number of Streams memory blocks.
pnt0-11	**Device not found!** **Explanation:** The driver cannot find an Ethernet controller. **Action:** Verify that the Ethernet controller is enabled. If the Ethernet controller is enabled, run the diagnostic programs.
pnt0-12	Device failed checksum test! **Explanation:** The driver cannot find an Ethernet controller. **Action:** Verify that the Ethernet controller is enabled. If the Ethernet controller is enabled, run the diagnostic programs.
pnt0-13	add_intr_handler failed! Interrupts already enabled. **Explanation:** The interrupt request (IRQ) that was specified, or the IRQ that was found, conflicts with other devices in the server. **Action**: Modify your hardware settings.
pnt0-14	Cannot locate hardware. **Explanation:** The SunSoft Solaris driver cannot find any Ethernet controller. **Action:** Verify that the Ethernet controller is enabled. If the Ethernet controller is enabled, run the diagnostic programs.
pnt0-15	No more devices to open. **Explanation:** The SunSoft Solaris driver cannot find any more Ethernet controllers. **Action:** Verify that additional IBM Netfinity 10/100 Fault Tolerant Adapters are present or replace the Ethernet adapter that fails to respond. If the problem persists, run the diagnostic programs.
pnt0-17	Device fault...Reset initiated! **Explanation:** The SunSoft Solaris driver has been reset due to a device fault. **Action:** Verify that additional IBM Netfinity 10/100 Fault Tolerant Adapters are present or replace the Ethernet adapter that fails to respond. If the problem persists, run the diagnostic programs.
pnt0-19	IRQ found for PCnet hardware does not match space.c (or pnt.conf)! **Explanation:** This is a warning message referring to the interrupt request (IRQ) that the SunSoft Solaris driver found in the system. **Action**: Ignore this message if you are sure that this is what you want to do. Otherwise, run the NETCONFIG program to match the hardware settings
pnt0-20	add_intr_handler failed! Unknown interrupt type. **Explanation:** The interrupt request (IRQ) that was specified, or the IRQ that was found, conflicts with other devices in the server. **Action**: • Modify your hardware settings. • Run the NETCONFIG program to search for another Ethernet controller.
pnt0-21	add_intr_handler failed! Out of range interrupt number. **Explanation:** The interrupt request (IRQ) that was specified, or the IRQ that was found, conflicts with other devices in the server. **Action**: • Modify your hardware settings. • Run the NETCONFIG program to search for another Ethernet controller.
pnt0-22	add_intr_handler failed! Out of range IPL. **Explanation:** The interrupt request (IRQ) that was specified, or the IRQ that was found, conflicts with other devices in the server. **Action**: Modify your hardware settings. Run the NETCONFIG program to search for another Ethernet controller.

Table 21. UNIX LLI driver messages for the Ethernet controller

pnt0-23	add_intr_handler failed! Vector already occupied. **Explanation:** The interrupt request (IRQ) that was specified, or the IRQ that was found, conflicts with other devices in the server. **Action:** Modify your hardware settings.
pnt0-24	add_intr_handler failed! Vector already shared at different IPL. **Explanation:** The interrupt request (IRQ) that was specified, or the IRQ that was found, conflicts with other devices in the server. **Action:** • Modify your hardware settings. • Run the NETCONFIG program to search for another Ethernet controller.
pnt0-26	The DMA number is not necessary for PCI device. **Explanation:** The IBM Netfinity 10/100 Fault Tolerant Adapter does not require a DMA setting. **Action:** Edit the SPACE.C file to delete the DMA parameter.
pnt0-29	The IRQ number is already in use. **Explanation:** The specified I/O address is already in use. **Action:** Run the NETCONFIG program to modify your hardware settings.
pnt0-31	I/O address is not necessary for the PCI device. **Explanation:** The I/O address specified is not required. **Action:** Remove the assigned I/O address specified for the Ethernet controller

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.

Note: In the U.S., call 1-800-IBM-4333 for information about 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 1-800-772-2227 within the United States, and 1-800-465-7999 or 1-800-465-6666 within Canada. Outside the U.S. and Canada, call your IBM reseller or IBM marketing representative.

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

Statement 2

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

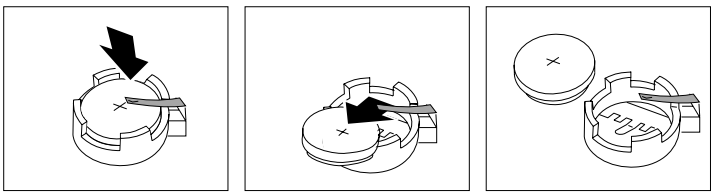
Do not:

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

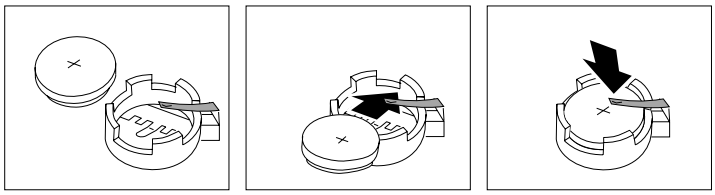
Dispose of the battery as required by local ordinances or regulations.

To replace the battery:

1. Read “Before you begin” on page 19, and follow any special handling and installation instructions supplied with the replacement battery.
2. Turn off the server and peripheral devices and disconnect all external cables and power cords; then, remove the server cover.
3. Remove the battery:
   a. Use one finger to lift the battery clip over the battery.
   b. Use one finger to slightly slide the battery out from its socket. The spring mechanism will push the battery out toward you as you slide it from the socket.
   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.



4. Insert the new battery:
   a. Tilt the battery so that you can insert it into the socket, under the battery clip.
   b. As you slide it under the battery clip, press the battery down into the socket.



5. Reinstall the server cover and connect the cables.

   Note: 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.

6. Turn on the server.
7. Start the Configuration/Setup Utility program and set configuration parameters.
   - Set the system date and time.
   - Set the power-on password.
   - Reconfigure your server.

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/netfinity	IBM Netfinity 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 119 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

Refer to 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, refer to the POST error-message charts in your hardware documentation. If you do not receive a POST error code, but suspect a hardware problem, refer to the troubleshooting information in your hardware documentation 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/netfinity

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. Expert technical-support representatives are available to assist you with questions you might have on the following:

- Setting up your computer and IBM monitor
- Installing and setting up IBM options purchased from IBM or an IBM reseller
- 30-day, preinstalled-operating-system support
- Arranging for service (on-site or carry-in)
- Arranging for overnight shipment of customer-replaceable parts

In addition, if you purchased an IBM PC Server or IBM Netfinity Server, you are eligible for IBM Start Up Support for 90 days after installation. This service provides assistance for:

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

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.[1]

Country		Number
Austria	Österreich	1-546 585 075
Belgium - Dutch	Belgie	02-717-2504
Belgium - French	Belgique	02-717-2503
Canada	Canada	1-800-565-3344
Denmark	Danmark	03-525-6905
Finland	Suomi	9-22-931805
France	France	01-69-32-40-03
Germany	Deutschland	069-6654-9003
Ireland	Ireland	01-815-9207
Italy	Italia	02-4827-5003
Luxembourg	Luxembourg	298-977-5060
Netherlands	Nederland	020-504-0531
Norway	Norge	2-305-3203
Portugal	Portugal	01-791-5147
Spain	España	091-662-4270

1.Response time will vary depending on the number and complexity of incoming calls.

Sweden	Sverige	08-632-0063
Switzerland - German	Schweiz	01-212-1810
Switzerland - French	Suisse	022-310-0418
Switzerland - Italian	Svizzera	091-971-0523
United Kingdom	United Kingdom	01475-555555
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 121.

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”.

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.

Chapter 5. Using the Recovery and Supplementary CDs

This chapter describes the applications included on the xSeries 150 Supplementary and Recovery CDs, and how and when you should use them.

Note: The IBM xSeries 150 is a preloaded appliance server. Changing the preloaded software configuration in any way, including applying or installing unauthorized service packs or updates to preinstalled software, or installing additional software products that are not included in either the preloaded image or on the Supplementary CD is not supported and could cause unpredictable results. To correct problems with a preloaded software component, you must backup your user and system data; then, use the Recovery CD to restore the preloaded software image. You can obtain IBM authorized updates for this preloaded appliance from the following site:

`http://www.ibm.com/eserver/xseries`

Using the Recovery Enablement Diskette and Recovery CD

The Recovery CD is a startable CD that contains the preload image for your xSeries 150 and is used to recover the preloaded image on your server. You must start your server using the Recovery Enablement Diskette before you will be able to use the Recovery CD.

Important

The Recovery Enablement Diskette enables the xSeries 150 to start from the CD-ROM drive. You will not be able to restore the preload image from the Recovery CD without first restarting the server using the Recovery Enablement Diskette.

To recover the preloaded image on your server:

1. Insert the diskette into the diskette drive and restart the server.

   When the Recovery Enablement Diskette has completed loading and reconfiguring your server startup sequence the server will begin beeping. Do not continue with this procedure until the server begins beeping.
2. Remove the Recovery Enablement Diskette from the diskette drive.
3. Place the Recovery CD in the CD-ROM drive and restart the server.

The recovery process will begin automatically and the original manufacturing preload will be restored. After the preload image is restored the system restarts automatically and all final operating system configuration changes are performed.

Important

After the server restarts a series of configuration and system preparation programs that finish configuring the NOS are run automatically. These programs must finish running before you use any included applications (such as the IBM Advanced Appliance Configuration Utility or the Terminal Services Client) to connect to or configure your xSeries 150. Do not connect to or configure the xSeries 150 for at least 15 minutes after system restart. This notice applies only to the first time the xSeries 150 is started after using the Recovery CD.

Note: Logical Disk 0 will be configured to a 2GB NTFS boot partition. Any other previously configured logical disk drives will be left unchanged.

Important

The xSeries 150 is a "headless" system, meaning that there is no keyboard or mouse is attached to the server. Because of this, the preload image restore process cannot require interaction. Starting the Recovery CD will, without prompting the user, automatically destroy all data on the system drive. Use the Recovery Enablement Diskette and Recovery CD only when it is absolutely necessary to restore the preloaded system image.

Using the Supplementary CD

The Supplementary CD contains documentation and copies of key software applications that are preinstalled on your xSeries 150. The following table includes the names of the directories found on the Supplementary CD and a description of the contents of the directory.

Directory Name	Contents
IBM Advanced Appliance Configuration	IBM Advanced Appliance Configuration console and agent installation files. The IBM Advanced Appliance Configuration agent is preinstalled as a Windows Powered service on the xSeries 150. To install the Advanced Appliance Configuration console, run setup.exe from the *x*:\IBM Advanced Appliance Configuration directory, where *x* is the drive letter assigned to your CD-ROM drive.
DiskImages	Self-extracting diskette images for the Recovery Enablement Diskette (RecovDsk.exe) and the ServeRAID Configuration Reset diskette (SR33YCFG.EXE, SR3XYCFG.EXE). To make a diskette, run the executable file and insert HD 1.44 floppy diskette into drive A: when prompted. Be sure to read the readme!.txt file located in this directory for last minute and model specific updates. **Attention**: Starting your system with the ServeRAID Configuration Reset diskette will reset your ServeRAID adapter to factory default settings. All data stored in your ServeRAID array will be lost. Use this diskette only if you want to reset the xSeries 150 to factory default settings.
I386	Windows Powered installation files. If you add device drivers, OS features, etc, you may be prompted to insert your Windows Powered CD-ROM. If so, insert the Supplementary CD, and specify path *x*:\i386 where *x* is the drive letter assigned to your CD-ROM drive.

Directory Name	Contents
Services for UNIX 2.0	SFU 2.0 installation files. If you add features that are not preloaded, you will be prompted for this CD.
Terminal Services Client	The stand-alone Win32 Terminal Services Client application. The NAS appliance supports web-based terminal services, so this is an optional installation. To install the Terminal Services Client, run setup.exe from the Disk1 subdirectory.
readme.txt	This is a text file that describes the contents of the Supplementary CD.

Chapter 6. Appliance Configuration Programs

Your xSeries appliance server comes with programs that can be used to configure, manage, and maintain your appliance server. These configuration programs include:

- **Universal Manageability Services**

  Universal Manageability Services (UM Services) provides point-to-point remote management of client systems through a Web browser window. Use UM Services to:

  — Learn detailed inventory information about your computers, including operating system, memory, network cards and hardware.

  — Track your computers proactively with features such as power management, event log, and system monitor capabilities.

  — Upwardly integrate with Tivoli Enterprise, Tivoli NetView, Computer Associates Unicenter, Microsoft SMS, and Intel LANDesk Management Suite.

- **IBM Advanced Appliance Configuration Utility**

  The Advanced Appliance Configuration Utility aids in setting up and reconfiguring the network configuration on your appliance servers. The Advanced Appliance Configuration Utility agent, preinstalled on your IBM xSeries appliance, works with the Advanced Appliance Configuration Utility console to automatically detect the presence of appliances on the network. Once the appliance server is detected by the Advanced Appliance Configuration Utility console, use the Advanced Appliance Configuration Utility to set up and manage the appliance's network configuration, including assigning the IP address, default gateway, network mask, and DNS server to be used by the appliance. You can also use the Advanced Appliance Configuration Utility to start UM Services on the appliance, enabling you to perform more advanced systems management tasks.

- **Terminal Services Client**

  Because your xSeries appliance server is installed in a "headless" environment (meaning that the appliance does not have a mouse or keyboard attached to it), you must perform systems management tasks on the appliance from a remote systems management console. The Terminal Services Client, when installed on a workstation that is attached to the same network as the appliance server, enables remote administration of the appliance.

Information about each of these appliance configuration programs follows.

Universal Manageability Services

Universal Manageability Services (UM Services) is a suite of graphical user interfaces (GUIs) that enhances the local or remote administration, monitoring, and maintenance of IBM systems. UM Services is a lightweight client that resides on each managed computer system. With UM Services, a client-system user or remote systems administrator can use a supported Web browser or the Microsoft Management Console (MMC) and UM Services Web console support to inventory, monitor, and troubleshoot IBM systems on which UM Services is installed.

This "point-to-point" systems-management approach, in which a system-management administrator uses a Web browser to connect directly to a remote client system, can be

used to enhance support and to enable systems administrators to effectively maintain IBM systems without requiring them to install additional systems-management software on their administrator console.

In addition to point-to-point systems-management support, UM Services also includes support for UM Services Upward Integration Modules (Aims). Aims enable systems-management professionals who use any supported systems-management platform (including Tivoli Enterprise, CA Unicenter TNG Framework, and Microsoft Systems Management Server (SMS) to integrate portions of UM Services into their systems-management console. Because it was designed to use industry-standard information gathering technologies and messaging protocols (including Common Information Model (CIM), Desktop Management Interface (DMI), and Simple Network Management Protocol (SNMP), UM Services adds value to any of these supported workgroup or enterprise system-management platforms.

Complete documentation on how to use UM Services is included on the *IBM xSeries 150 Documentation CD*.

System Requirements

The UM Services client is preinstalled on your xSeries appliance server. However, you must have a supported web browser installed on your systems management console. Supported browsers include:

- Microsoft Internet Explorer 4.01 or later

  Notes:

  1. If you are using Internet Explorer 5.x, you must install the optional Java Virtual Machine (VM) support to access a client system running UM Services.
  2. If you are using Internet Explorer and you reinstall Internet Explorer after installing UM Services you must reapply the Microsoft VM update. The UM Services client requires Microsoft VM Build 3165 or later. Download the latest Microsoft VM from

     `http://www.microsoft.com/java`

- Netscape Navigator or Netscape Communicator 4.5 or later
- Microsoft Management Console (MMC) 1.1 or later

  Note: If you install UM Services before you install MMC 1.1 or later you will not have an icon for Microsoft Management Console in the IBM Universal Manageability Services section of your Start Menu.

Starting UM Services

Before you can use UM Services, you must configure the network settings (such as IP address, subnet mask, and so forth) on your xSeries appliance server. You can use IBM Advanced Appliance Configuration Utility or Windows Terminal Services Client to configure the network setting remotely, or you can attach a keyboard and mouse to your appliance server and configure the Network settings using the Windows Control Panel. Once you have configured the network settings for your appliance, you are ready to use UM Services.

To start UM Services:

1. Start your web browser and then type in the **Address** or **Location** field of the browser

   `http://`*`ip_address`*`:1411`

   where *ip_address* is IP address of the appliance server, and then press **Enter**.

Or, type

`http://ibm-xxxxxxx:1411`

where *xxxxxxx* is the IBM serial number of the appliance, and then **Enter**.

2. A user login window appears. Type Administrator in the Username field, and type password for the Password field. You can leave domain blank. Make sure the "Save this password in your password list" checkbox is not checked, and then click **OK**.

   Note: The first time you connect you may be prompted to install XML and Swing components. Follow the on-screen instructions to install these components, then close and restart Internet Explorer before you proceed.

3. You are now connected to the appliance via UMS. Complete documentation on how to use UM Services is included on the *IBM xSeries 150 Documentation CD*. In additional to the standard UM Services functionality, your xSeries applaince includes additional functionality, available from the Applainces tab in the UM Services console. The default view when you connect to your appliance the Terminal Services panel, which displays a Windows 2000 Terminal Services Web Connection page. To connect to the appliance to manage it as though you were running Terminal Services Client from your desktop:

   a. Type in the IP address field the IP Address of the server (seen in upper left hand corner of left UMS panel), or enter IBM-{xxxxxxx} (where *xxxxxxx* is the serial number that appears on the front of the appliance).

   b. Choose a size other than full screen which the Appliance desktop will appear in, then click **Connect** to start the Terminal Services Client session on the appliance. A user login widow appears.

   c. Log into the appliance. Type Administrator in the Username field, type pass word in the password field, and then click OK to log in. Once you have logged in, you can begin using Terminal Services Cleint to configure and manage your appliance.

      Note: To ensure system security, use Windows Powered to change the Administrator password from "password" to something else. Once you do, or if you create another user in the Administrator group in the future, use your new username / password combination instead of the default username / password combination.

IBM Advanced Appliance Configuration Utility

The IBM Advanced Appliance Configuration Utility aids in setting up and reconfiguring the network configuration on your xSeries appliance servers. The Advanced Appliance Configuration Utility agent, preinstalled on your IBM xSeries appliance, works with the Advanced Appliance Configuration Utility console, a Java-based application that is installed on a network-attached system that will be used as a systems management console that enables you to automatically detect the presence of xSeries appliances on the network. Once the xSeries appliance is detected by the Advanced Appliance Configuration Utility console, use the Advanced Appliance Configuration Utility to set up and manage the appliance's network configuration, including assigning the IP address, default gateway, network mask, and DNS server to be used by the appliance. You can also use the Advanced Appliance Configuration Utility to start *Universal Manageability Services* (*UM Services*) on the appliance, enabling you to perform more advanced systems management tasks.

Networks that are not currently running DHCP servers will find the Advanced Appliance Configuration Utility particularly useful for automatically configuring network settings for newly added appliance servers. However, networks with DHCP servers will benefit from using the Advanced Appliance Configuration Utility as it enables the systems administrator to reserve and assign the appliance IP address in an

orderly, automated fashion. Even if the customer decides to use DHCP and does not choose to reserve an IP address for the appliance, the Advanced Appliance Configuration Utility can still be used to discover appliances and to start UM Services web-based systems management.

Notes:

1. The Advanced Appliance Configuration configures and reports the TCP/IP settings of the first adapter on each appliance server only. The first adapter is typically the built-in Ethernet controller. Be sure to connect the built-in Ethernet connector to the same physical network as your systems management console.
2. The Advanced Appliance Configuration Utility must be running to configure newly installed appliance servers automatically.
3. The system running the Advanced Appliance Configuration Utility console automatically maintains a copy of its database (ServerConfiguration.dat) in the Advanced Appliance Configuration Station installation directory. To remove previous configuration data, close the Advanced Appliance Configuration Utility, delete this file, and then restart the utility. This deletes all previously configured Families. However, the Advanced Appliance Configuration Utility will discover connected xSeries appliances and their network settings.

The Advanced Appliance Configuration Utility Agent

Once your appliance is connected to your network, the Advanced Appliance Configuration Utility agent automatically reports the appliance's MAC address (of the first NIC only), serial number, type of appliance, and whether DHCP in use by the appliance or not. Furthermore, it will report the hostname, primary IP address, subnet mask, primary DNS address, and primary gateway address if these are configured on the system.

The Advanced Appliance Configuration Utility agent is preinstalled on your xSeries appliance.

Note: The Advanced Appliance Configuration Utility agent periodically broadcasts the appliance server IP settings. To prevent the service from broadcasting this data periodically, stop the iaaconfig service.

The Advanced Appliance Configuration Utility Console

The Advanced Appliance Configuration Utility Console is a Java application that you install on one system in your network that will be used as a systems management console. For information on how to install the Advanced Appliance Configuration Utility Console, see "Using the Supplementary CD" on page 124.

Note: Do not install the Advanced Appliance Configuration Utility Console on more than one systems management console.

The Advanced Appliance Configuration Utility Console enables you to:

- Automatically discover xSeries appliance servers that run the Advanced Appliance Configuration Utility agent and are attached to the same physical subnet as the Advanced Appliance Configuration Utility Console.

  When you start the Advanced Appliance Configuration Utility Console it automatically detects all appliance servers on your physical subnet that are running the Advanced Appliance Configuration Utility agent.

- Use a simple, GUI-based application to configure the appliance servers network settings.

  Use the Advanced Appliance Configuration Utility to assign IP addresses, DNS and gateway server addresses, subnet masks, hostnames, and more.

- Automatically group discovered appliances into function-specific Families.

  Appliances are added to a Family based on the appliance type. Appliances running different operating systems, but which perform the same function, appear in the same Family.

- Start UM Services web-based systems management console.

  Launch UM Services on your appliance servers and perform advanced systems management tasks on a selected appliance server with a single mouse click.

The Advanced Appliance Configuration Utility Console is divided into two panes:

- The Tree View Pane

  The Tree View Pane, located on the left side of the Advanced Appliance Configuration Utility Console window, presents a list of all discovered xSeries appliances and includes any Families you have previously defined. The Tree View Pane also includes groups for appliances that do not fit any of the defined Families, that were not configured using the Advanced Appliance Configuration Utility, or that have IP addresses that conflict with other devices on your network. When you click on any item in the Tree View information about that item (and any items which are nested below that item in the tree view) information about the selected item appears in the Information Pane.

- The Information Pane

  The Information Pane, located at the right side of the Advanced Appliance Configuration Utility Console, displays information about the item that is currently selected in the Tree View Pane. The information that appears in the Information Pane varies depending on the item that is selected. For example, if you select the All Appliances item from the Tree View Pane, the Information Pane displays configuration information (IP settings, hostname, serial number, and so forth) about all of the xSeries appliances that have been discovered by the Advanced Appliance Configuration Utility Console. However, if you select a Family, the Information Pane displays information about the Family settings for the selected Family.

The Advanced Appliance Configuration Utility Console also features the following menus:

- File

  Use the selections available form the File menu to import or export the Advanced Appliance Configuration Utility Console configuration data, to rescan the network, or to exit the program.

- Family Use the selections available from the Family menu to add or delete Families, or to move Families up or down in the tree view.

- Appliance Use the selections available form the Appliance menu to remove a previously discovered appliance from a Family or group, and to add an appliance to the first matching Family in the tree view.

- Help

  Use the Help menu to display product information.

Discovering xSeries Appliances

Any xSeries appliance server that is running and is connected to the same subnet as the system running the Advanced Appliance Configuration Utility console is automatically discovered when you start the Advanced Appliance Configuration Utility console. Discovered appliances appear in the Advanced Appliance Configuration Utility console tree view (found in the left pane of the Advanced Appliance Configuration Utility console window). Each appliance will appear in two locations in the tree view:

1. Every discovered appliance is listed in the tree view under All Appliances.
2. Each discovered appliance will also appear in one of the following portions of the tree view:
   - In a *Family*

     If the discovered appliance fits the requirements of a Family, it will automatically appear as part of a Family.

     Note: If a discovered appliance fits the requirements of more than one Family, it is automatically added to the first appropriate Family that is listed in the tree view, starting from the top of the tree. For information on how to move appliances between families, see "Using Families and Groups in the Tree View".
   - In the *Orphaned Appliances* group

     If the discovered appliance does not fit a previously configured Family, it is placed in the *Orphaned Appliances* group.
   - In the *Orphaned Externally Configured Appliances* group

     Appliances that are running the Advanced Appliance Configuration Utility agent, but that have a network configuration that was not set by the Advanced Appliance Configuration Utility agent or console, will appear in the *Orphaned Externally Configured Appliances* group. If an appliance is contained in the Orphaned Externally Configured Appliances group you can use the Adopt By First Matching Family function to add it to a previously defined Family. For more information, see "Using the Adopt by First Matching Family Function" on page 135.

Using Families and Groups in the Tree View

Families are important elements of the Advanced Appliance Configuration Utility. They specify the parameters the Advanced Appliance Configuration Utility uses to automatically categorize discovered appliances and to configure them with the appropriate network settings. Family rules are defined solely by appliance type or purpose. Each Family can contain only one type of appliance. The only way to automatically apply predetermined network settings to newly installed and discovered appliance servers is to create and use Families.

Appliance servers that match the rules criteria for a Family group can be automatically configured to use predefined network settings. A Family can be configured to allow appliances to use DHCP to configure their IP settings, or can be defined to automatically assign IP settings (such as primary gateway and DNS server addresses, assigning an IP address from a specified IP address range, and specifying a subnet mask). Host names for discovered appliances can also be defined so that they are allocated using either a Prefix or Serial Number.

The Advanced Appliance Configuration Utility is not the only way to configure network settings. For example, network settings can be configured using Terminal Services for Windows or by attaching a keyboard and mouse to the appliance and using Windows Control Panel on the server. If the appliance network settings have been configured by a method other than using the Advanced Appliance Configuration Utility the appliance will be discovered by the Advanced Appliance Configuration Utility and it will be added to an appropriate Family, if one exists. Appliances that have been configured using a method other than the Advanced Appliance Configuration Utility for which no appropriate family exists will appear in the Orphaned Externally Configured Appliances group.

The Tree View Panel contains the following items:

- All Appliances Every discovered appliance is listed in the tree view under All Appliances.

- Families

  The Families group in the Tree View Pane shows all Families that have been defined, with appliance servers that have already been assigned to each Family nested beneath the Family name in the tree view. Families are defined by appliance purpose so all appliances that appear in a given family are of the same type. If you select a Family from the Tree View Pane a description of the Family and the rules that are used to define the selected Family are displayed in the Information Pane. If you select an appliance server from a Family in the Tree View Pane, the selected appliance network settings are displayed in the Information Pane.

  If you are not using DHCP, the Advanced Appliance Configuration Utility automatically assigns one IP address per appliance server, using available addresses within the range defined in the Family rules. When a Family's IP address range has been exhausted, the Advanced Appliance Configuration Utility automatically searches for other Families that have rules matching the appliance server being configured. If a matching Family with an available address is found, the server will automatically be assigned to the Family that has available IP addresses. This enables you to define multiple Families, each of which uses a range of non-contiguous IP address ranges.

  When an appliance is discovered on the network, the Advanced Appliance Configuration Utility automatically searches all previously defined Families, starting with the first Family listed in the Families tree view and moving downward. Appliances are automatically added to the first defined Family that matches the appliance purpose. Therefore, the order in which Families appear is important. To adjust this search order, right click on a Family and then select Move Up or Move Down to adjust its position within the Families list.

- Orphaned Appliances

  Any discovered appliance servers that have been configured using the Advanced Appliance Configuration Utility but that do not meet the rules for any existing Family are automatically added to the Orphaned Appliances group.

- Orphaned Externally Configured Appliances

  Any discovered appliance server that has been configured without using the Advanced Appliance Configuration Utility tool and that does not meet the rules for any existing Family is automatically added to the Orphaned Externally Configured Appliances group. Appliance servers configured without the Advanced Appliance Configuration Utility that meet the rules for any existing Family are automatically added to the matching Family. To add an Orphaned Externally configured Appliance to an appropriate Family that was created after the orphaned appliance was discovered, right-click on the orphaned appliance and select **Adopt by First Matching Family**. For more information, see "Using the Adopt by First Matching Family Function" on page 135.

  Note: The Advanced Appliance Configuration Utility will not change manually configured network settings of discovered appliance servers. If the manually configured IP and Subnet addresses fit an existing Family, the Advanced Appliance Configuration Utility will place that appliance server into that Family, but will not change any other settings (such as Host Name or DNS or Gateway addresses).

- Conflicting Network Addresses

  Any discovered appliance server that has the same IP address as a previously discovered appliance server will be listed in the Conflicting Network Addresses group.

Creating a Family: To create a Family:

1. Select **Create Family** from the Family menu.

The Advanced Appliance Configuration Utility Family Setup window appears.

2. Select the Appliance Family Rules.

   The Appliance Family Rules determine what purpose an appliance must serve to be included in the Family. You can select one of the following values:

   - IBM xSeries 150
   - IBM xSeries 130 and 135

3. Specify a Family name.

   Type in the Family Name field that name that will be used for this Family.

4. Specify network resources to be used by members of the Family.

   You can use the Advanced Appliance Configuration Utility to assign network resources for members of this Family, to you can use a DHCP server to assign network resources.

   - To use the Advanced Appliance Configuration Utility to assign network resources, uncheck the **Use DHCP** checkbox and fill in the following fields:

     Min IP Address
     The lowest IP address in a range of IP addresses that can be assigned to an appliance that is a member of this Family

     Max IP Address
     The highest IP address in a range of IP addresses that can be assigned to an appliance that is a member of this Family

     Subnet Mask The subnet mask value that will be used by appliances that are members of this Family

     Default Gateway
     The IP address of the default gateway that will be used by appliances that are members of this Family (optional)

     DNS The IP address of the Domain Name Server that will be used by appliances that are members of this Family (optional)

   - To use a DHCP server to assign network resources, check the **Use DHCP** checkbox. This will allow a DHCP server on your network to assign an IP address and subnet mask and to specify the default gateway address and address of the Domain Name Server that will be used by appliances that are members of this Family.

5. Select a Host Name Allocation Type.

   The Host Name Allocation Type enables you to automatically specify a specific Host Name that members of this Family will use. You can select one of the following Host Name Allocation Types:

   No Allocation
   No preconfigured host name format will be assigned to appliances that are members of this family.

   Use Serial Number
   The Serial Number of the discovered appliance will be used as a host name for the appliance.

   Use Prefix Name
   A user-specified prefix, along with an incremental number for each appliance, will be used for the host name of each appliance that is a member of this Family. Type the desired prefix in the **Host Name Prefix** field.

6. Click **OK** to save this Family.

Removing Appliances from Families: Use the Remove Appliance to delete an appliance from the Advanced Appliance Configuration Utility console database. Removing an appliance that is no longer in use allows the IP address that was assigned to the appliance to be allocated to another appliance. You can also removing an appliance from a family and then Rescan the network to add it to an appropriate Family that appears higher in the Tree View pane.

To remove an appliance, right-click on the appliance, and then select Remove Appliance from the pop-up menu.

- If the Advanced Appliance Configuration Utility is unable to communicate with the selected appliance (because, for example, it has been removed from the network or has failed) the appliance is removed immediately.
- If the Advanced Appliance Configuration Utility is able to communicate with the selected appliance you will be asked to confirm removal of the appliance before the appliance removal task is completed. This helps prevent accidental removal of an active and functional appliance.

Using the Adopt by First Matching Family Function: Use the Adopt by First Matching Family function to:

- Add an *Orphaned Externally Configured Appliance* to an appropriate Family.

  Appliances that have been configured without using the Advanced Appliance Configuration Utility tool and that do not meet the rules for any existing Family are automatically added to the Orphaned Externally Configured Appliances group. If, after the orphaned appliance is discovered, you create a Family that is appropriate for the orphaned appliance, right-click on the orphaned appliance and select **Adopt by First Matching Family** to move the appliance from the Orphaned Externally Configured Appliances group to the newly created Family.
- Move an appliance from one Family to another appropriate Family that occurs higher in the list of previously defined Families. If there is more than one appropriate Family for a newly discovered appliance, it automatically appears in the first appropriate Family in the list of Families. If you want to move a discovered appliance from one appropriate Family to another appropriate Family:

  1. Right-click on the Family that you want the appliance moved to.
  2. Select Move Up in List to move the selected Family up in the list of families. Repeat steps 1 and 2 until the Family that you want to add the appliance to appears above the Family that currently contains the appliance.
  3. Right-click on the appliance that you want to move to another Family and then select **Adopt by First Matching Family**.

Launching UM Services

You can use the Advanced Appliance Configuration Utility to quickly and easily launch UM Services on your xSeries appliances.

Note: The selected appliance server must be running Universal Manageability (UM) Services as a UM Services client. Also, the systems management console (the system that is running the Advanced Appliance Configuration Utility Console) must use a web browser that is supported for use with UM Services, and if you have never used UM Services from this system previously you will need to install several plug-ins before proceeding. If you are using an unsupported browser, or if your browser does not have the necessary plug-ins, you will be notified when you attempt to launch UM Services on the appliance. For more information on UM Services, see the following web site:

`http://www.pc.ibm.com/ww/software/applications/ums/library.html`

To use the Advanced Appliance Configuration Utility Console to start UM Services on an appliance:

1. Click on the appliance in the Advanced Appliance Configuration Utility Console Tree View Pane.

   When you select the appliance from the tree vie information about the selected appliance appears in the Information Pane. A **Start Web-Based Management** button appears as well.

2. Click **Start Web-Based Management**.

   Your default web browser starts, loading the UM Services console automatically.

3. Log on to the UM Services console. Refer to step 2 on page 129 for proper login instruction.

For more information on using UM Services to manage your appliances, see the *Universal Manageability Services User's Guide*, included on your *IBM xSeries 150 Documentation CD*.

Terminal Services Client

To install the Terminal Services Client on the remote workstation and connect to your xSeries appliance server:

1. Insert the *Supplementary CD* into the workstation CD-ROM drive.
2. Click **Start**-> **Run**.
3. In the **Open** field, type (with quotes)

   `"x:\Terminal Services Client\Disk 1\setup.exe"`

   where *x* is the drive letter assigned to the CD-ROM drive. Then click **OK** to begin the Terminal Services Client Setup program.

4. Accept the defaults in each window that opens or refer to the Microsoft Windows documentation for more instructions. When the Terminal Services Client Setup program is completed proceed to the next step.
5. Check the workstation network TCP/IP protocol configuration settings.

   The IP address used by the workstation must be obtained automatically. If the network interface card for the workstation is configured to obtain an IP address automatically you can proceed to the next step. However, if the network interface card for the workstation is configured to use a static IP address you must set the IP Address and Subnet mask properties as follows:

   a. Set the IP address.

      If the workstation's network interface card is configured to use a static IP address you must configure it to obtain an IP address automatically.

   b. Set the Subnet mask to: 255.255.0.0

   Notes:

   a. You might be prompted to restart the workstation after you have changed the configuration.

   b. Do not be concerned if you do not have a DHCP server on your network. This configuration automatically assigns an unused IP address to the workstation that is on the same subnet as the xSeries appliance servers attached to the LAN.

   c. If you are not certain how to check the workstation network TCP/IP protocol configuration settings refer to the Microsoft Windows documentation that came with your workstation for network configuration instructions.

6. Connect to the xSeries 150 Appliance using the Terminal Services Client.
7. In the Terminal Services Client window, type

   `IBM-xxxxxxx`

   where *xxxxxxx* is the serial number located in the lower right corner of the bezel and then click **Connect**.
8. Login to the xSeries appliance server.

   Use the following case-sensitive user name and password to log onto terminal services

   User ID administrator

   Password password

   When you log on to Window Terminal Services, you can view the Web Hosting Appliance graphical user interface (GUI) that is used to administer the appliance. However, when you first log onto Terminal Services, the Setup and Configuration Web page opens. This page provides links to documentation related to various xSeries software products.

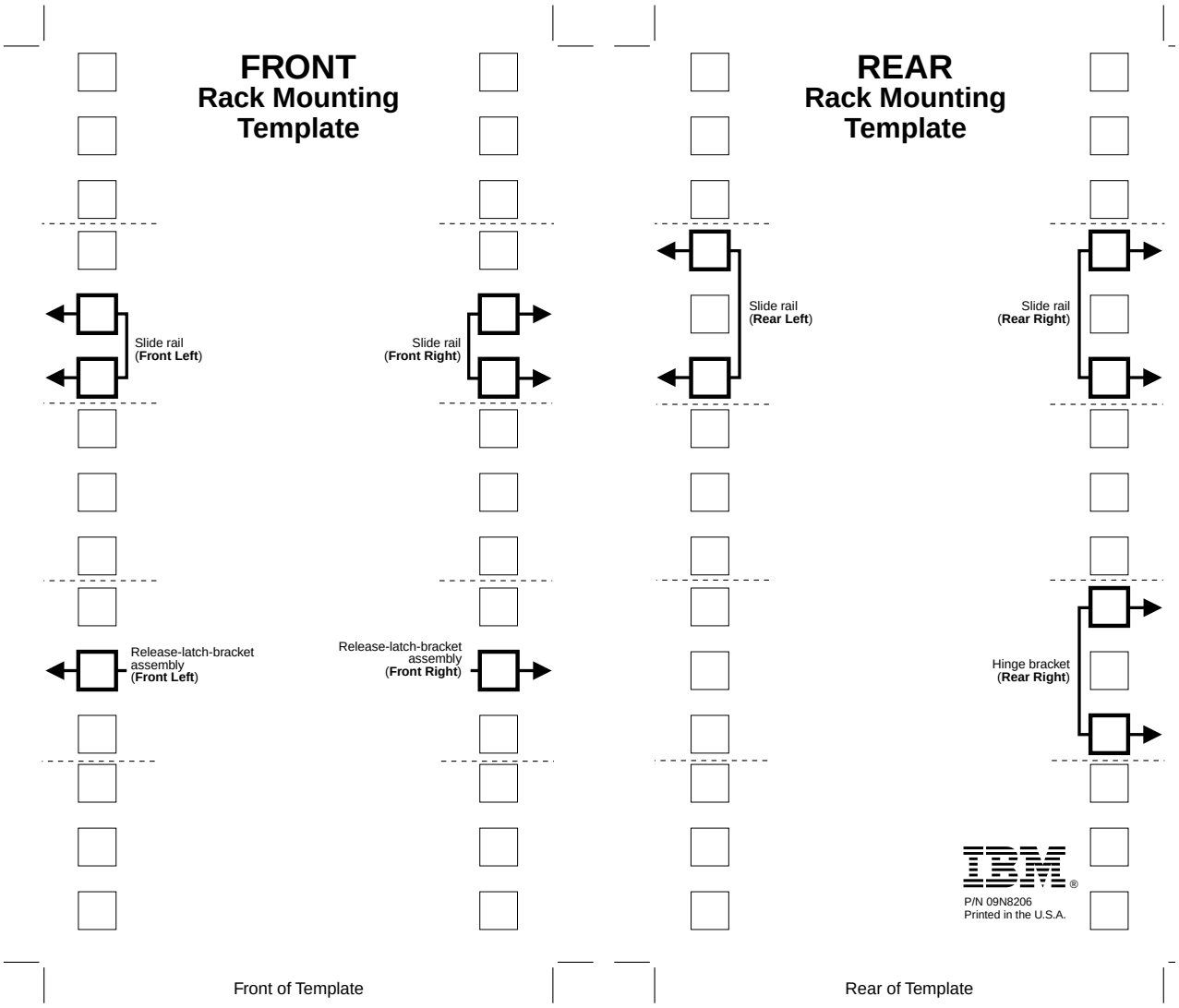
- To complete the client installation, add to the appliance any Web content or applications required by your site.
- Refer to the Web page mentioned above, the IBM xSeries 150 Documentation CD and the following Web site for assistance in using preinstalled software:

  `http:\\www.ibm.com\pc\netfinity`

  After the web page loads, click Solutions.

Appendix A. Rack Installation Instructions

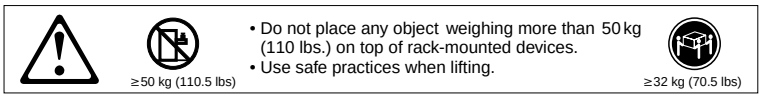
The following reduced-size illustration of the front and the back of the rack mounting template shows where to place the clip nuts or cage nuts when installing your server in a rack.



NOTE TO PRINTER: Final Size 5" X 9" Colors: Black

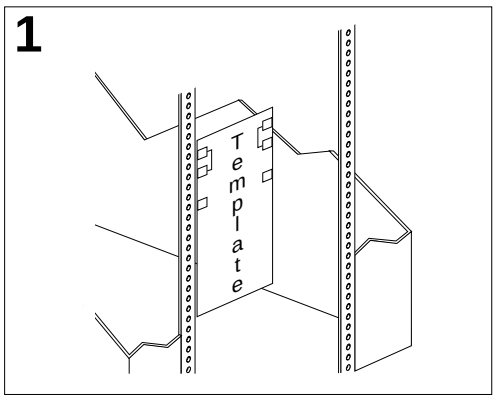
Rack Mounting Instructions

- Review the documentation that comes with your rack enclosure.
- Maintain 15 cm (6 in.) of clearance around your server for air circulation.
- Ensure the room air temperature is below 35°C (95°F).
- Plan the server installation working from the bottom of the rack up.
- Remove the rack doors and the side panels during the installation, if necessary.
- Position the template to the rack so that the edges of the template do not overlap any other devices to be installed.
- Connect all power cords on the server and on other devices to properly wired and grounded electrical outlets.
- Take precautions to prevent the rack from overloading the power outlets when you install multiple devices in a rack.

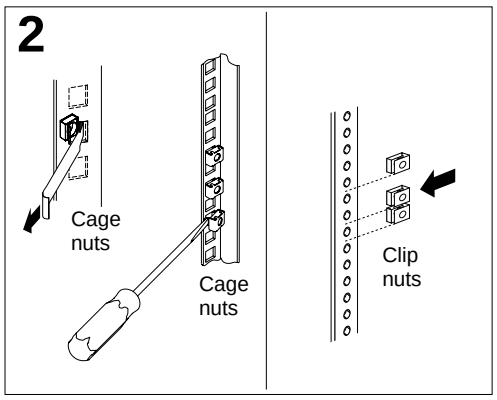


The following is a list of items shipped in your rack installation kit. If any items are missing or damaged, contact your place of purchase.

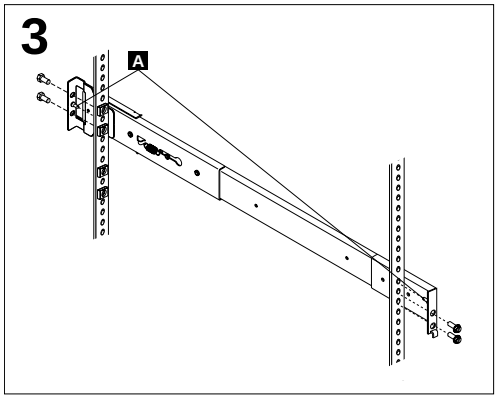
- Cable-management assembly
- Cable straps (7)
- Cable ties (10)
- Cage nuts (12)
- Clip nuts (12)
- Screw packages (2)
- Slide rails (2)



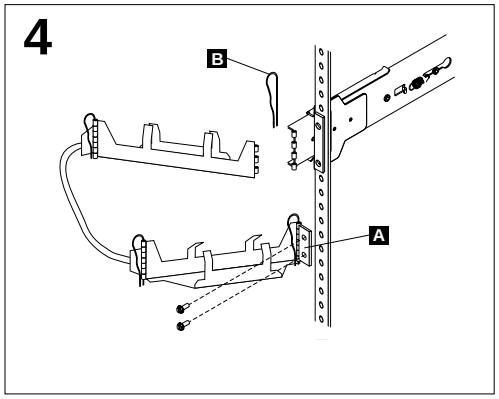
Use the attached stickers to mark the holes on the front and the rear of the rack in the locations indicated by the arrows on the template.



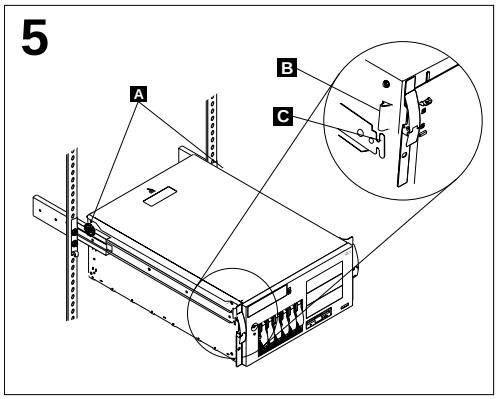
Use a screwdriver or the cage-nut-insertion tool to insert the cage nuts, or slide on the clip nuts, as required for your rack, into all the marked holes.



Use the pins **A** on the slide rail to align the slide rail to the rack. Use the M6 screws to bolt the slide rail to the rack (left front of rack shown here). Repeat this step for the other slide rail.

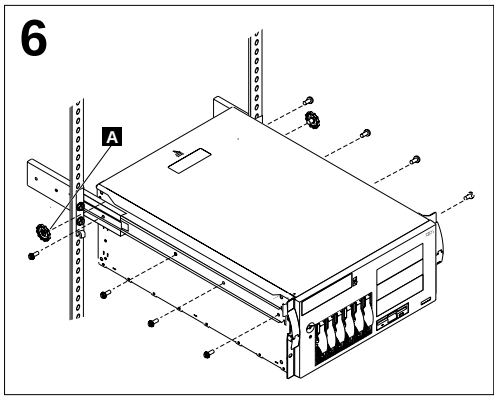


Use the M6 screws to attach the hinge bracket **A** to the rear of the rack. Then, use the hinge pin **B** to attach the cable-management assembly to the slide rail. (Right rear of rack shown here).

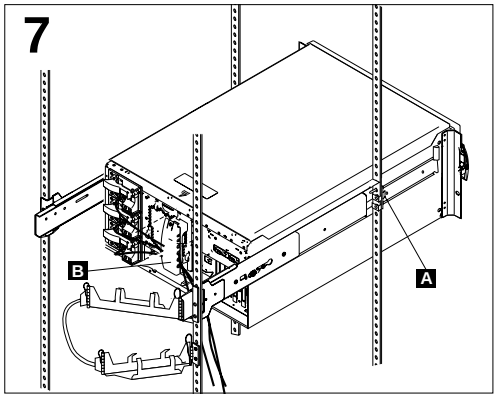


Attention: To avoid injury, do not place your fingers around the rack-support wheels when lowering the server onto the rails.

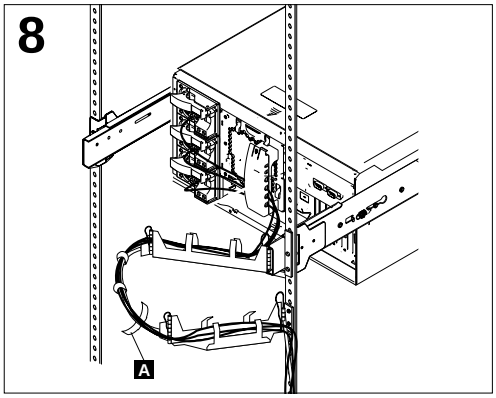
Fully extend the slide rails out of the rack. Lift the server above the rails; then, rest the rack-support wheels **A** located on the rear of the server on the slide rails. Lower the front of the server onto the slide rails.
Note: Be sure the bracket notches **B** on the front of the server fit securely on the tabs **C** located on the front of the slide rails.



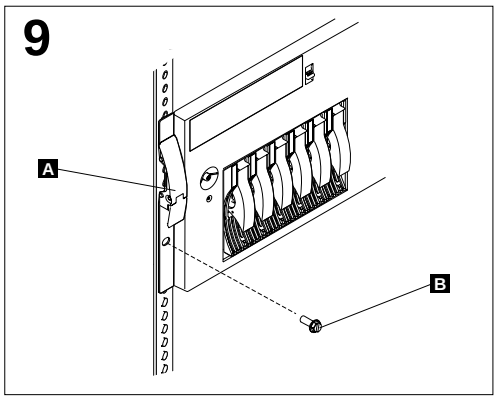
Use the M4 screws to secure the server to the rails. Unscrew the rack-support wheels **A** and store them in a safe place.



Press in on the safety latches **A** and slide the server halfway into the rack. Attach the power, keyboard, mouse, and monitor cables (if required) to the server and route them through the cable restraint bracket **B**. Then, attach all other required cables to the server.



Route all the cables through the cable-management assembly as shown. Then, use the cable straps **A** or the cable ties to secure the cables to the cable-management assembly



Slide the server into the rack until the release latches **A** snap shut. Then, insert the M6 screws **B** through the release-latch-bracket assembly.
Note: Inserting the M6 screws **B** is optional, unless you are moving the rack or the rack is in a vibration-prone area.

Refer to your server documentation to complete the installation.

Store these instructions in the binder that comes with your server.

P/N 19K0804
Printed in the U.S.A.

Appendix B. 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 all countries. 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)**

  (page 143, Part 1 - General Terms)
- **Worldwide except Canada, Puerto Rico, Turkey, and United States (Z125-5697-01 11/97)**

  (“Part 1 - General Terms,” on page 146)
- **Worldwide Country-Unique Terms**

  (“Part 2 - Worldwide Country-Unique Terms” on page 149)

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- @server xSeries 150

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. 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- @server xSeries 150

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 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.

Part 2 - Worldwide Country-Unique Terms

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.

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 fulfills 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**.

UNITED STATES OF AMERICA: Warranty Service: The following is added to this section:

To obtain warranty service from IBM, call **1-800-772-2227**.

End-User License Agreement: Microsoft Windows Powered Operating System

IMPORTANT—READ CAREFULLY: This End-User License Agreement ("EULA") is a legal agreement between you (either anindividual or a single entity) and the manufacturer ("Manufacturer") of the computer system (as defined below, "xSeries 150") with which you acquired the Microsoft software product identified above ("Product"). If the Product is not accompanied by a new xSeries 150, you may not use or copy the Product. The Product includes computer software, the associated media, any printed materials, and any "online" or electronic documentation. This EULA is valid and grants the end-user license rights ONLY if the Product is genuine and a genuine Certificate of Authenticity for the Product is included as part of the Product. Any software provided along with the Product that is associated with a separate end-user license agreement is licensed to you under the terms of that license agreement. By installing, copying, downloading, accessing or otherwise using the Product, you agree to be bound by the terms of this EULA. If you do not agree to the terms of this EULA, Manufacturer and Microsoft Licensing, Inc. ("MS") are unwilling to license the Product to you. In such event, you may not use or copy the Product, and you should promptly contact Manufacturer for instructions on return of the unused Product in accordance with Manufacturer's return policies.

SOFTWARE LICENSE

The Product is protected by copyright laws and international copyright treaties, as well as other intellectual property laws and treaties. MS, Microsoft Corporation and/or its suppliers own the title, copyright, and other intellectual property rights in the Product. The Product is licensed, not sold.

The capitalized terms used in this EULA are defined as follows:

- "xSeries 150" shall mean the computer with which you acquired the Product acting solely as an Appliance server;

1. **GRANT OF LICENSE.** This EULA grants you the following rights to the Product provided you comply with all its terms and conditions:
   a. ***Processor Limits.*** You may use the Product with no more than two processors at any one time unless a higher number of allowed processors is indicated on the Certificate of Authenticity for the Product.

b. ***General Purpose Functionality.*** The Product may contain services and functionality of a general-purpose server. Notwithstanding that software for such services and functionality may be included as part of the Product, you agree not to use the following general-purpose functionality.

- **File Services**, (accessing or managing files or disk storage)
- **Print Services**, (printing to a printer managed by the Product)
- **Terminal Services**, except to the limited extent necessary to administer the Product in Administration Mode, on the xSeries 150 or remotely, for up to two connections;
- **Microsoft Clustering Service**, other than the Windows Load Balancing Service;
- **Network Infrastructure Services**, including without limitation Dynamic Host Configuration Protocol (DHCP) services, Domain Name System (DNS) service, Routing and Remote Access Service or Windows Internet Name Service (WINS);

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- **Authentication Services**, including but not limited to direct use of the Product or indirect use through other computers or servers of: (i) domain controller (DCPromo.exe) functionality, (ii) the Windows NT Server or Windows 2000 Server Integrated Sign-On Service or (iii) the Product to receive credentials from the Windows NT Server or Windows 2000 Directory Services.

If you wish to make use of such functionality, you must acquire licenses for Windows 2000 Server or Windows 2000 Advanced Server.

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13F9997	Denmark
14F0015	Bangladesh, Burma, Pakistan, South Africa, Sri Lanka
14F0033	Antigua, Bahrain, Brunei, Channel Islands, Cyprus, Dubai, Fiji, Ghana, Hong Kong, 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
62X1045	Bahamas, Barbados, Bermuda, Bolivia, Brazil, Canada, Cayman Islands, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Guatemala, Guyana, Haiti, Honduras, Jamaica, Japan, Korea (South), Liberia, Mexico, Netherlands Antilles, Nicaragua, Panama, Peru, Philippines, Saudi Arabia, Suriname, Taiwan, Trinidad (West Indies), United States of America, Venezuela

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Part Number: 25P2532

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