IBM

eserver

xSeries 345

Type 8670

User's Guide

IBM xSeries 345
Type 8670

User's Guide

SC48-P971-70

Note:

Before using this information and the product it supports, be sure to read the general information in Appendix A, “Warranty information” on page 35, and Appendix B, “Notices” on page 47.

First Edition (July 2002)

Contents

Safety

Before installing this product, read the Safety Information.

قبل تركيب هذا المنتج، يجب قراءة الملاحظات الآمنية

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

在安装本产品之前，请仔细阅读 Safety Information
(安全信息)。

安裝本產品之前，請先閱讀「安全資訊」。

Prije instalacije ovog produkta obavezno pročitajte Sigurnosne Upute.

Před instalací tohoto produktu si přečtěte příručku bezpečnostních instrukcí.

Læs sikkerhedsforskrifterne, før du installerer dette produkt.

Lees voordat u dit product installeert eerst de veiligheidsvoorschriften.

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

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

Vor der Installation dieses Produkts die Sicherheitshinweise lesen.

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

לפני שתתקינו מוצר זה, קראו את הוראות הבטיחות.

A termék telepítése előtt olvassa el a Biztonsági előírásokat!

Prima di installare questo prodotto, leggere le Informazioni sulla Sicurezza.

製品の設置の前に、安全情報をお読みください。

본 제품을 설치하기 전에 안전 정보를 읽으십시오.

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

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

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

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

Перед установкой продукта прочтите инструкции по
технике безопасности.

Pred inštaláciou tohto zariadenia si pečítaje Bezpečnostné predpisy.

Pred namestitvijo tega proizvoda preberite Varnostne informacije.

Antes de instalar este producto lea la información de seguridad.

Läs säkerhetsinformationen innan du installerar den här produkten.

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

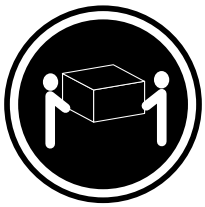
CAUTION:
When laser products (such as CD-ROMs, DVD drives, fiber optic devices, or transmitters) are installed, note the following:

- **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

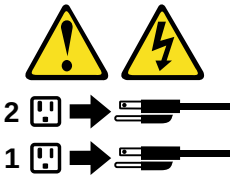


≥18 kg (39.7 lb) ≥32 kg (70.5 lb) ≥55 kg (121.2 lb)

CAUTION:
Use safe practices when lifting.

Statement 5

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



Statement 8

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

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

Statement 12:

CAUTION:
The following label indicates a hot surface nearby.

Statement 13

DANGER:
Overloading a branch circuit is potentially a fire hazard and a shock hazard under certain conditions. To avoid these hazards, ensure that your system electrical requirements do not exceed the branch circuit protection requirements. Refer to the information that is provided with your IBM device for electrical specifications.

Statement 14

CAUTION:
Hazardous voltage, current, and energy levels might be present. Only a qualified service technician is authorized to remove the covers where the following label is attached.

Statement 15

CAUTION:
Make sure that the rack is secured properly to avoid tipping when the server unit is extended.

Statement 16

CAUTION:
Some accessory or option board outputs exceed Class 2 or limited power source limits and must be installed with appropriate interconnecting cabling in accordance with the national electric code.

Statement 17

CAUTION:
The following label indicates moving parts nearby.

Chapter 1. Introducing the IBM xSeries 345 Type 8670

Your IBM® @server xSeries™ 345 Type 8670 server is a high-performance server that can be upgraded to a symmetric multiprocessing (SMP) server through a microprocessor upgrade. It is ideally suited for networking environments that require superior microprocessor performance, efficient memory management, flexibility, and reliable data storage.

The xSeries 345 server contains several IBM X-Architecture™ technologies, which help increase server performance and reliability. See “What your server offers” on page 4 for more information about the X-Architecture technologies provided in your server.

Your server comes with a limited warranty. If you have access to the World Wide Web, you can obtain up-to-date information about your server model and other IBM server products at http://www.ibm.com/pc/us/eserver/xseries/.

Your server serial number and model number are located on labels on the bottom of the server and on the lower corner of the bezel. You will need these numbers when you register your server with IBM. The information label containing the serial number, machine type, model number, and agency marks for your server is located on the bottom of the server.

Related publications

This *User's Guide* provides general information about your server, including information about features, how to configure your server, how to use the *ServerGuide Setup and Installation* CD, and how to get help.

In addition to this *User's Guide*, the following xSeries 345 Type 8670 documentation is provided with your server:

- *Installation Guide*
  This printed publication contains setup and installation instructions.
- *Rack Installation Instructions*
  This printed publication contains the instructions to install your server in a rack.
- *Safety Book*
  This multilingual publication is provided in Portable Document Format (PDF) on the IBM *xSeries Documentation* CD. It contains translated versions of the caution and danger statements that appear in the documentation for your server. Each caution and danger statement has an assigned number, which you can use to locate the corresponding statement in your native language.
- *Hardware Maintenance Manual and Troubleshooting Guide*
  This publication is provided in PDF on the IBM *xSeries Documentation* CD. It contains information to help you solve the problem yourself or to provide helpful information to a service technician.

- *Option Installation Guide*
  This publication is provided in PDF on the IBM *xSeries Documentation* CD. It contains instructions to install, remove, and connect optional devices supported by your server.

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

Notices and statements in this book

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

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

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

Features and specifications

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

Table 1. Features and specifications

Microprocessor:
- Intel® Xeon™, 2.0 GHz or higher depending on server model
- 512 KB (minimum) Level-2 cache
- 100 MHz front-side bus (FSB), at four data transfers per cycle, yielding a 400 MHz system bus
- Support for up to two microprocessors with Intel Hyper-Threading technology

Memory:
- Minimum: 512 MB, expandable to 4 GB
- Type: 100 MHz, PC2100 (CL2.5), downward compatible with PC1600 (CL2), registered, ECC, double data rate (DDR), SDRAM
- Sizes: 256 MB, 512 MB, or 1 GB, in pairs
- Connectors: Two-way interleaved, four dual inline memory module (DIMM) connectors
- Maximum: Two pairs of DIMMs

Drives standard:
- Diskette: 1.44 MB
- CD-ROM: IDE

Expansion bays:
- Six hot-swap, slim-high, 3.5-inch drive bays (hot-swap hard disk drives installed, some models)
- One 5.25-inch bay (CD-ROM drive installed)
- One 3.5-inch removable-media drive bay (diskette drive installed)

Hot-swap fans:
- Minimum: Five
- Maximum: Eight - provide redundant cooling

Hot-swap power supplies:

350 watts (115-230 V ac)
- Minimum: One
- Maximum: Two - provide redundant power

Upgradeable microcode:

BIOS, diagnostics, and IBM Advanced System Management upgrades (when available) can update EEPROMs on the system board

PCI expansion slots:
- Two PCI-X non-hot-plug 133 MHz/64-bit
- Two PCI-X non-hot-plug 100 MHz/64-bit (low profile)
- One PCI non-hot-plug, 33 MHz/32-bit

Integrated functions:
- IBM integrated system management processor (ISMP)
  - Service processor with Light Path Diagnostics™
  - Interconnect port
  - Dedicated I/O port
  - Support for IBM Remote Supervisor Adapter
- Two 10BASE-T/100BASE-TX/1000BASE-T Ethernet ports (Intel Ethernet controller on system board)
- One serial port
- One external and one internal Ultra320 SCSI port (dual-channel integrated controller with RAID capability)
- Three Universal Serial Bus (USB) v1.1 ports
- Keyboard port
- Mouse port
- ATI Rage XL video (controller on system board)
  - Compatible with SVGA and VGA
  - 8 MB video memory

Acoustical noise emissions:
- Declared sound power, idle: 6.5 bel
- Declared sound power, operating: 6.5 bel
- Bystander sound pressure, idle: 48 dBa
- Bystander sound pressure, operating: 48 dBa

Environment:
- Air temperature:

  Maximum altitude: 2133 m (7000 ft)
  - Server on: 10° to 35°C (50° to 95°F).
  - Server off: -40° to +60°C (-40° to 140°F).
- Humidity:
  - Server on: 8% to 80%
  - Server off: 8% to 80%

Security features:
- Power-on password
- Remote control security settings
- Selectable drive startup
- Keyboard password
- System management security
  - User login password
  - Read-only or read/write access
  - Dial-in call-back

Predictive Failure Analysis® (PFA) alerts:
- Power supplies
- Fans
- Memory
- Hard disk drives
- Microprocessors
- Voltage regulator modules (VRMs)

Size (2 U):
- Height: 85.4 mm (3.36 in.)
- Depth: 698 mm (27.48 in.)
- Width: 443.6 mm (17.5 in.)
- Weight: 21.09 kg (46.5 lb) to 28.12 kg (62 lb) depending upon configuration

Heat output:

Approximate heat output in British thermal units (Btu) per hour
- Minimum configuration: 341 Btu/hour (100 watts)
- Maximum configuration: 2200 Btu/hour (645.2 watts)

Electrical input:
- Sine-wave input (50-60 Hz) required
- Input voltage range automatically selected
- Input voltage low range:
  - Minimum: 90 V ac
  - Maximum: 137 V ac
- Input voltage high range:
  - Minimum: 180 V ac
  - Maximum: 265 V ac
- Input kilovolt-amperes (kVA) approximately:
  - Minimum: 0.1 kVA
  - Maximum: 0.62 kVA

Power available for drives:
- +5 V dc
- +12 V dc

What your server offers

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

- **IBM X-Architecture technology**

  IBM X-Architecture features leverage proven innovative IBM technologies to build the most powerful, scalable, reliable Intel-processor-based servers in the world. X-Architecture technology includes features such as Light Path Diagnostics™, Chipkill™ memory, Predictive Failure Analysis® (PFA), and the Advanced System Management processor.

- **Impressive performance using SMP**

  Your server supports up to two Intel Xeon microprocessors. Your server comes with at least 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 25.4 mm (1-inch) slim-high, 3.5-inch hot-swap hard disk drives in the hot-swap bays. This *hot-swap* feature enables you to add, remove, or replace hard disk drives without turning off the server.

- **Redundant cooling and power capabilities**

  The server supports up to eight hot-swap fans. Eight fans provide redundant cooling. The hot-swap capabilities of the fans in your server enable continued operation if one of the fans fails. You can also replace a failing fan without turning off the server.

  The server supports up to two 350-watt power supplies, which ensure redundancy and hot-swap capability for a typical configuration.

- **Large system memory**

  Your server supports up to 4 GB of system memory. The memory controller provides error correcting code (ECC) support for up to four industry-standard, 100 MHz, 2.5 V, 184-pin, double-data rate (DDR), PC2100 CL2.5 (downward compatible with PC1600 CL2), registered, synchronous dynamic random-access memory (SDRAM) dual inline memory modules (DIMMs). The memory controller also provides Chipkill™ memory protection if all DIMMs are of the type x4. Chipkill memory protection is a technology that protects the system from a single chip failure on a DIMM.

- **System-management capabilities**

  Your server comes with an integrated system management processor (ISMP) and support for the Remote Supervisor Adapter. The ISMP with the system-management software that is provided with your server, enables you to manage the functions of the server locally and remotely. The ISMP also provides system monitoring, event recording, and dial-out alert capability.

  Note: The ISMP is sometimes referred to as the service processor.

  The optional IBM Remote Supervisor Adapter works with the integrated service processor to give you a World Wide Web interface to the system-management functions. You can manage your server over the Internet or intranet.

  See the documentation provided with your system-management software for more information.

- **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, 100-Mbps, or 1000-Mbps networks. The server automatically selects between 10BASE-T, 100BASE-TX, and 1000BASE-T. The controller provides full-duplex (FDX) capability, which enables simultaneous transmission and reception of data on the Ethernet local area network (LAN).
- **Redundant connection**

  The addition of an optional 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. If the appropriate device drivers are installed, this switching occurs without data loss and without user intervention.
- **IBM ServerGuide Setup and Installation CD**

  The *ServerGuide™ Setup and Installation* CD that is included with your server provides programs to help you set up your server and install the network operating system (NOS). The ServerGuide program detects the hardware options that are installed and provides the correct configuration programs and device drivers.

  For more information about the *ServerGuide Setup and Installation* CD, see “Using the ServerGuide Setup and Installation CD” on page 11.

Reliability, availability, and serviceability

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.

- Automatic error retry and recovery
- Automatic restart after a power failure
- Backup basic input/output system (BIOS) switching under the control of the service processor
- Built-in monitoring for fan, power, temperature, voltage, and power-supply redundancy
- Cable-presence detection on most connectors
- Chipkill memory protection
- Error codes and messages
- Error correcting code (ECC) L2 cache and system memory
- Hot-swap hard disk drives
- Information and Light Path Diagnostics LED panels
- Integrated service processor subsystem for remote system management
- Memory scrubbing and Predictive Failure Analysis (PFA) (background and real time)
- Menu-driven setup, system configuration, and redundant array of independent disks (RAID) configuration programs
- Availability of microcode and diagnostic levels
- Parity checking on the small computer system interface (SCSI) bus and PCI buses
- Power management: Compliance with Advanced Configuration and Power Interface (ACPI)

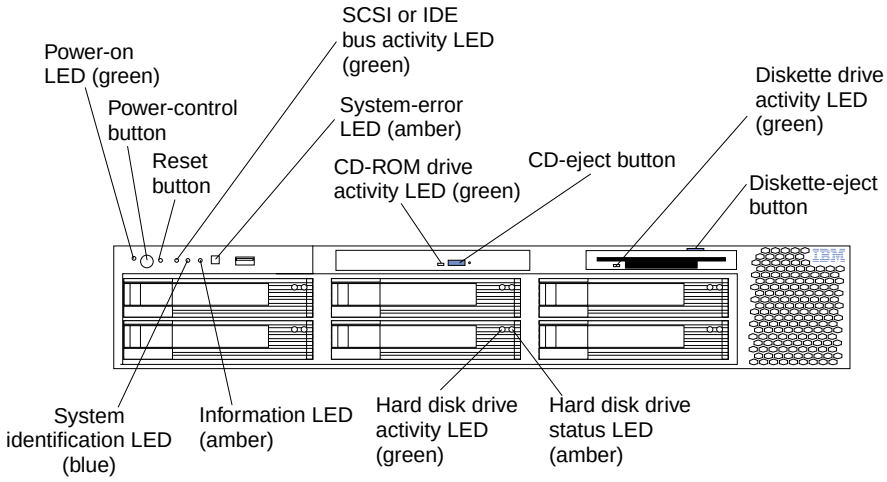
- Power-on self-test (POST)
- Predictive Failure Analysis (PFA) alerts
- Redundant Ethernet capabilities (requires optional Ethernet adapter) with failover support
- Hot-swap cooling fans with speed-sensing capability
- Redundant hot-swap power supplies and redundant hot-swap fans (some models)
- Remind button to temporarily turn off the System-error LED
- Remote system problem-determination support
- Standby voltage for system-management features and monitoring
- Startup (boot) from LAN through remote initial program load (RIPL) or dynamic host configuration protocol/boot protocol (DHCP/BOOTP)
- System auto-configuring from the configuration menu
- System error logging (POST and service processor)
- System-management monitoring through the Intra-Integrated Circuit (I^2C) bus
- Upgradeable POST, BIOS, diagnostics, service processor microcode, and read-only memory (ROM) resident code, locally or over the LAN
- Vital product data (VPD) on microprocessors, system board, power supplies, SCSI (hot-swap-drive) backplane, and power backplane
- Wake on LAN® capability

Server controls and indicators

This section identifies the controls and indicators on the front and the back of your server.

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

Front view



Power-on LED: This green LED is lit and stays on when you turn on your server and flashes when the server is in Standby mode.

Attention: If the power-on light-emitting diode (LED) is off, it does not mean there is no electrical current present in the server. The LED might be burned out. To remove all electrical current from the server, you must unplug the server power cords from the electrical outlets or from the uninterruptible power device.

Power-control button: Press this button to manually turn on the server and put the server in Standby mode (see “Server power features” on page 9).

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

SCSI or IDE bus activity LED: This LED is on when there is activity on the SCSI or IDE bus.

System-error LED: This amber LED is lit when a system error occurs. An LED on the diagnostic LED panel will also be on to further isolate the error.

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

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

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

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

Hard disk drive status LED: Each hot-swap drive has a hard disk drive status LED. When this amber LED is lit continuously, the drive has failed. If a RAID adapter is installed in the server, when the LED flashes slowly (one flash per second), the drive is being rebuilt. When the LED flashes rapidly (three flashes per second), the controller is identifying the drive.

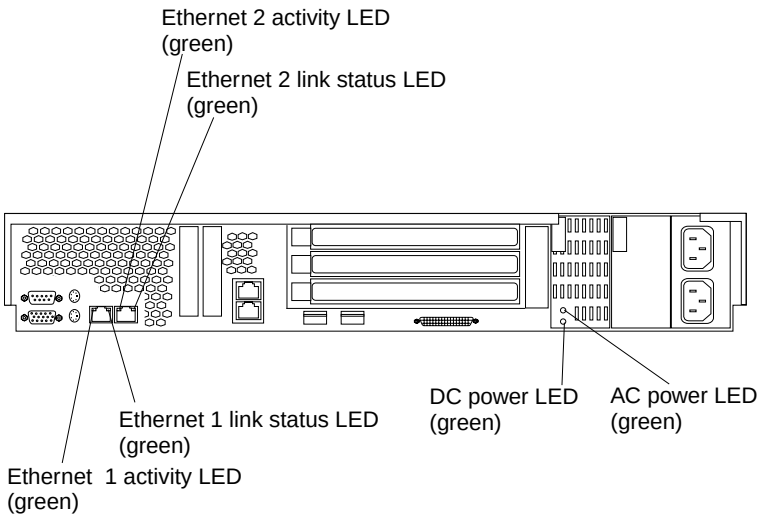
Hard disk drive activity LED: Each of the hot-swap drives has a hard disk drive activity LED. When this green LED is flashing, the controller is accessing the drive.

Information LED: This amber LED is lit when the information log contains information about certain conditions in your server that might affect performance. For more information, see the *Hardware Maintenance Manual and Troubleshooting Guide* on the IBM *xSeries Documentation* CD.

System-identification LED: This blue LED is lit in response to a programmed condition, or it can be turned on remotely by the system administrator to aid in server identification for maintenance. The system administrator can turn off the system identification LED after maintenance is complete.

Rear view

This section identifies the indicators on the rear of your server.



Ethernet 2 activity LED: This green LED is lit when the server is transmitting or receiving signals to the Ethernet LAN that is connected to Ethernet port 2.

Ethernet 2 link status LED: This green LED is lit when there is an active link connection on the 10BASE-T, 100BASE-TX, or 1000BASE-TX interface for Ethernet port 2.

AC power LED: This green LED provides status information about the power supply. During typical operation, both the ac and dc power LEDs are lit. For any other combination of LEDs, see the *Hardware Maintenance Manual and Troubleshooting Guide* on the IBM *xSeries Documentation* CD.

DC power LED: This green LED provides status information about the power supply. During typical operation, both the ac and dc power LEDs are lit. For any other combination of LEDs, see the *Hardware Maintenance Manual and Troubleshooting Guide* on the IBM *xSeries Documentation* CD.

Ethernet 1 link status LED: This green LED is lit when there is an active link connection on the 10BASE-T, 100BASE-TX, or 1000BASE-TX interface for Ethernet port 1.

Ethernet 1 activity LED: This green LED is lit when the server is transmitting or receiving signals to the Ethernet LAN that is connected to Ethernet port 1.

Server power features

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

Turning on the server

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

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

  Note: You can install a circular disk over the power-control button to prevent accidental manual power-off. This disk, known as the power-control-button shield, comes with your server.
- If the server is turned on and a power failure occurs, it restarts automatically when power is restored.
- You can turn on the server by using the Integrated System Management Processor (ISMP).
- You can turn on the server by using the optional Remote Supervisor Adapter.
- When you plug in your server for the first time, Wake on LAN® can turn on the server.
- If your server was previously turned on, it must be properly placed in Standby mode for the Wake on LAN feature to turn on the server.

Complete the following steps to manually turn on the server:

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

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

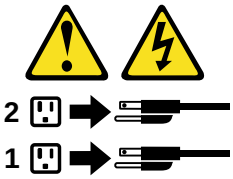
Turning off the server

Complete the following steps to manually turn off the server:

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

Statement 5

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



3. Press the power-control button on the front of the server. This will put the server in Standby mode.
4. Disconnect the server from the power source.

   Notes:

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

Standby mode

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

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

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

   Note: Each operating system is different. Read all the documentation about shutting down the operating system before continuing.
2. Press the power-control button on the front of the server.

You can put the server into Standby mode remotely by using the service processor.

Chapter 2. Configuring your server

The following configuration programs are provided with your server:

- **ServerGuide Setup and Installation CD**

  The *ServerGuide Setup and Installation* CD provides software setup tools and installation tools that are specifically designed for your IBM server. Use this CD during the initial installation of your server to configure basic hardware features such as ServeRAID and integrated RAID, and to simplify your network operating system (NOS) installation. (See “Using the ServerGuide Setup and Installation CD” for more information.)

- **Configuration/Setup Utility**

  This program is part of the *basic input/output system* (*BIOS*) code that comes with your server. You can use this program to configure serial port assignments, change interrupt request (IRQ) settings, change the drive startup sequence, set the date and time, and set passwords. You also can use this program to view the system configuration settings, for example, the number of installed microprocessors, the amount of installed memory, the BIOS diagnostics version level, and so on. See “Using the Configuration/Setup Utility program” on page 15 for more information.

- **ServeRAID programs**

  The ServeRAID programs come with your server. If your server has a ServeRAID adapter installed or if you are using the RAID capabilities of the integrated SCSI controller, you must use the ServeRAID Manager program to define and configure your disk-array subsystem *before* you install your operating system. See “Using ServeRAID Manager” on page 21 for more information.

- **LSI Logic Configuration Utility**

  With the built-in LSI Logic Configuration Utility program, you can configure the integrated SCSI controller and the devices that attach to it. See “Using the LSI Logic Configuration Utility program” on page 27.

- **Integrated System Management**

  To update the Integrated System Management (ISM) firmware, see “Updating the integrated system management firmware” on page 28 for more information.

- **Ethernet controller configuration process**

  To configure the integrated Ethernet controller, see “Configuring the Ethernet controller” on page 28.

- **IBM Director**

  IBM Director is a work-group-hardware-management tool that you can use to centrally manage xSeries servers; IBM Netvista™, IntelliStation®, and ThinkPad® computers; and non-IBM Intel-microprocessor-based systems. IBM Director automates tasks such as inventory-taking, monitoring of environmental sensors (such as temperature, voltage and fans), alerting, and system-health information.

  For more information and instructions about IBM Director, see the IBM *Director User’s Guide* on the IBM *Director* CD that comes with your server.

Using the ServerGuide Setup and Installation CD

The *ServerGuide Setup and Installation* CD includes an easy-to-use setup and installation program that is specifically designed for your IBM server. The ServerGuide program detects the server model and hardware options that are installed and uses that information during setup to configure the hardware. The

ServerGuide program simplifies network operating system (NOS) installations by providing updated device drivers and, in some cases, installing them automatically.

If a later version of the ServerGuide program is available, you can download a free image of the *ServerGuide Setup and Installation* CD, or you can purchase the CD. To download the latest ServerGuide program, go to the IBM ServerGuide Web page at http://www.ibm.com/pc/qtechinfo/MIGR-4ZKPPT.html. To purchase the latest *ServerGuide Setup and Installation* CD, see the "ServerGuide Updates" flyer that comes with your server library, or go to the ServerGuide fulfillment Web site at http://www.ibm.com/pc/coupon/.

The ServerGuide program has the following features to make setup easier:

- An easy-to-use interface with online help
- Diskette-free setup, and configuration programs that are based on detected hardware
- Starts the ServeRAID Manager program to configure your disk-array subsystems.
- A system BIOS update program, which updates the BIOS code directly from the CD
- Device drivers that are provided for your server model and detected hardware
- NOS partition size and file-system type that are selectable during setup

ServerGuide features

Features and functions can vary slightly with different versions of the ServerGuide program. To learn more about the version that you have, start the *ServerGuide Setup and Installation* CD and view the online overview. Not all features are supported on all server models.

The ServerGuide program requires a supported IBM server with an enabled startable (bootable) CD-ROM drive. In addition to the *ServerGuide Setup and Installation* CD, you must have your NOS CD to install your NOS.

The ServerGuide program has the following features:

- Sets system date and time.
- Detects the SCSI RAID adapter or controller and the integrated SCSI controller with RAID capabilities and runs the SCSI RAID configuration program.
- Updates the licensed internal code (firmware) level without diskettes.
- Checks the system BIOS code and microcode (firmware) levels of supported options to determine whether a later level is available from the CD. You can perform updates without using diskettes.
- Creates a System Partition on the default drive. You can run server-specific utility programs after setup.
- Detects installed hardware options and provides updated device drivers for most adapters and devices.
- Creates a setup-replication diskette for replicating setup selections for other servers of the same model.
- Provides diskette-free installation for supported operating systems.
- Provides a replicated installation path for multiple installations of supported operating systems.
- Includes an online README file with links to tips for your hardware and NOS installation.

Setup and configuration overview

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

Note: Features and functions can vary slightly with different versions of the ServerGuide Program.

When you start the *ServerGuide Setup and Installation* CD, the program performs the following tasks:

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

Notes:

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

System Partition

The ServerGuide program creates a 50 MB System Partition on the default drive. The System Partition contains server-specific utility programs such as service processor disk operating system (DOS) utilities, system diagnostics, flash BIOS updates, and other programs. Programs in the System Partition vary by server model, and not all server models run utility programs from the System Partition. To determine which ones do, start the *ServerGuide Setup and Installation* CD and view the online overview.

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

Typical NOS installation

You can use the ServerGuide program to shorten your installation time. The ServerGuide program provides the device drivers that are required for your hardware and for the NOS that you are installing. This section describes a typical ServerGuide NOS installation.

Note: Features and functions can vary slightly with different versions of the ServerGuide Program.

1. After you have completed the setup process, the NOS installation program starts. (You will need your NOS CD to complete the installation.)
2. The ServerGuide program stores information about the server model, service processor, hard disk drive controllers, and network adapters. Then, the program checks the CD for newer device drivers. This information is stored and then passed to the NOS installation program.
3. With some NOS installations, you can create a NOS-replication diskette for setting up additional servers. This diskette contains the Internet protocol (IP) address, server name, and other selections.
4. The ServerGuide program presents NOS partition options that are based on your NOS selection and the installed hard disk drives.
5. If you are installing the NOS from diskette, the ServerGuide program lists the diskettes that you must create and the optional diskettes that you might want to create. The diskettes that you can create are the device-driver diskettes for the installed adapters or controllers.
6. The ServerGuide program prompts you to insert your NOS CD and restart the server. At this point, the installation program for the NOS takes control to complete the installation.

Setting up or updating multiple servers

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

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

You can create a setup-replication diskette, which contains your hardware configuration selections. Use this diskette to replicate selections to other servers that are of the same model.

You can create a NOS-replication diskette, which contains information that you need to complete multiple installations. Not all operating systems support NOS-replication diskettes.

Installing your NOS without ServerGuide

If you have already configured the server hardware and you decide not to use the ServerGuide program to install your NOS, complete the following steps to download the latest NOS installation instructions from the IBM Support Web page:

1. Go to http://www.ibm.com/pc/support/.
2. Under **Browse**, click **Servers**.
3. From the **Family** drop-down list, select your server model.
4. If NOS installation instructions are available for your server model, **OS installation** is listed on the left side the Web page. Click **OS installation** and select the instructions for your NOS.

Using the Configuration/Setup Utility program

This section provides instructions to start the Configuration/Setup Utility program and descriptions of the available menu choices.

Starting the Configuration/Setup Utility program

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

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

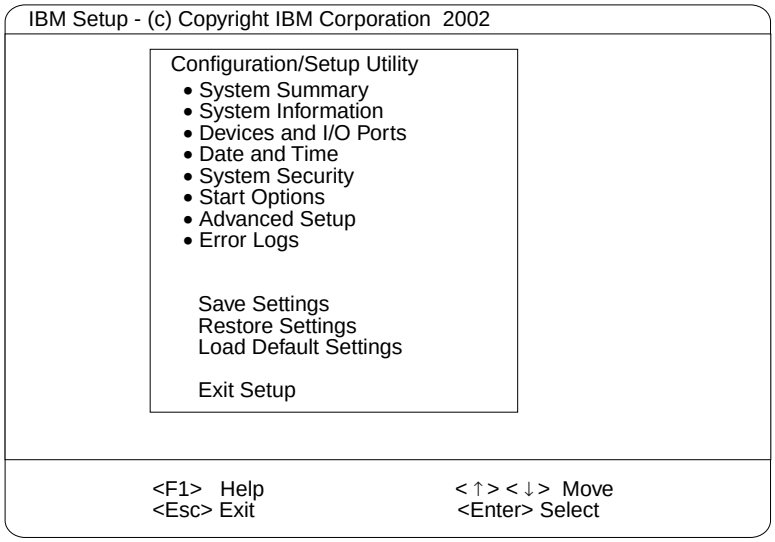
   Notes:

   a. If you have set both levels of passwords (power-on and administrator), you must type the administrator password to access the full Configuration/Setup Utility main menu. Without the administrator password, limited Configuration/Setup Utility program functions are available.

   b. You can set an administrator password only if the optional IBM Remote Supervisor Adapter is installed in your server
3. Follow the instructions that appear on the screen.

Choices available from the Configuration/Setup main menu

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



Notes:

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

Descriptions of the choices available from the main menu are as follows:

- **System Summary**

  Select this choice to display configuration information. This includes the type, speed, and cache sizes of the microprocessors and the amount of memory installed.

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

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

- **System Information**

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

  – **Product Data**

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

- **Devices and I/O Ports**

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

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

- The default setting is **Enabled** for all the controllers available from this menu. If you select **Disabled**, the system will not configure the disabled device, and the operating system will not detect the device. (This is equivalent to unplugging the device.)
- If the SCSI controller is disabled and no SCSI adapter is installed, the server will have no SCSI capability.
- If the on-board Ethernet controller is disabled and no Ethernet adapter is installed, the server will have no Ethernet capability.

- **Date and Time**

  Select this choice to set the system date and time. This choice appears only on the full Configuration/Setup Utility main menu.

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

- **System Security**

  Select this choice to set passwords or the Remote Control Security settings. This choice appears only on the full Configuration/Setup Utility main menu.

  You can implement password protection using the following passwords:

  - **Power-on Password**

    Select this choice to set or change a power-on password. See “Using passwords” on page 19 for more information.

  - **Administrator Password**

    Note: This choice is available on the Configuration/Setup Utility menu only if the optional IBM Remote Supervisor Adapter is installed in your server.

    Select this choice to set or change an administrator password.

    Attention: If an administrator password is set and then forgotten, it cannot be overridden or removed. You must replace the system board.

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

    See “Using passwords” on page 19 for more information.

- **Start Options**

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

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

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

  If your server contains Wake on LAN™ hardware and software and your operating system supports Wake on LAN functions, you can also define a startup sequence for the Wake on LAN functions.

If the **Boot Fail Count** choice is enabled, you can restore the BIOS system defaults after three consecutive boot failures. If this choice is disabled, the BIOS system defaults can be loaded only from the Configuration/Setup Utility main menu.

You also can select whether the integrated SCSI controller or a PCI SCSI adapter is given boot precedence.

You can enable a virus-detection test that checks for changes in the master boot record at startup.

- **Advanced Setup**

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

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

  – **System Partition Visibility**

    Select this choice to indicate whether the System Partition is visible. To make the System Partition visible, set this choice to **Visible**. To make the System Partition invisible, set this choice to **Hidden**. See “Using the ServerGuide Setup and Installation CD” on page 11 for additional information about the System Partition.

  – **Memory Settings**

    Select this choice to manually enable a pair of memory connectors.

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

  – **CPU Options**

    Select this choice to indicate whether the microprocessor serial number in the microprocessor is readable or to set the microprocessor cache mode to disabled, write-back, or write-through. Selecting write-back mode will provide better system performance.

  – **PCI Bus Control**

    Select this choice to view and set interrupts for PCI devices and to configure the master latency timer value for the server.

  – **Integrated System Management Processor Settings**

    You can view and enable or disable the **Reboot on System NMI** setting on this menu. If this setting is enabled, the server will automatically restart 60 seconds after the service processor issues a nonmaskable interrupt (NMI) to the server. If this setting is disabled, the server will not restart. The default setting is **Enable**.

- **Error Logs**

  Select this choice to view or clear error logs.

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

    Select **Clear event/error logs** from the **POST Error Log** menu to clear the error log.

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

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

- **Save Settings**

  Select this choice to save your customized settings (except PCI slot utility changes).

- **Restore Settings**

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

- **Load Default Settings**

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

- **Exit Setup**

  Select this choice to exit from the Configuration/Setup Utility program. If you have made any changes and not saved them (except PCI slot utility changes), the program will prompt you to save the changes or exit without saving the changes.

Additional Configuration/Setup Utility menu choices

When you install an IBM Remote Supervisor Adapter in your server, you can view additional menu choices and additional information in the Configuration/Setup Utility program, such as:

- **System Summary**

  Select this choice to display additional information about your server.

- **PCI Slot Information**

  Select this choice to view the properties of the adapters installed in PCI slots.

- **Administrator Password**

  Select this choice to set or change the administrator password.

- **Remote Control Security Settings**

  Select this choice to set a remote-control password. When you set a remote-control password, you can also set the number of failed attempts to enter the correct remote-control password, and the length of time before another attempt is allowed.

Using passwords

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

Power-on password

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

You can use any combination of up to seven characters (A–Z, a–z, and 0–9) for your power-on password. Keep a record of your password in a secure place. When a power-on password is set, POST is not completed until you type the password. If you forget the power-on password, you can regain access to the server through one of the following methods:

- If an administrator password is set, type the administrator password at the power-on prompt. (If necessary, see “Administrator password” for details.) Start the Configuration/Setup Utility program and change the power-on password.
- Remove the battery and then reinstall the battery (see the *Option Installation Guide* on the IBM *xSeries Documentation* CD for instructions).
- Change the position of the power-on password override switch (switch 6 on switch block 1) to bypass the power-on password check. You can then start the Configuration/Setup Utility program and change the power-on password.

  Notes:

  1. Before changing any switch settings or moving any jumpers, turn off the server; then, disconnect all power cords and external cables.
  2. Any system-board switch or jumper blocks that are not shown in the illustrations in this book are reserved.
  3. Changing the position of the power-on password override switch bypasses the power-on password check the next time the server is turned on. You do not need to move the switch back after the password is overridden. The default position is Off. To bypass the power-on password check, move the switch to the opposite position.
  4. Changing the position of this switch does not affect the administrator password.

Administrator password

Note: This choice is available on the Configuration/Setup Utility menu only if the optional IBM Remote Supervisor Adapter is installed in your server.

Select this choice to set an administrator password. The administrator password provides access to all choices on the Configuration/Setup Utility main menu. When you use an administrator password, you can set, change, or delete both the administrator and power-on passwords and allow a power-on password to be changed by the user. You can use any combination of up to seven characters (A–Z, a–z, and 0–9) for your administrator password. Keep a record of your password in a secure place.

Attention: If an administrator password is set and then forgotten, it cannot be overridden or removed. You must replace the system board.

The following table provides a summary of the password features.

Table 2. Power-on and administrator password features

Type of password	Features
Power-on password	• Type the password to complete the system startup. • All choices are available on the Configuration/Setup Utility main menu.
Administrator password	• No password is required to complete the system startup. • Type the password to access the Configuration/Setup Utility program. • All choices are available on the Configuration/Setup Utility main menu.

Table 2. Power-on and administrator password features (continued)

Type of password	Features
Administrator *and* power-on password	• You can type either password to complete the system startup. • The administrator password provides access to all choices on the Configuration/Setup Utility main menu. You can set, change, or delete both the administrator and power-on passwords and allow a power-on password to be changed by the user. • The power-on password provides access to a limited set of choices on the Configuration/Setup Utility main menu. This limited access might include changing or deleting the power-on password.

Using ServeRAID Manager

You can use the ServeRAID Manager program, provided on the *IBM ServeRAID Support* CD, to:

- Configure a redundant array of independent disks (RAID)
- Restore a SCSI hard disk drive to factory-default settings, erasing all data
- View your RAID configuration and associated devices
- Monitor operation of your RAID controllers

The ServeRAID Manager program operates in two ways:

- Startable CD mode
- As an installed software program

The following sections provide instructions for running ServeRAID Manager in Startable CD mode to configure your integrated SCSI controller with RAID capabilities and perform an initial RAID configuration on your server. See the ServeRAID documentation on the *IBM ServeRAID Support* CD for additional information about RAID technology and instructions for using ServeRAID Manager to configure your integrated SCSI controller with RAID capabilities.

Notes:

1. The integrated SCSI controller with RAID capabilities in your server supports RAID level 1 operation.
2. If your server has a ServeRAID-5i controller installed, you can use ServeRAID Manager to configure the integrated SCSI controller with RAID capabilities for additional RAID levels.

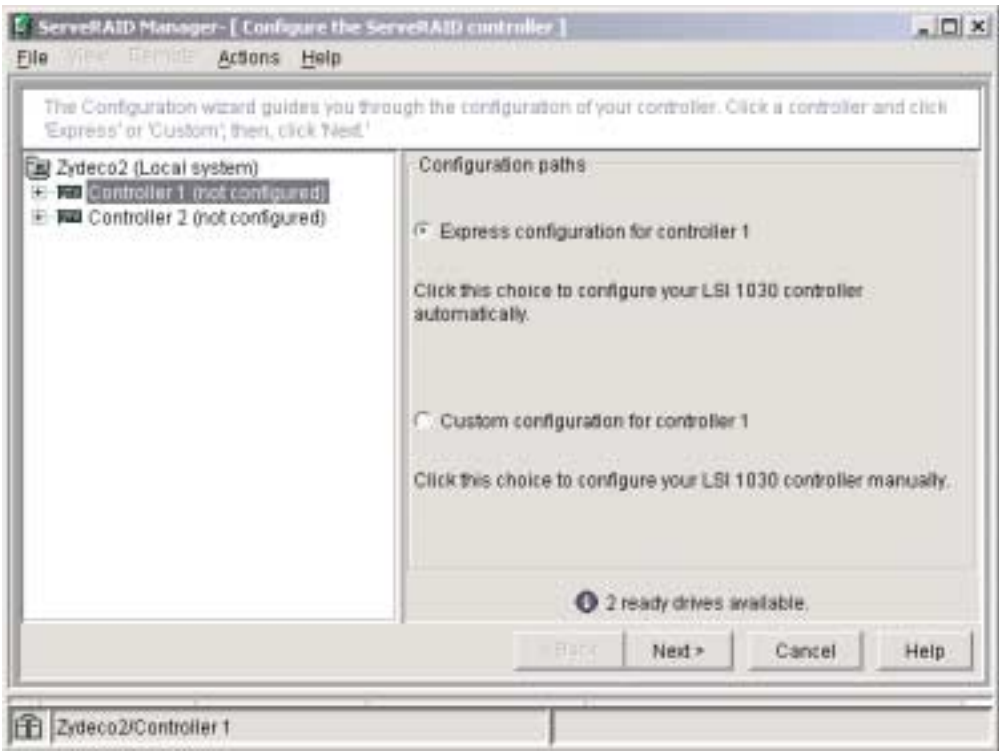
Using ServeRAID Manager in Startable CD mode

The information in this section focuses on using the ServeRAID Manager program in Startable CD mode to configure your controller. For information about installing ServeRAID Manager, see the documentation on the *IBM ServeRAID Support* CD.

When you run the ServeRAID Manager program from the startable *IBM ServeRAID Support* CD, you are using Startable CD mode, in which you can configure your controller *before* you install your operating system.

To run the ServeRAID Manager program in Startable CD mode, turn on the server; then, insert the *IBM ServeRAID Support* CD into the CD-ROM drive. If the ServeRAID Manager program detects an unconfigured controller and ready drives, the program automatically starts the Configuration wizard, and a window similar to

the following opens.



Configuring the controller

You can use the Configuration wizard to configure your controller. The Configuration wizard provides two configuration options: Express and Custom. Express configuration automatically configures your controller, and you can use Custom configuration to configure your controller manually.

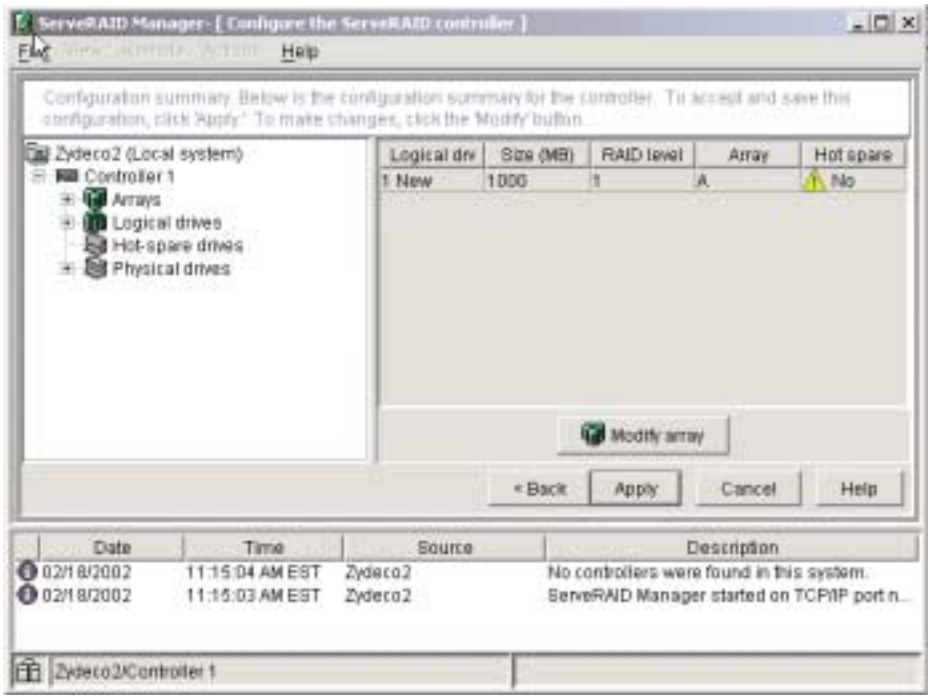
Note: If the RAID controller has two channels, it will appear in the ServeRAID Manager tree as two controller objects. However, you can configure only one array and one RAID level-1 logical drive.

Using Express configuration: Express configuration automatically configures your controller, creates an array by grouping together the first two physical drives that appear in the ServeRAID Manager tree, and it creates a RAID level-1 logical drive.

Complete the following steps to use Express configuration:

1. In the ServeRAID Manager tree, click the controller.
2. Click **Express configuration**.
3. Click **Next**. The “Configuration summary” window opens.

4. Review the information that is displayed in the “Configuration summary” window. To change the configuration, click **Modify arrays**.



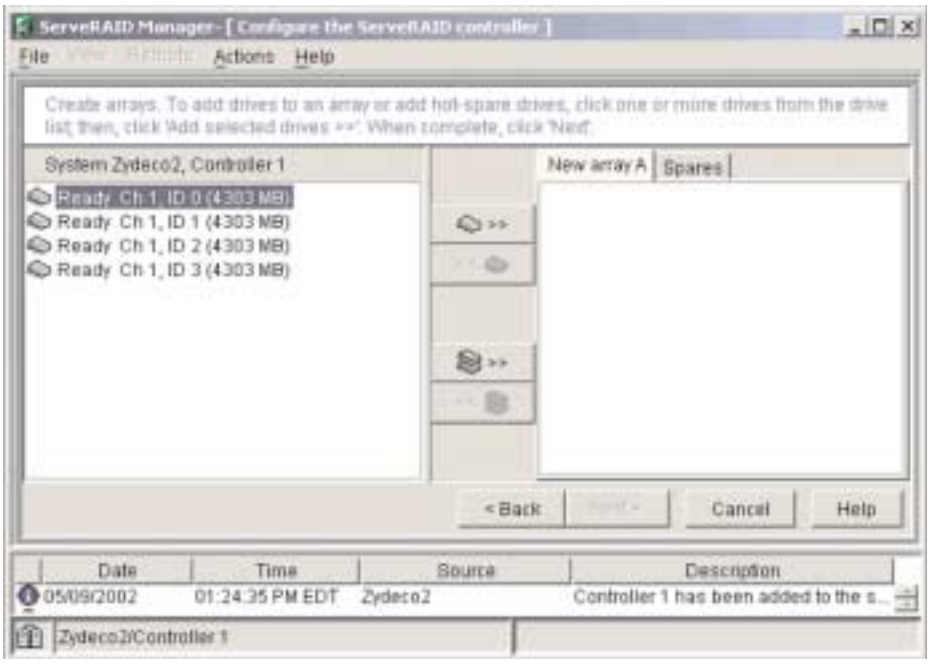
5. Click **Apply**; then, click **Yes** when asked if you want to apply the new configuration. The configuration is saved in the controller and in the physical drives. Exit from the ServeRAID Manager program and remove the CD from the CD-ROM drive. Restart the server.

Using Customer configuration: To configure your controller manually, select Custom configuration. Using Custom configuration, you can select which two physical drives you want to configure and create a hot-spare drive.

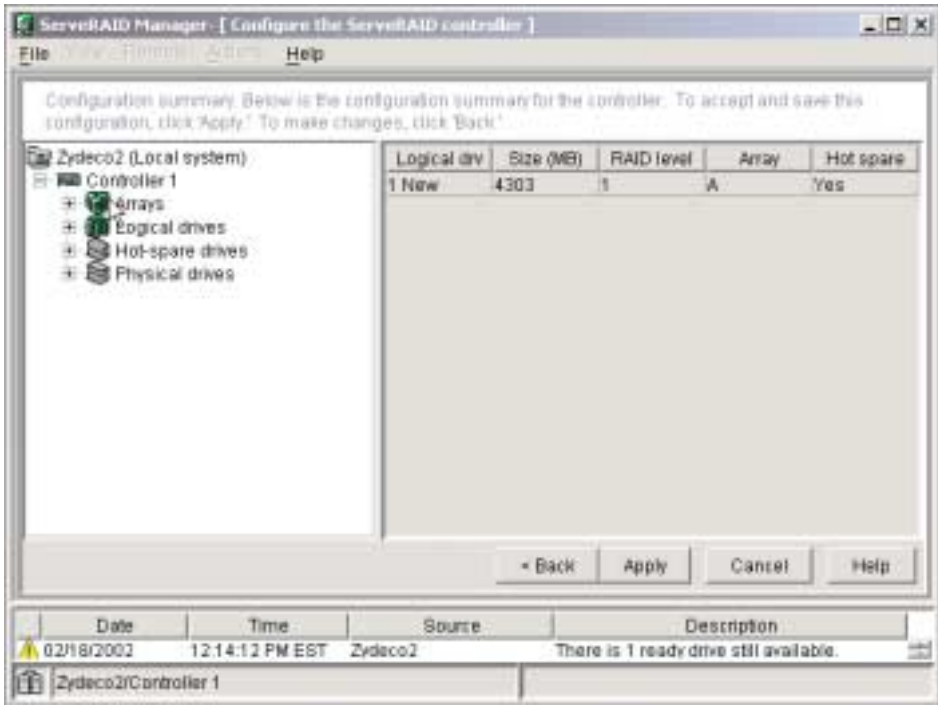
Complete the following steps to use Custom configuration:

1. In the ServeRAID Manager tree, click the controller.
2. Click **Custom configuration**.

3. Click **Next**. The “Create arrays” window opens.



4. From the list of ready drives, select the two drives you want to move to the array.
5. Click  (`Add selected drives`) to add the drives to the array.
6. Complete the following steps, if you want to configure a hot-spare drive:
   a. Click the **Spares** tab.
   b. Select the physical drive you want to designate as the hot-spare drive; then, click  (`Add selected drives`).
7. Click **Next**. The “Configuration summary” window opens.

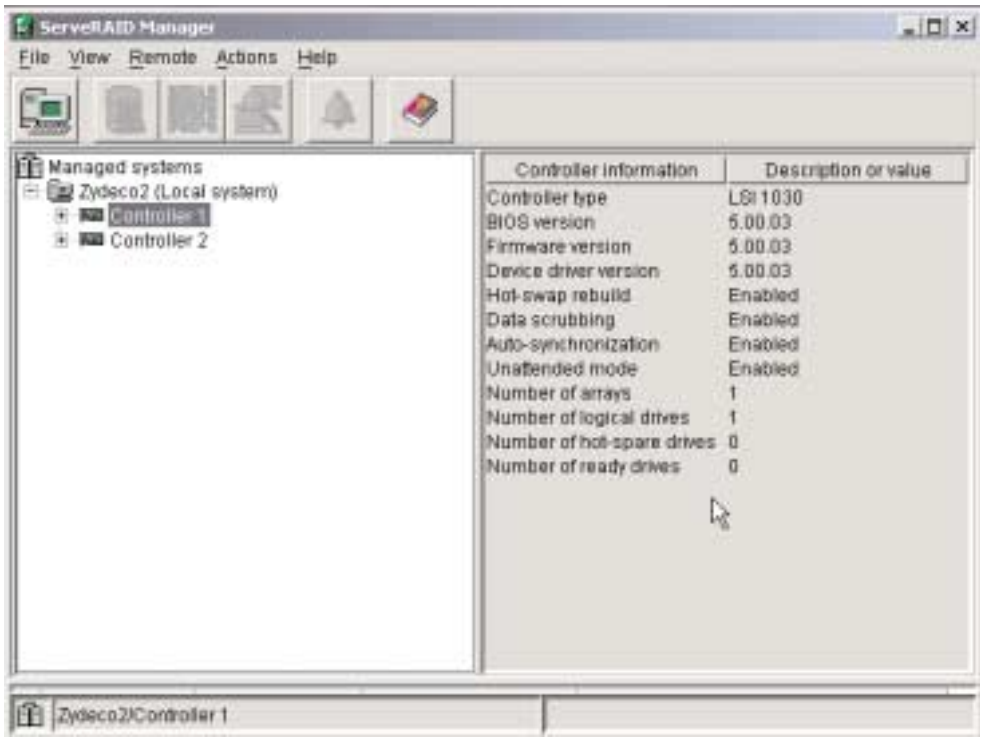


8. Review the information that is displayed in the “Configuration summary” window. To change the configuration, click **Back**.
9. Click **Apply**; then, click **Yes** when asked if you want to apply the new configuration. The configuration is saved in the controller and in the physical drives.
10. Exit from the ServeRAID Manager program, and remove the CD from the CD-ROM drive.
11. Restart the server.

Viewing your configuration

You can use ServeRAID Manager to view information about RAID controllers and the RAID subsystem (such as arrays, logical drives, hot-spare drives, and physical drives).

To view information, expand the ServeRAID Manager tree; then, click the relevant tree object. Detailed information about the selected device appears in the right pane.

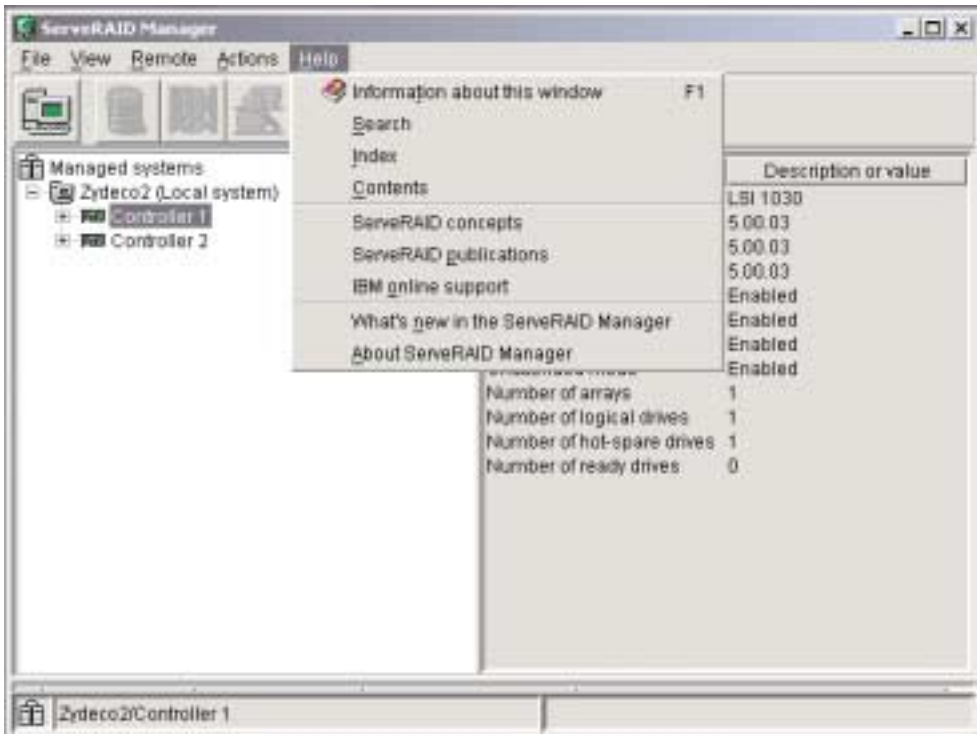


To display available actions for an item, click the item in the ServeRAID Manager tree and click **Actions**.

Getting assistance

For more information about ServeRAID Manager, see the online help system. To start the help system, either click  (`Information about this window`) on the

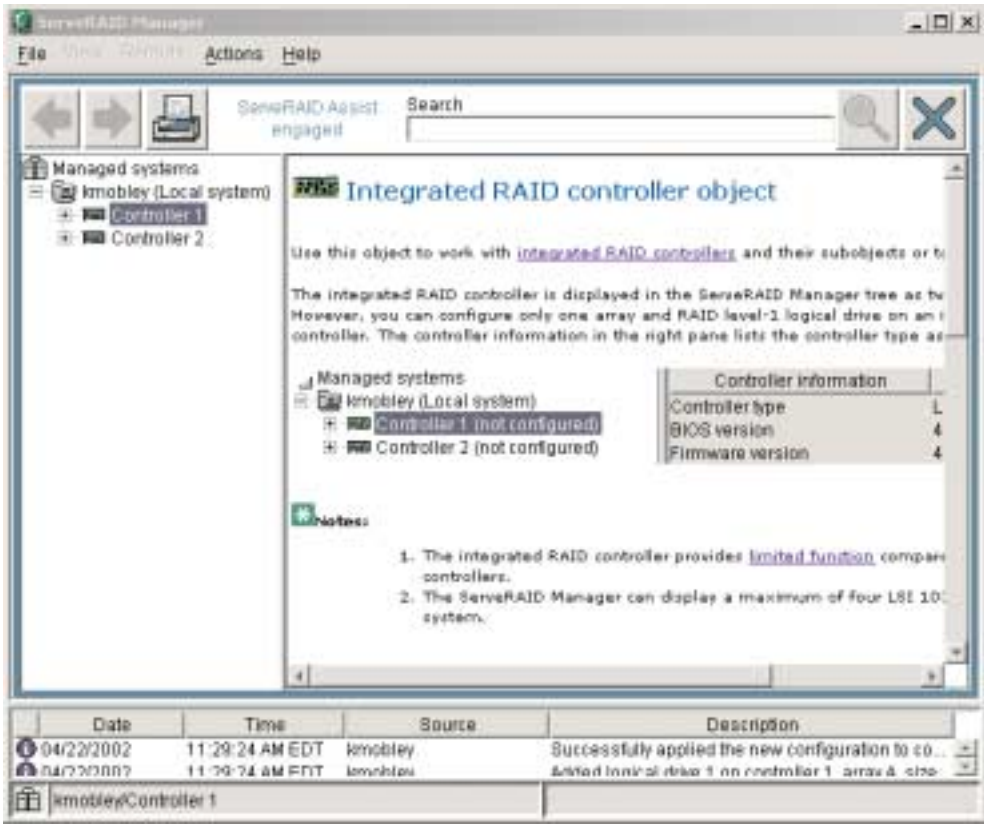
toolbar or select an item from the **Help** menu.



The help system (ServeRAID Assist) will open within the ServeRAID Manager interface.

To learn more about the ServeRAID Manager tree objects and the actions that apply to them, select a tree object and click **Actions → Hints and tips**. ServeRAID

Assist will start, and information about the tree object will appear in the right pane.



Using the LSI Logic Configuration Utility program

You can use the built-in, menu-driven LSI Logic Configuration program to:

- Perform a low-level format on a hard disk drive
- Set the SCSI device scan order
- Set the SCSI ID for a controller

Notes:

1. The integrated SCSI controller with RAID capabilities in your server supports RAID level 1 operation.
2. If your server has a ServeRAID-5i controller installed, you can use ServeRAID Manager to configure the integrated SCSI controller with RAID capabilities for additional RAID levels.

Complete the following steps to start the LSI Logic Configuration Utility program:

1. Turn on the server and watch the monitor screen.
2. When the `Press CTRL C to start LSI Logic Configuration Utility` prompt appears, press Ctrl+C.

   Note: If an administrator password has been set, a prompt appears asking you to type the password to start the LSI Logic Configuration Utility program.
3. Use the arrow keys to select a controller (channel) from the list of adapters; then, press Enter.
4. Follow the instructions on the screen to change the settings of the selected items; then, press Enter.

Formatting a SCSI hard disk drive

You can use the LSI Logic Configuration Utility program to perform a low-level format on a SCSI hard disk drive. Complete the following steps to format a drive:

1. Select the controller channel for the drive from the list of adapters.
2. Select **Device Properties**.
3. Use the arrow keys to highlight the drive to format.

   Attention: Low-level formatting removes all data from the hard disk drive. If there is data you want to save, backup the hard disk drive before continuing this procedure.
4. Use the arrow keys or the End key to scroll to the right.
5. Highlight the **Format** item; then, press Enter to start.

Updating the integrated system management firmware

To update the integrated system management (ISM) firmware for the integrated system management processor (ISMP), you must download the image of the Integrated System Management Firmware Update Utility program for your server from the IBM Support Web site at http://www.ibm.com/pc/support/ on the World Wide Web. You can then run the Integrated System Management Firmware Update Utility program to create an Integrated System Management Firmware Update Utility diskette that is used to update the ISM firmware. This diskette updates the ISM firmware only and does not affect any device drivers.

Complete the following steps to update the ISMP firmware:

1. Turn off your server.
2. Insert the diskette into the diskette drive.
3. Turn on your server. If your server does not start from the diskette drive, use the Configuration/Setup Utility program to configure the diskette drive as a startup device. See “Using the Configuration/Setup Utility program” on page 15. Then, go back and start with step 1
4. From the main menu, select **Update System Management Firmware** and press Enter.
5. Follow the on-screen instructions to complete the update.

Configuring the Ethernet controller

The server comes with an integrated dual-port Ethernet controller. This controller provides an interface for connecting to 10-Mbps, 100-Mbps, and 1000-Mbps networks and provides full-duplex (FDX) capability, which enables simultaneous transmission and reception of data on the Ethernet local area network (LAN).

To use the Ethernet controller, connect a Category 5 or higher unshielded twisted-pair (UTP) cable to either of the two Ethernet ports on the rear panel of the server.

The Ethernet connectors on the rear panel each have two LEDs. When the Ethernet link-status LED is on, there is an active connection on the Ethernet port. When the Ethernet transmit/receive TX/RX LED is on, there is activity between the server and the network. For a description of the server Ethernet ports, see the *Option Installation Guide* on the IBM *xSeries Documentation* CD.

When you connect the server to the network, the Ethernet controller automatically detects the data-transfer rate (10 Mbps, 100 Mbps, or 1000Mbps) on the network

and sets the controller to operate at the appropriate rate. In addition, if the Ethernet port that the server is connected to supports auto-negotiation, the Ethernet controller will set the appropriate duplex state. That is, the Ethernet controller will adjust to the network data rate, whether the data rate is standard Ethernet (10BASE-T), Fast Ethernet (100BASE-TX), Gigabit Ethernet (1000BASE-T), half duplex (HDX), or full duplex (FDX). The controller supports half-duplex (HDX) and full-duplex (FDX) modes at all speeds.

For information on configuring your Ethernet controller, see the *Intel Ethernet Software* CD that comes with your server. For updated information on configuring your Ethernet controller, go to the IBM Support Web site at http://www.ibm.com/pc/support and navigate to the area for your specific server type. From this area you can download documentation, the most current device drivers for your server, and software that supports advanced networking functions.

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

High-performance Ethernet modes

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

Teaming mode

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

- **Adapter fault tolerance** (AFT) provides automatic redundancy for the Ethernet controller. If the primary controller fails, the optional Ethernet adapter takes over. Adapter fault tolerance supports from 2 to 4 controllers per team.
- **Adaptive load balancing** (ALB) enables you to balance the transmission data flow among 2 to 4 Ethernet controllers. ALB also includes the AFT option. You can use ALB with any 100BASE-TX or 1000BASE-T switch.
- **Cisco Fast EtherChannel** (FEC) creates a team of 2 to 4 Ethernet controllers to increase transmission and reception throughput. FEC also includes the AFT option. You can only use FEC with a switch that has FEC capability.

Priority Packet mode

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

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

Priority Packet prioritizes traffic based on priority filters. These are parameters you assign to outgoing (transmit) packets. Using the Priority Filter wizard, you can set up predefined or custom priority filters based on a node (MAC) address, Ethernet

type, or by various properties of the protocol and port. Priority Packet provides two different methods for prioritizing traffic: IEEE 802.1p tagging and High Priority Queue.

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

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

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

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

The requirements for effectively using IEEE 802.1p tagging are:

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

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

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

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

Virtual LAN mode

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

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

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

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

Notes:

1. Windows NT versions prior to 4.0 do not support VLANs.
2. VLANs require Windows NT 4.0 with Service Pack 3.0 and the network driver interface specifications (NDIS) driver hotfix from Microsoft.
3. In Windows NT, VLANS cannot be implemented on controllers that have been configured for teaming options. Netware can support teaming options and VLANS on the same adapters.

Complete the following steps to join a VLAN from Windows NT 4.0:

1. Create a VLAN on the switch. Use the parameters you assign there to join the VLAN from the server. See the switch documentation for more information.
2. Double-click the **Start Proset** icon in the Control Panel window.
3. On the Adapters page, right click on the adapter that you want to be on the VLAN.
4. In IBMSet, click **Add VLAN** for the first adapter or click **Join VLAN** for remaining adapters. Note that VLANs cannot be assigned to adapters that are already defined to have an adapter teaming option.
5. Type the VLAN ID and VLAN name. The VLAN ID must match the VLAN ID of the switch. The VLAN name is for information only and does not need to match the name on the switch.
6. Repeat steps 3 through 5 for each VLAN you want the server to join. The VLANs you add are listed on the Adapters page.
7. Click **Close** and restart the server.

Chapter 3. Getting help and technical assistance

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

Before you call

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

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

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

Using the documentation

Information about your IBM xSeries or IntelliStation system and preinstalled software, if any, is available in the documentation that comes with your system. That documentation includes printed books, online books, README files, and help files. See the troubleshooting information in your system documentation for instructions for using the diagnostic programs. The troubleshooting information or the diagnostic programs might tell you that you need additional or updated device drivers or other software. IBM maintains pages on the World Wide Web where you can get the latest technical information and download device drivers and updates. To access these pages, go to http://www.ibm.com/pc/support/ and follow the instructions. Also, you can order publications through the IBM Publications Ordering System at http://www.elink.ibmlink.ibm.com/public/applications/publications/cgibin/pbi.cgi.

Getting help and information from the World Wide Web

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

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

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

Software service and support

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

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

Hardware service and support

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

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

Appendix A. Warranty information

This section contains information about your warranty period and the service and support that are provided by your warranty.

Warranty period

The warranty period varies by machine type and country or region.

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

Prior to on-site warranty service, you are required to go through problem determination with an IBM service specialist call center technician.

A warranty period of 3 years on parts and 1 year on labor means that IBM will provide warranty service without charge for:

1. parts and labor during the first year of the warranty period
2. parts only, on an exchange basis, in the second and third years of the warranty period. IBM will charge you for any labor it provides in performance of the repair or replacement.

The IBM Machine Warranties Web site at http://www.ibm.com/servers/support/machine_warranties/ contains a worldwide overview of the IBM Statement of Limited Warranty for IBM Machines, a glossary of terms used in the Statement of Limited Warranty, Frequently Asked Questions (FAQ), and links to Product Support Web pages. The IBM Statement of Limited Warranty is available from this Web site in 29 languages in Portable Document Format (PDF).

Machine - IBM @server xSeries 345 Type 8670

Country or region	Warranty period	Service delivery method
Japan	Parts - 3 years, Labor - 1 year	On-site repair
All other countries or regions	Parts - 3 years, Labor - 3 years	On-site repair

Problem determination

Prior to on-site warranty service, you are required to go through problem determination with an IBM service specialist call center technician. The service specialist will run diagnostic tests on the hardware and check the software.

Running diagnostics

The IBM service specialist will help you determine whether your equipment is functioning as specified. It might be necessary to isolate the failing xSeries, Netfinity, or IntelliStation system; IBM component; or both from any active production environment to run diagnostics and perform defect-isolation programs. You are responsible for making the system, IBM component, or both available for running diagnostics and defect-isolation programs.

Checking software

The IBM service specialist will help you ensure that the correct BIOS code, firmware, device drivers, and other supporting IBM software are installed and correctly configured. It might be necessary to manually gather information about the relevant software levels or run IBM-approved utility programs to gather this information. It might be necessary to isolate the failing system from any active production environment to gather this information. You are responsible, with assistance from the service specialist, for gathering this information. The IBM Statement of Limited Warranty does not include on-site assistance with this activity.

Warranty service and support

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

The following services are available during the warranty period:

- **Problem determination** - Trained personnel are available to assist you with determining if you have a hardware problem and deciding what action is necessary to fix the problem.
- **IBM hardware repair** - If the problem is determined to be caused by IBM hardware under warranty, trained service personnel are available to provide the applicable level of service, either on-site or at an IBM service center as determined by IBM.
- **Engineering Change management** - Occasionally, there might be changes that are required after a product has been shipped from IBM. In those instances, IBM will make Engineering Changes (ECs) available that apply to your hardware.
- **Customer replaceable units (CRUs)** - Some parts of IBM servers are designated as customer replaceable units. IBM ships CRUs to you for replacement by you. CRUs include keyboards, monitors, memory, diskette drives, hard disk drives, and mice (this list is not inclusive of all CRUs).

The following items are not covered under warranty service:

- Replacement or use of non-IBM parts. All IBM parts contain a 7-character identification in the format IBM FRU XXXXXXX.
- Identification of software problem sources.
- Installation of customer replaceable units (CRUs).
- Installation and configuration of BIOS code, firmware, or device drivers that are designated as customer installable.

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

Please have the following information ready when you call:

- The machine type and model of your IBM hardware product (if available)
- Serial numbers of your IBM hardware products
- A description of the problem
- The exact wording of any error messages
- Hardware and software configuration information

International Warranty Service

If you travel with your xSeries or IntelliStation system or relocate it to a country where your system is sold and serviced by IBM or IBM resellers authorized to perform warranty service, International Warranty Service (IWS) is available during the warranty period. Eligible IBM systems are identified by their four-digit machine types.

You can obtain IWS through the service delivery method (such as depot, carry-in, or on-site) provided in the servicing country. Service methods and procedures vary by country, and some service or parts might not be available in all countries. Service centers in certain countries might not be able to service all models of a particular machine type. In addition, some countries might have fees and restrictions that apply at the time of service.

To determine whether your system is eligible for IWS, go to http://www.ibm.com/pc/support/ and click **Warranty lookup**.

Purchasing additional services

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

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

IBM Statement of Limited Warranty Z125-4753-06 8/2000

Part 1 - General Terms

This Statement of Limited Warranty includes Part 1 - General Terms and Part 2 - Country-unique Terms. The terms of Part 2 replace or modify those of Part 1. The warranties provided by IBM in this Statement of Limited Warranty apply only to Machines you purchase for your use, and not for resale, from IBM or your reseller. The term “Machine” means an IBM machine, its features, conversions, upgrades, elements, or accessories, or any combination of them. The term “Machine” does not include any software programs, whether pre-loaded with the Machine, installed subsequently or otherwise. Unless IBM specifies otherwise, the following warranties apply only in the country where you acquire the Machine. Nothing in this Statement of Limited Warranty affects any statutory rights of consumers that cannot be waived or limited by contract. If you have any questions, contact IBM or your reseller.

The IBM Warranty for Machines: IBM warrants that each Machine 1) is free from defects in materials and workmanship and 2) conforms to IBM’s Official Published Specifications (“Specifications”). The warranty period for a Machine is a specified, fixed period commencing on its Date of Installation. The date on your sales receipt is the Date of Installation unless IBM or your reseller informs you otherwise.

If a Machine does not function as warranted during the warranty period, and IBM or your reseller are unable to either 1) make it do so or 2) replace it with one that is at least functionally equivalent, you may return it to your place of purchase and your money will be refunded.

Extent of Warranty: The warranty does not cover the repair or exchange of a Machine resulting from misuse, accident, modification, unsuitable physical or operating environment, improper maintenance by you, or failure caused by a product for which IBM is not responsible. The warranty is voided by removal or alteration of Machine or parts identification labels.

THESE WARRANTIES ARE YOUR EXCLUSIVE WARRANTIES AND REPLACE ALL OTHER WARRANTIES OR CONDITIONS, EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OR CONDITIONS OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. THESE WARRANTIES GIVE YOU SPECIFIC LEGAL RIGHTS AND YOU MAY ALSO HAVE OTHER RIGHTS WHICH VARY FROM JURISDICTION TO JURISDICTION. SOME JURISDICTIONS DO NOT ALLOW THE EXCLUSION OR LIMITATION OF EXPRESS OR IMPLIED WARRANTIES, SO THE ABOVE EXCLUSION OR LIMITATION MAY NOT APPLY TO YOU. IN THAT EVENT, SUCH WARRANTIES ARE LIMITED IN DURATION TO THE WARRANTY PERIOD. NO WARRANTIES APPLY AFTER THAT PERIOD.

Items Not Covered by Warranty: IBM does not warrant uninterrupted or error-free operation of a Machine. Any technical or other support provided for a Machine under warranty, such as assistance via telephone with “how-to” questions and those regarding Machine set-up and installation, will be provided **WITHOUT WARRANTIES OF ANY KIND.**

Warranty Service: To obtain warranty service for a Machine, contact IBM or your reseller. If you do not register your Machine with IBM, you may be required to present proof of purchase.

During the warranty period, IBM or your reseller, if approved by IBM to provide warranty service, provides without charge certain types of repair and exchange service to keep Machines in, or restore them to, conformance with their Specifications. IBM or your reseller will inform you of the available types of service for a Machine based on its country of installation. At its discretion, IBM or your reseller will 1) either repair or exchange the failing Machine and 2) provide the service either at your location or a service center. IBM or your reseller will also manage and install selected engineering changes that apply to the Machine.

Some parts of IBM Machines are designated as Customer Replaceable Units (called “CRUs”), e.g., keyboards, memory, or hard disk drives. IBM ships CRUs to you for replacement by you. You must return all defective CRUs to IBM within 30 days of your receipt of the replacement CRU. You are responsible for downloading designated Machine Code and Licensed Internal Code updates from an IBM Internet Web site or from other electronic media, and following the instructions that IBM provides.

When warranty service involves the exchange of a Machine or part, the item IBM or your reseller replaces becomes its property and the replacement becomes yours. You represent that all removed items are genuine and unaltered. The replacement may not be new, but will be in good working order and at least functionally equivalent to the item replaced. The replacement assumes the warranty service status of the replaced item. Many features, conversions, or upgrades involve the removal of parts and their return to IBM. A part that replaces a removed part will assume the warranty service status of the removed part.

Before IBM or your reseller exchanges a Machine or part, you agree to remove all features, parts, options, alterations, and attachments not under warranty service.

You also agree to
1. ensure that the Machine is free of any legal obligations or restrictions that prevent its exchange;
2. obtain authorization from the owner to have IBM or your reseller service a Machine that you do not own; and
3. where applicable, before service is provided:
    a. follow the problem determination, problem analysis, and service request procedures that IBM or your reseller provides;
    b. secure all programs, data, and funds contained in a Machine;
    c. provide IBM or your reseller with sufficient, free, and safe access to your facilities to permit them to fulfill their obligations; and
    d. inform IBM or your reseller of changes in a Machine’s location.

IBM is responsible for loss of, or damage to, your Machine while it is 1) in IBM’s possession or 2) in transit in those cases where IBM is responsible for the transportation charges.

Neither IBM nor your reseller is responsible for any of your confidential, proprietary or personal information contained in a Machine which you return to IBM or your reseller for any reason. You should remove all such information from the Machine prior to its return.

Limitation of Liability: Circumstances may arise where, because of a default on IBM’s part or other liability, you are entitled to recover damages from IBM. In each such instance, regardless of the basis on which you are entitled to claim damages from IBM (including fundamental breach, negligence, misrepresentation, or other

contract or tort claim), except for any liability that cannot be waived or limited by applicable laws, IBM is liable for no more than

1. damages for bodily injury (including death) and damage to real property and tangible personal property; and
2. the amount of any other actual direct damages, up to the charges (if recurring, 12 months' charges apply) for the Machine that is subject of the claim. For purposes of this item, the term "Machine" includes Machine Code and Licensed Internal Code.

   This limit also applies to IBM's suppliers and your reseller. It is the maximum for which IBM, its suppliers, and your reseller are collectively responsible.

UNDER NO CIRCUMSTANCES IS IBM LIABLE FOR ANY OF THE FOLLOWING: 1) THIRD-PARTY CLAIMS AGAINST YOU FOR DAMAGES (OTHER THAN THOSE UNDER THE FIRST ITEM LISTED ABOVE); 2) LOSS OF, OR DAMAGE TO, YOUR RECORDS OR DATA; OR 3) SPECIAL, INCIDENTAL, OR INDIRECT DAMAGES OR FOR ANY ECONOMIC CONSEQUENTIAL DAMAGES, LOST PROFITS OR LOST SAVINGS, EVEN IF IBM, ITS SUPPLIERS OR YOUR RESELLER IS INFORMED OF THEIR POSSIBILITY. SOME JURISDICTIONS DO NOT ALLOW THE EXCLUSION OR LIMITATION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES, SO THE ABOVE LIMITATION OR EXCLUSION MAY NOT APPLY TO YOU.

Governing Law: Both you and IBM consent to the application of the laws of the country in which you acquired the Machine to govern, interpret, and enforce all of your and IBM's rights, duties, and obligations arising from, or relating in any manner to, the subject matter of this Agreement, without regard to conflict of law principles.

Part 2 - Country-unique Terms

AMERICAS

BRAZIL

Governing Law: *The following is added after the first sentence:*Any litigation arising from this Agreement will be settled exclusively by the court of Rio de Janeiro.

NORTH AMERICA

Warranty Service: *The following is added to this Section:* To obtain warranty service from IBM in Canada or the United States, call 1-800-IBM-SERV (426-7378).

CANADA

Governing Law: *The following replaces "laws of the country in which you acquired the Machine" in the first sentence:* laws in the Province of Ontario.

UNITED STATES

Governing Law: *The following replaces "laws of the country in which you acquired the Machine" in the first sentence:* laws of the State of New York.

ASIA PACIFIC

AUSTRALIA

The IBM Warranty for Machines: *The following paragraph is added to this Section:* The warranties specified in this Section are in addition to any rights you may have under the Trade Practices Act 1974 or other similar legislation and are only limited to the extent permitted by the applicable legislation.

Limitation of Liability: *The following is added to this Section:* Where IBM is in breach of a condition or warranty implied by the Trade Practices Act 1974 or other similar legislation, IBM's liability is limited to the repair or replacement of the goods or the supply of equivalent goods. Where that condition or warranty relates to right to sell, quiet possession or clear title, or the goods are of a kind ordinarily acquired for personal, domestic or household use or consumption, then none of the limitations in this paragraph apply.

Governing Law: *The following replaces "laws of the country in which you acquired the Machine" in the first sentence:* laws of the State or Territory.

CAMBODIA, LAOS, AND VIETNAM

Governing Law: *The following replaces "laws of the country in which you acquired the Machine" in the first sentence:*laws of the State of New York.

The following is added to this Section: Disputes and differences arising out of or in connection with this Agreement shall be finally settled by arbitration which shall be held in Singapore in accordance with the rules of the International Chamber of Commerce (ICC). The arbitrator or arbitrators designated in conformity with those rules shall have the power to rule on their own competence and on the validity of the Agreement to submit to arbitration. The arbitration award shall be final and binding for the parties without appeal and the arbitral award shall be in writing and set forth the findings of fact and the conclusions of law.

All proceedings shall be conducted, including all documents presented in such proceedings, in the English language. The number of arbitrators shall be three, with each side to the dispute being entitled to appoint one arbitrator.

The two arbitrators appointed by the parties shall appoint a third arbitrator before proceeding upon the reference. The third arbitrator shall act as chairman of the proceedings. Vacancies in the post of chairman shall be filled by the president of the ICC. Other vacancies shall be filled by the respective nominating party. Proceedings shall continue from the stage they were at when the vacancy occurred.

If one of the parties refuses or otherwise fails to appoint an arbitrator within 30 days of the date the other party appoints its, the first appointed arbitrator shall be the sole arbitrator, provided that the arbitrator was validly and properly appointed.

The English language version of this Agreement prevails over any other language version.

HONG KONG AND MACAU

Governing Law: *The following replaces "laws of the country in which you acquired the Machine" in the first sentence:* laws of Hong Kong Special Administrative Region.

INDIA

Limitation of Liability: *The following replaces items 1 and 2 of this Section:*

1. liability for bodily injury (including death) or damage to real property and tangible personal property will be limited to that caused by IBM's negligence;
2. as to any other actual damage arising in any situation involving nonperformance by IBM pursuant to, or in any way related to the subject of this Statement of Limited Warranty, IBM's liability will be limited to the charge paid by you for the individual Machine that is the subject of the claim.

JAPAN

Governing Law: *The following sentence is added to this Section:*Any doubts concerning this Agreement will be initially resolved between us in good faith and in accordance with the principle of mutual trust.

NEW ZEALAND

The IBM Warranty for Machines: *The following paragraph is added to this Section:* The warranties specified in this Section are in addition to any rights you may have under the Consumer Guarantees Act 1993 or other legislation which cannot be excluded or limited. The Consumer Guarantees Act 1993 will not apply in respect of any goods which IBM provides, if you require the goods for the purposes of a business as defined in that Act.

Limitation of Liability: *The following is added to this Section:* Where Machines are not acquired for the purposes of a business as defined in the Consumer Guarantees Act 1993, the limitations in this Section are subject to the limitations in that Act.

PEOPLE'S REPUBLIC OF CHINA (PRC)

Governing Law: *The following replaces this Section:* Both you and IBM consent to the application of the laws of the State of New York (except when local law requires otherwise) to govern, interpret, and enforce all your and IBM's rights, duties, and obligations arising from, or relating in any manner to, the subject matter of this Agreement, without regard to conflict of law principles.

Any disputes arising from or in connection with this Agreement will first be resolved by friendly negotiations, failing which either of us has the right to submit the dispute to the China International Economic and Trade Arbitration Commission in Beijing, the PRC, for arbitration in accordance with its arbitration rules in force at the time. The arbitration tribunal will consist of three arbitrators. The language to be used therein will be English and Chinese. An arbitral award will be final and binding on all the parties, and will be enforceable under the Convention on the Recognition and Enforcement of Foreign Arbitral Awards (1958).

The arbitration fee will be borne by the losing party unless otherwise determined by the arbitral award.

During the course of arbitration, this Agreement will continue to be performed except for the part which the parties are disputing and which is undergoing arbitration.

EUROPE, MIDDLE EAST, AFRICA (EMEA)

THE FOLLOWING TERMS APPLY TO ALL EMEA COUNTRIES: The terms of this Statement of Limited Warranty apply to Machines purchased from IBM or an IBM reseller.

Warranty Service: If you purchase an IBM Machine in Austria, Belgium, Denmark, Estonia, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland or United Kingdom, you may obtain warranty service for that Machine in any of those countries from either (1) an IBM reseller approved to perform warranty service or (2) from IBM. If you purchase an IBM Personal Computer Machine in Albania, Armenia, Belarus, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Georgia, Hungary, Kazakhstan, Kirghizia, Federal Republic of Yugoslavia, Former Yugoslav Republic of Macedonia (FYROM), Moldova, Poland, Romania, Russia, Slovak Republic, Slovenia, or Ukraine, you may obtain warranty service for that Machine in any of those countries from either (1) an IBM reseller approved to perform warranty service or (2) from IBM.

If you purchase an IBM Machine in a Middle Eastern or African country, you may obtain warranty service for that Machine from the IBM entity within the country of purchase, if that IBM entity provides warranty service in that country, or from an IBM reseller, approved by IBM to perform warranty service on that Machine in that country. Warranty service in Africa is available within 50 kilometers of an IBM authorized service provider. You are responsible for transportation costs for Machines located outside 50 kilometers of an IBM authorized service provider.

Governing Law: The applicable laws that govern, interpret and enforce rights, duties, and obligations of each of us arising from, or relating in any manner to, the subject matter of this Statement, without regard to conflict of laws principles, as well as Country-unique terms and competent court for this Statement are those of the country in which the warranty service is being provided, except that in 1) Albania, Bosnia-Herzegovina, Bulgaria, Croatia, Hungary, Former Yugoslav Republic of Macedonia, Romania, Slovakia, Slovenia, Armenia, Azerbaijan, Belarus, Georgia, Kazakhstan, Kyrgyzstan, Moldova, Russia, Tajikistan, Turkmenistan, Ukraine, and Uzbekistan, the laws of Austria apply; 2) Estonia, Latvia, and Lithuania, the laws of Finland apply; 3) Algeria, Benin, Burkina Faso, Cameroon, Cape Verde, Central African Republic, Chad, Congo, Djibouti, Democratic Republic of Congo, Equatorial Guinea, France, Gabon, Gambia, Guinea, Guinea-Bissau, Ivory Coast, Lebanon, Mali, Mauritania, Morocco, Niger, Senegal, Togo, and Tunisia, this Agreement will be construed and the legal relations between the parties will be determined in accordance with the French laws and all disputes arising out of this Agreement or related to its violation or execution, including summary proceedings, will be settled exclusively by the Commercial Court of Paris; 4) Angola, Bahrain, Botswana, Burundi, Egypt, Eritrea, Ethiopia, Ghana, Jordan, Kenya, Kuwait, Liberia, Malawi, Malta, Mozambique, Nigeria, Oman, Pakistan, Qatar, Rwanda, Sao Tome, Saudi Arabia, Sierra Leone, Somalia, Tanzania, Uganda, United Arab Emirates, United Kingdom, West Bank/Gaza, Yemen, Zambia, and Zimbabwe, this Agreement will be governed by English Law and disputes relating to it will be submitted to the exclusive jurisdiction of the English courts; and 5) in Greece, Israel, Italy, Portugal, and Spain any legal claim arising out of this Statement will be brought before, and finally settled by, the competent court of Athens, Tel Aviv, Milan, Lisbon, and Madrid, respectively.

THE FOLLOWING TERMS APPLY TO THE COUNTRY SPECIFIED:

AUSTRIA AND GERMANY

The IBM Warranty for Machines: *The following replaces the first sentence of the first paragraph of this Section:* The warranty for an IBM Machine covers the functionality of the Machine for its normal use and the Machine's conformity to its Specifications.

The following paragraphs are added to this Section:

The minimum warranty period for Machines is six months. In case IBM or your reseller is unable to repair an IBM Machine, you can alternatively ask for a partial refund as far as justified by the reduced value of the unrepaired Machine or ask for a cancellation of the respective agreement for such Machine and get your money refunded.

Extent of Warranty: *The second paragraph does not apply.*

Warranty Service: *The following is added to this Section:* During the warranty period, transportation for delivery of the failing Machine to IBM will be at IBM's expense.

Limitation of Liability: *The following paragraph is added to this Section:* The limitations and exclusions specified in the Statement of Limited Warranty will not apply to damages caused by IBM with fraud or gross negligence and for express warranty.

The following sentence is added to the end of item 2: IBM's liability under this item is limited to the violation of essential contractual terms in cases of ordinary negligence.

EGYPT

Limitation of Liability: *The following replaces item 2 in this Section:* as to any other actual direct damages, IBM's liability will be limited to the total amount you paid for the Machine that is the subject of the claim. For purposes of this item, the term "Machine" includes Machine Code and Licensed Internal Code.

Applicability of suppliers and resellers (unchanged).

FRANCE

Limitation of Liability: *The following replaces the second sentence of the first paragraph of this Section:*In such instances, regardless of the basis on which you are entitled to claim damages from IBM, IBM is liable for no more than: *(items 1 and 2 unchanged)*.

IRELAND

Extent of Warranty: *The following is added to this Section:* Except as expressly provided in these terms and conditions, all statutory conditions, including all warranties implied, but without prejudice to the generality of the foregoing all warranties implied by the Sale of Goods Act 1893 or the Sale of Goods and Supply of Services Act 1980 are hereby excluded.

Limitation of Liability: *The following replaces items one and two of the first paragraph of this Section:*1. death or personal injury or physical damage to your real property solely caused by IBM's negligence; and 2. the amount of any other actual direct damages, up to 125 percent of the charges (if recurring, the 12 months' charges apply) for the Machine that is the subject of the claim or which otherwise gives rise to the claim.

Applicability of suppliers and resellers (unchanged).

The following paragraph is added at the end of this Section: IBM's entire liability and your sole remedy, whether in contract or in tort, in respect of any default shall be limited to damages.

ITALY

Limitation of Liability: *The following replaces the second sentence in the first paragraph:*In each such instance unless otherwise provided by mandatory law, IBM is liable for no more than: 1. *(unchanged)* 2. as to any other actual damage arising in all situations involving nonperformance by IBM pursuant to, or in any way related to the subject matter of this Statement of Warranty, IBM's liability, will be limited to the total amount you paid for the Machine that is the subject of the claim. *Applicability of suppliers and resellers (unchanged).*

The following replaces the third paragraph of this Section: Unless otherwise provided by mandatory law, IBM and your reseller are not liable for any of the following: *(items 1 and 2 unchanged)* 3) indirect damages, even if IBM or your reseller is informed of their possibility.

SOUTH AFRICA, NAMIBIA, BOTSWANA, LESOTHO AND SWAZILAND

Limitation of Liability: *The following is added to this Section:* IBM's entire liability to you for actual damages arising in all situations involving nonperformance by IBM in respect of the subject matter of this Statement of Warranty will be limited to the charge paid by you for the individual Machine that is the subject of your claim from IBM.

UNITED KINGDOM

Limitation of Liability: *The following replaces items 1 and 2 of the first paragraph of this Section:*

1. death or personal injury or physical damage to your real property solely caused by IBM's negligence;
2. the amount of any other actual direct damages or loss, up to 125 percent of the charges (if recurring, the 12 months' charges apply) for the Machine that is the subject of the claim or which otherwise gives rise to the claim;

The following item is added to this paragraph: 3. breach of IBM's obligations implied by Section 12 of the Sale of Goods Act 1979 or Section 2 of the Supply of Goods and Services Act 1982.

Applicability of suppliers and resellers (unchanged).

The following is added to the end of this Section: IBM's entire liability and your sole remedy, whether in contract or in tort, in respect of any default shall be limited to damages.

Appendix B. Notices

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Important notes

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

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

When referring to processor storage, real and virtual storage, or channel volume, KB stands for approximately 1000 bytes, MB stands for approximately 1000000 bytes, and GB stands for approximately 1000000000 bytes.

When referring to hard disk drive capacity or communications volume, MB stands for 1 000 000 bytes, and GB stands for 1 000 000 000 bytes. Total user-accessible capacity may vary depending on operating environments.

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

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Some software may differ from its retail version (if available), and may not include user manuals or all program functionality.

Electronic emission notices

Federal Communications Commission (FCC) statement

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense.

Properly shielded and grounded cables and connectors must be used in order to meet FCC emission limits. IBM is not responsible for any radio or television interference caused by using other than recommended cables and connectors or by unauthorized changes or modifications to this equipment. Unauthorized changes or modifications could void the user's authority to operate the equipment.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Industry Canada Class A emission compliance statement

This Class A digital apparatus complies with Canadian ICES-003.

Avis de conformité à la réglementation d'Industrie Canada

Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.

Australia and New Zealand Class A statement

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

United Kingdom telecommunications safety requirement

Notice to Customers

This apparatus is approved under approval number NS/G/1234/J/100003 for indirect connection to public telecommunication systems in the United Kingdom.

European Union EMC Directive conformance statement

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

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

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

Taiwan electrical emission statement

警告使用者:
這是甲類的資訊產品，在
居住的環境中使用時，可
能會造成射頻干擾，在這
種情況下，使用者會被要
求採取某些適當的對策。

Japanese Voluntary Control Council for Interference (VCCI) statement

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Power cords

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

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

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

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

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

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

IBM power cord part number	**Used in these countries and regions**
13F9940	Argentina, Australia, China (PRC), New Zealand, Papua New Guinea, Paraguay, Uruguay, Western Samoa
13F9979	Afghanistan, Algeria, Andorra, Angola, Austria, Belgium, Benin, Bulgaria, Burkina Faso, Burundi, Cameroon, Central African Rep., Chad, China (Macau S.A.R.), Czech Republic, Egypt, Finland, France, French Guiana, Germany, Greece, Guinea, Hungary, Iceland, Indonesia, Iran, Ivory Coast, Jordan, Lebanon, Luxembourg, Malagasy, Mali, Martinique, Mauritania, Mauritius, Monaco, Morocco, Mozambique, Netherlands, New Caledonia, Niger, Norway, Poland, Portugal, Romania, Senegal, Slovakia, Spain, Sudan, Sweden, Syria, Togo, Tunisia, Turkey, former USSR, Vietnam, former Yugoslavia, Zaire, Zimbabwe
13F9997	Denmark
14F0015	Bangladesh, Burma, Pakistan, South Africa, Sri Lanka

IBM power cord part number	Used in these countries and regions
14F0033	Antigua, Bahrain, Brunei, Channel Islands, China (Hong Kong S.A.R.), Cyprus, Dubai, Fiji, Ghana, India, Iraq, Ireland, Kenya, Kuwait, Malawi, Malaysia, Malta, Nepal, Nigeria, Polynesia, Qatar, Sierra Leone, Singapore, Tanzania, Uganda, United Kingdom, Yemen, Zambia
14F0051	Liechtenstein, Switzerland
14F0069	Chile, Ethiopia, Italy, Libya, Somalia
14F0087	Israel
1838574	Thailand
6952301	Bahamas, Barbados, Bermuda, Bolivia, Brazil, Canada, Cayman Islands, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Guatemala, Guyana, Haiti, Honduras, Jamaica, Japan, Korea (South), Liberia, Mexico, Netherlands Antilles, Nicaragua, Panama, Peru, Philippines, Saudi Arabia, Suriname, Taiwan, Trinidad (West Indies), United States of America, Venezuela

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