

xSeries 450



User's Guide

xSeries 450



User's Guide

Note: Before using this information and the product it supports, be sure to read the general information in Appendix A, "Warranty information", on page 33 and Appendix B, "Notices", on page 45.

First Edition (February 2003)

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Contents

Safety	v
Chapter 1. Introducing the IBM xSeries 450	1
Related publications	1
Notices and statements used in this book	2
Features and specifications	3
What your IBM xSeries 450 offers	4
Reliability, availability, and serviceability features	4
Active Memory	5
Memory scrubbing and Memory ProteXion	5
Memory mirroring	5
Server controls and indicators	6
Front view	6
Rear view	7
Server power features	9
Turning on the server	9
Turning off the server	9
Chapter 2. Configuring your server	11
Using the Extensible Firmware Interface (EFI) Boot Manager	11
Using the Configuration/Setup Utility program	12
Starting the Configuration/Setup Utility program	12
Configuration/Setup Utility menu choices	12
Passwords	14
Power-on password	14
Administrator password	14
Using the LSI Logic Configuration Utility program	15
Setting up the Remote Supervisor Adapter	15
Remote Supervisor Adapter features	16
Setup requirements	16
Cabling and configuring the Remote Supervisor Adapter	16
Cabling the Ethernet LAN port and serial port	17
Cabling the Ethernet LAN port	18
Cabling the serial (COM) port	18
Configuring the adapter	19
Enabling remote access to the adapter	19
Configuring the Ethernet settings for Web-based remote access	19
Configuring the serial port for text-based remote access	21
Setting up point-to-point protocol	23
Installing Advanced System Management device drivers	24
Configuring the remote control password	24
Completing the configuration	25
Using the ASM interconnect network	25
Planning and cabling the interconnect network	25
Forwarding alerts	26
Connecting the ASM Interconnect module to the xSeries 450	27
ASM interconnect network configuration examples	28
Configuring the Gigabit Ethernet controller	30
Chapter 3. Getting help and technical assistance	31
Before you call	31
Using the documentation	31
Getting help and information from the World Wide Web	31

Software service and support	32
Hardware service and support	32
Appendix A. Warranty information	33
Warranty period	33
Problem determination	33
Running diagnostics	33
Checking software	33
Warranty service and support	34
International Warranty Service	34
Purchasing additional services	35
IBM Statement of Limited Warranty Z125-4753-06 8/2000	36
Part 1 - General Terms	36
Part 2 - Country-unique Terms	38
Appendix B. Notices	45
Edition notice	45
Trademarks	46
Important notes.	46
Product recycling and disposal	47
Electronic emission notices	47
Federal Communications Commission (FCC) statement	47
Industry Canada Class A emission compliance statement	48
Australia and New Zealand Class A statement	48
United Kingdom telecommunications safety requirement.	48
European Union EMC Directive conformance statement.	48
Taiwanese Class A warning statement	49
Chinese Class A warning statement	49
Japanese Voluntary Control Council for Interference (VCCI) statement	49
Power cords	49
Index	53

Safety

Before installing this product, read the Safety Information.

قبل تركيب هذا المنتج، يجب قراءة الملاحظات الأمنية

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 ασφαλείας (safety information).

לפני שתתקינו מוצר זה, קראו את הוראות הבטיחות.

A termék telepítése előtt olvassa el a Biztonsági előírásokat!

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

製品の設置の前に、安全情報をお読みください。

본 제품을 설치하기 전에 안전 정보를 읽으십시오.

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

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

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

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

Перед установкой продукта прочтите инструкции по технике безопасности.

Pred inštaláciou tohto zariadenia si pečítajte Bezpečnostné predpisy.

Pred namestitvijo tega proizvoda preberite Varnostne informacije.

Antes de instalar este producto, lea la información de seguridad.

Läs säkerhetsinformationen innan du installerar den här produkten.

Statement 1:



DANGER

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

To avoid a shock hazard:

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

To Connect:	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.

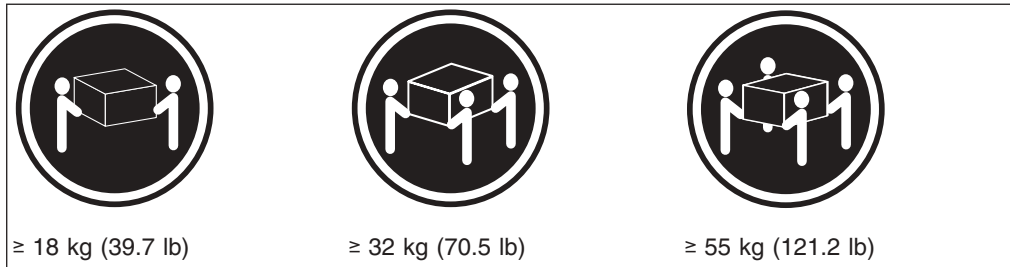


DANGER

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:

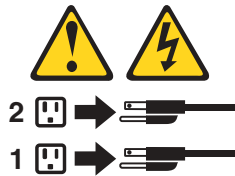


CAUTION:
Use safe practices when lifting.

Statement 5:



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



Statement 8:



CAUTION:

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



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

Statement 10:



CAUTION:

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



WARNING: Handling the cord on this product or cords associated with accessories sold with this product, will expose you to lead, a chemical known to the State of California to cause cancer, and birth defects or other reproductive harm. **Wash hands after handling.**

Chapter 1. Introducing the IBM xSeries 450

Your IBM® @server™ xSeries™ 450 Type 8688 is a four U-high¹ rack model server for high-availability 64-bit database processing.

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

Your server contains IBM Enterprise X-Architecture™ technologies, which help increase performance and reliability. For more information, see “What your IBM xSeries 450 offers” on page 4 and “Reliability, availability, and serviceability features” on page 4.

You can obtain up-to-date information about your server and other IBM server products at <http://www.ibm.com/eserver/xseries/>.

For service, assistance, or additional information on the World Wide Web, see Chapter 3, “Getting help and technical assistance”, on page 31.

Related publications

This *User's Guide* provides general information about your server, including information about features, how to configure the server, and how to get help. In addition to this *User's Guide*, the following documentation comes with your server:

- *Installation Guide*

This printed publication contains instructions for setting up your server and basic instructions for installing some options.

- *Option Installation Guide*

This publication is in Portable Document Format (PDF) on the IBM *xSeries Documentation* CD. It contains detailed instructions for installing, removing, and connecting optional devices that your server supports.

- *Safety Information*

This publication is in PDF on the IBM *xSeries Documentation* CD. It contains translated caution and danger statements. Each caution and danger statement that appears in the documentation has a number that you can use to locate the corresponding statement in your language in the *Safety Information* book.

- *Rack Installation Instructions*

This printed publication contains instructions for installing your server in a rack.

- *Hardware Maintenance Manual and Troubleshooting Guide*

This publication is in PDF on the IBM *xSeries Documentation* CD. It contains information to help you solve problems yourself, and it contains information for service technicians.

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

1. Racks are marked in vertical increments of 1.75 inches each. Each increment is referred to as a unit, or “U.” A one-U-high device is 1.75 inches tall.

The latest version of this publication is available from the IBM Web site. Complete the following steps to display a list of publications for your server:

1. From <http://www.ibm.com>, click **Support & downloads**.
2. Click **Search technical support**.
3. In the **Enter PC machine type and model** field, type 8688 and click **Submit**.
4. On the left side of the "xSeries 450 8688 support" page, click **Online publications**.
5. From the **Online publications by category** menu, select the category of publications you want to display.

Notices and statements used in this book

The caution and danger statements that appear in this book are also in the multilingual *Safety Information* book, which is on the IBM *xSeries Documentation* CD. Each statement is numbered for reference to the corresponding statement in the *Safety Information* book.

The following notices and statements are used in the documentation:

- **Notes:** 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 potential 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 specification of your xSeries 450.

<p>Microprocessor:</p> <ul style="list-style-type: none"> Intel® Itanium® 2 900 MHz or higher, depending on server model 1.5 MB (minimum) Level-3 cache 200 MHz front-side bus (FSB), at two data transfers per cycle, yielding a 400 MHz system bus (minimum) Support for up to four microprocessors XceL4™ Server Accelerator Cache: 64 MB <p>Active Memory™:</p> <ul style="list-style-type: none"> Minimum: 1 GB Maximum: 40 GB Type: 2-way interleaved PC2100, ECC DDR SDRAM, registered DIMMs only Supports 512 MB, 1 GB, and 2 GB dual inline memory modules (DIMMs) <p>Drives standard:</p> <p>DVD/CD-RW: IDE</p> <p>Expansion bays:</p> <ul style="list-style-type: none"> Two removable media bays (one DVD/CD-RW preinstalled) Supports up to two internal Ultra320 SCSI hard disk drives <p>Active™ PCI-X expansion slots:</p> <p>Six 64-bit Active PCI-X expansion slots:</p> <ul style="list-style-type: none"> Two 66 MHz PCI-X slots Two 100 MHz PCI-X slots Two 133 MHz PCI-X slots <p>Cooling:</p> <p>Four hot-swap fans</p> <ul style="list-style-type: none"> Two 150 mm x 51 mm fans Two 150 mm x 38 mm fans <p>Acoustical noise emissions:</p> <ul style="list-style-type: none"> Declared sound power, idle: 6.5 bels Declared sound power, operating: 6.5 bels Bystander sound pressure, idle: 49 dBa Bystander sound pressure, operating: 49 dBa 	<p>Power supply:</p> <p>Two power supplies: 550 watts at 100-127 V ac or 1050 watts at 200-240 V ac (hot-swappable and redundant at 200-240 V ac only)</p> <p>Video:</p> <ul style="list-style-type: none"> Integrated ATI RageXL video PCI bus interface Compatible with SVGA 8 MB SDRAM video memory <p>Size (4 U):</p> <ul style="list-style-type: none"> Height: 17.8 cm (7 inches, 4 U) Depth: 69.85 cm (27.5 inches) Width: 48.3 cm (19 inches) Maximum weight: 38.6 kg (85 lb), depending on your configuration <p>Integrated functions:</p> <ul style="list-style-type: none"> Broadcom 5704 10/100/1000 dual port Ethernet controller Light Path Diagnostics™ One external and one internal Ultra320 SCSI port (dual-channel integrated controller with RAID capabilities) Remote Supervisor Adapter (service processor) <ul style="list-style-type: none"> ASM interconnect (peer-to-peer) port Ethernet port Serial port IDE controller RXE Management Port RXE Expansion Ports Three USB ports SCSI ports Serial port Wake on LAN® <p>Environment:</p> <ul style="list-style-type: none"> Air temperature: <ul style="list-style-type: none"> Server on: 10° to 35°C (50.0° to 95.0°F). Altitude: 0 to 914 m (2998.7 ft) Server on: 10° to 32°C (50.0° to 89.6°F). Altitude: 0 to 2133 m (6998.0 ft) Server off: -40° to 60°C (-104° to 140°F). Maximum altitude: 2133 m (6998.0 ft) Humidity: <ul style="list-style-type: none"> Server on: 8% to 80% Server off: 5% to 100% 	<p>Heat output:</p> <p>Approximate heat output in British thermal units (Btu) per hour</p> <ul style="list-style-type: none"> Minimum configuration: 854 Btu (250 watts) Maximum configuration: 2646 Btu (775 watts) <p>Electrical input:</p> <ul style="list-style-type: none"> Sine-wave input (50-60 Hz) required Input voltage low range: <ul style="list-style-type: none"> Minimum: 100 V ac Maximum: 127 V ac Input voltage high range: <ul style="list-style-type: none"> Minimum: 200 V ac Maximum: 240 V ac Input kilovolt-amperes (kVA) approximately: <ul style="list-style-type: none"> Minimum: 0.250 kVA Maximum: 1.3 kVA <p>Notes:</p> <ol style="list-style-type: none"> Power consumption and heat output vary depending on the number and type of optional features installed and the power-management optional features in use. These levels were measured in controlled acoustical environments according to the procedures specified by the American National Standards Institute (ANSI) S12.10 and ISO 7779 and are reported in accordance with ISO 9296. Actual sound-pressure levels in a given location might exceed the average values stated because of room reflections and other nearby noise sources. The declared sound-power levels indicate an upper limit, below which a large number of computers will operate.
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What your IBM xSeries 450 offers

Your server includes the following features and technologies:

- **IBM Enterprise X-Architecture technology**

Enterprise X-Architecture technology combines proven, innovative IBM designs to make your Intel-processor-based server powerful, scalable, and reliable. For more information, go to

<http://www.ibm.com/pc/us/eserver/xseries/xarchitecture/enterprise/index.html>

- **Active Memory**

The Active Memory feature improves the reliability of memory through memory mirroring, memory scrubbing, and the Memory ProteXion™ feature. For more information, see “Active Memory” on page 5.

- **Large system memory**

The memory bus supports up to 40 GB of system memory. The memory controller provides error code correcting (ECC) support for up to 28 industry-standard PC2100, 2.5 V, 184-pin, 133 megahertz (MHz), registered, double data rate (DDR), synchronous dynamic random access memory (SDRAM) dual inline memory modules (DIMMs).

- **Xcel4™ Server Accelerator Cache**

The Xcel4 Server Accelerator Cache provides 64 MB of external Level-4 cache, which increases effective memory bandwidth.

- **Light Path Diagnostics feature**

The Light Path Diagnostics feature provides LEDs to help you isolate problems. For more information, see the section about the Light Path Diagnostics feature in the *Installation Guide*.

- **System-management capabilities**

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

- **Integrated network support**

Your server comes with an integrated Broadcom Gigabit Ethernet controller, which supports connection to a 10-Mbps, 100-Mbps, or 1000-Mbps network. For more information, see “Configuring the Gigabit Ethernet controller” on page 30.

Reliability, availability, and serviceability features

Three important computer design features are reliability, availability, and serviceability (RAS). The RAS features help to ensure the integrity of the data that is stored in your server, the availability of the computer when you need it, and the ease with which you can diagnose and repair problems.

Your server has the following RAS features:

- Active Memory
- Active PCI-X (hot-plug) adapter slots
- Advanced Configuration and Power Interface (ACPI)
- Advanced Desktop Management Interface (DMI) features
- Advanced memory ECC, including the Memory ProteXion feature and multiple Chipkill™ capability
- Automatic error retry or recovery
- Auto-ranging power supplies

- Automatic restart
- Built-in, menu-driven Configuration/Setup Utility program and diagnostic programs
- Built-in monitoring for fan, power, temperature, voltage, and power-supply redundancy
- Customer-upgradeable system firmware
- Diagnostic support of Ethernet controller provided on the *Resource CD*
- Error codes and messages
- Error correcting code (ECC) protection on the L3 and Xcel4 cache
- Failover Ethernet support
- Front-side bus (FSB) ECC protected
- Hot-swap hard disk drives
- Light Path Diagnostics
- Memory mirroring
- Parity checking on the SCSI buses
- Power-on self-test (POST)
- Processor serial number access
- Read-only memory (ROM) checksums
- Remote Supervisor Adapter to enable remote server management
- SDRAM with serial presence detect (SPD) and vital product data (VPD)
- Standard cable presence detection
- Standby voltage for system-management features and monitoring
- System-error logging
- Vital product data (VPD) (includes information stored in nonvolatile memory for easier remote viewing)
- Wake on LAN capability

Active Memory

Active Memory is a feature that improves the reliability of memory through memory mirroring, memory scrubbing, and the Memory ProteXion feature.

Memory scrubbing and Memory ProteXion

Memory scrubbing tests the memory at regular intervals to detect and report recoverable memory ECC errors before they can cause server outages.

If the recoverable ECC error rate exceeds the system-defined threshold, the Memory ProteXion feature replaces the failing bit positions, maintaining reliable operation. If the recoverable ECC error rate exceeds the threshold, LEDs on the Light Path Diagnostics feature are lit to indicate the failing DIMM.

You do not have to enable memory mirroring to use memory scrubbing and the Memory ProteXion feature.

Memory mirroring

Memory mirroring stores data in memory port 1 and memory port 2 simultaneously. To support memory mirroring, you must install identical dual inline memory modules (DIMMs) in memory port 1 and memory port 2. For more information, see the section about installing memory modules in the *Option Installation Guide* on the IBM *xSeries Documentation CD*.

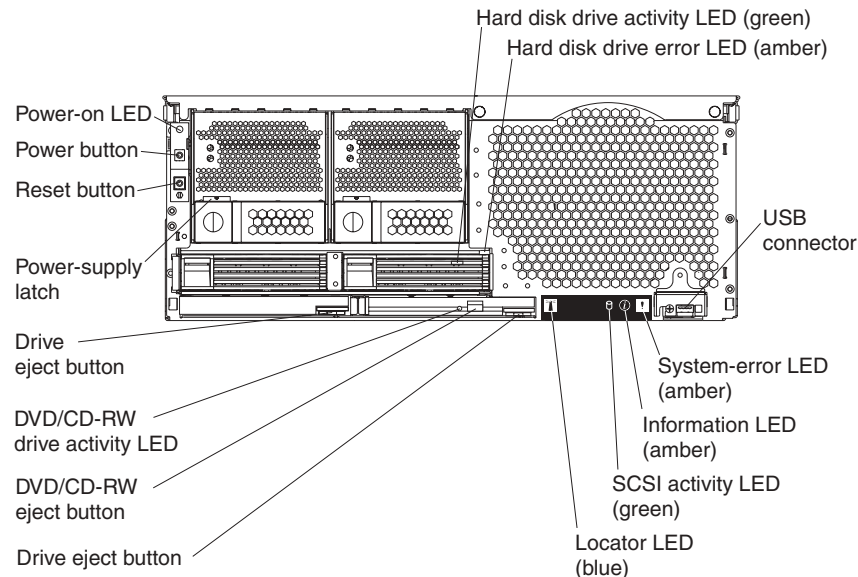
To enable memory mirroring through the Configuration/Setup Utility program, select **Advanced Setup** from the main menu, and select **Memory Configuration**. For more information about using the Configuration/Setup Utility program, see Chapter 2, “Configuring your server”, on page 11.

Server controls and indicators

The following section identifies the controls and light-emitting diodes (LEDs) on the front and rear of your server.

Front view

The following illustration shows the controls, LEDs, and connectors on the front of the server.



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

Hard disk drive activity LED: When this green LED is lit, it indicates that the hard disk drive is in use.

Hard disk drive error LED: When this amber LED is lit, it indicates that there is a problem with the hard disk drive.

USB connector: Connect a USB device to this connector.

System-error LED: When this amber LED is lit, it indicates a system error has occurred.

Information LED: When this amber LED is lit, it indicates that information about a system error has been entered in the System Error log.

SCSI activity LED: When this green LED is lit, it indicates that there is activity on the SCSI bus.

Locator LED: This blue LED is used to help you locate other devices connected to the server. When this LED flashes, it indicates that POST is in progress.

Drive eject button: Press this button to release the drive from the server.

DVD/CD-RW eject button: Press this button to release a DVD or CD from the drive.

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

Drive eject button: Press this button to release a drive from the server.

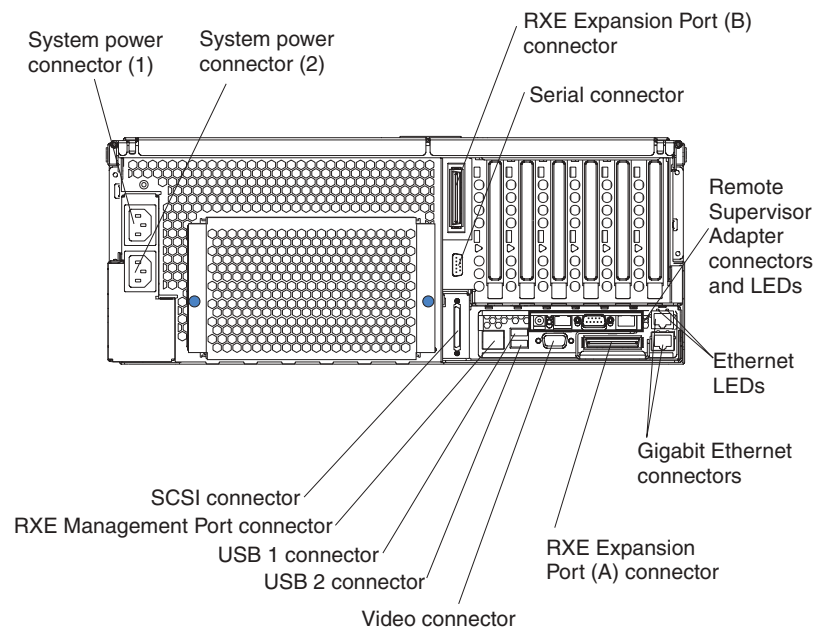
Power-supply latch: This latch secures the power supply in place.

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.

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

Rear view

The following illustration shows the connectors and LEDs on the rear of the server.



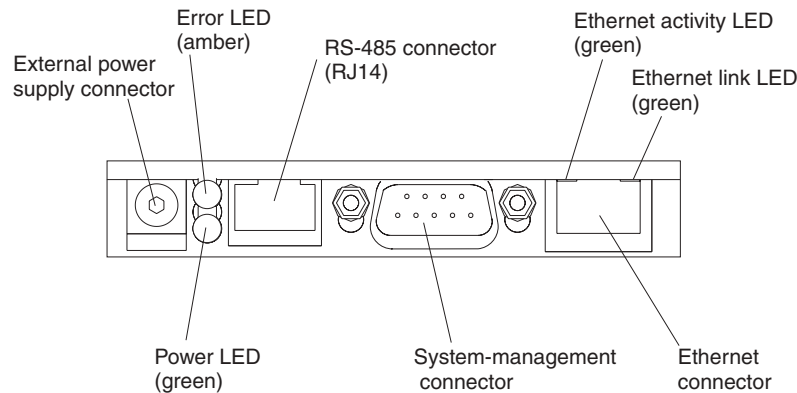
System power connectors (1 and 2): Connect the power cords to these two connectors to provide power to the server.

RXE Expansion Port (B) connector: Connect a remote I/O enclosure to this connector.

Serial connector: Connect the signal cable for a system console or other serial device to this connector.

Remote Supervisor Adapter connectors and LEDs: This group of connectors and LEDs located on the back of the server are used for system management

information and control.



- **External power supply connector:** This connector is not supported on this server.
- **Error LED:** When this amber LED is lit, it indicates an error on the Remote Supervisor Adapter.
- **ASM RS-485 connector (RJ-14):** Connect signal cables for managing expansion module resources to this connector.
- **Ethernet activity LED:** When this green LED flashes, it indicates that there is activity on the Ethernet LAN.
- **Ethernet link LED:** When this green LED is lit, it indicates that there is an active link connection.
- **Ethernet connection:** Connect Ethernet signal cables to this connector.
- **System-management connector:** Connect signal cables for modems or other serial devices to this connector.
- **Power LED:** The green power LED indicates the status of the power connection.

Ethernet LEDs: When these LEDs are amber, it indicates that there is activity on the Ethernet LAN. When these LEDs are green, it indicates that there is an active link connection on the Gigabit Ethernet controller.

Gigabit Ethernet connectors: Use these connectors to connect the server to a network.

RXE Expansion Port (A) connector: Connect a remote I/O enclosure to this connector.

Video connector: Connect a monitor to this connector.

USB 2 connector: Connect a USB device to this connector.

USB 1 connector: Connect a USB device to this connector.

RXE Management Port connector: Connect a remote I/O enclosure to this connector.

SCSI connector: Connect a SCSI device to this connector.

Server power features

When the server is connected to an ac power source but is not turned on, the operating system does not run, and all core logic except for the service processor is shut down; however, the server can respond to requests from the service processor, such as a remote request to turn on the server. The power-on LED flashes to indicate that the server is connected to ac power but is not turned on.

Turning on the server

Approximately 20 seconds after the server is connected to ac power, the power-control button becomes active, and you can turn on the server and start the operating system by pressing the power-control button. The server can also be turned on in any of the following ways:

- If a power failure occurs while the server is turned on, the server will restart automatically when power is restored.
- If ac power is present, the server can be turned on from the Remote Supervisor Adapter user interface.
- The Wake on LAN feature can turn on the server.

Notes:

1. The power supplies are hot-swappable and redundant only at 200-240 V ac.
2. Both power supplies must be connected to the power source for operation at 100-127 V ac.
3. During normal operation, both power supplies must be installed for proper operation.
4. While the server is powering up, the power-on LED on the front of the server is lit. When the server is connected to ac power but is not turned on, the power-on LED on the front of the server flashes.

Turning off the server

When you turn off the server and leave it connected to ac power, the server can respond to requests from the service processor, such as a remote request to turn on the server. To remove all power from the server, you must disconnect it from the power source.

Some operating systems require an orderly shutdown before you turn off the server. See your operating-system documentation for information about shutting 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.



The server can be turned off in any of the following ways:

- You can turn off the server from the operating system, if your operating system supports this feature. After an orderly shutdown of the operating system, the server will be turned off automatically.
- You can press the power-control button to start an orderly shutdown of the operating system and turn off the server, if your operating system supports this feature.
- If the operating system stops functioning, you can press and hold the power-control button for more than 4 seconds to turn off the server.
- If the server is connected to an Advanced System Management interconnect network, the server can be turned off from the Remote Supervisor Adapter user interface.
- The integrated system management processor can turn off the server as an automatic response to a critical system failure.

Notes:

1. You might need to press and hold the power-control button for more than 4 seconds to cause an immediate shutdown of the server. You can use this feature if the operating system stops functioning.
2. If you disconnect the server from the power source, wait approximately 15 seconds for the server to stop running before you open the cover. Watch for the power-on LED on the front of the server to stop flashing.

Chapter 2. Configuring your server

The following configuration programs and capabilities come with your server:

- **Extensible Firmware Interface (EFI) Boot Manager program**

This program controls the startup environment. After you turn on the server, this program offers you a choice of startup options. For example, you can start to an operating system on the network or on media, or to the EFI Boot Maintenance Manager main menu. See “Using the Extensible Firmware Interface (EFI) Boot Manager” for more information.

- **Configuration/Setup Utility program**

This program is an EFI utility that comes with your server. You can use this program to set the date and time, and to set passwords. See “Using the Configuration/Setup Utility program” on page 12 for more information.

- **LSI Logic Configuration Utility program**

With the built-in LSI Logic Configuration Utility program, you can configure the integrated SCSI controller and the devices that are attached to it. See “Using the LSI Logic Configuration Utility program” on page 15 for more information.

- **Remote Supervisor Adapter configuration process**

See “Setting up the Remote Supervisor Adapter” on page 15 for information about setting up and cabling the Remote Supervisor Adapter for use with an Advanced System Management (ASM) network.

- **Ethernet controller configuration process**

To configure the integrated Ethernet controller, see “Configuring the Gigabit Ethernet controller” on page 30.

Using the Extensible Firmware Interface (EFI) Boot Manager

You can use the EFI Boot Manager to configure a variety of start options, including starting to an external device or to a specific file. The following table provides a summary of the selections available from the EFI Boot Maintenance Manager main menu.

Selection	Description
Boot from a file	Automatically adds EFI applications as start options, or you can start the server from a specific file.
Add a boot option	Adds a start option to the EFI Boot Manager. You specify the option by providing the name of the EFI application.
Delete boot options	Deletes a specific start option or all start options.
Change boot order	Controls the relative order in which the EFI Boot Manager attempts start options.
Manage boot next setting	Defines a start option to use one time (the next start operation).
Set automatic boot timeout value	Defines the amount of time before the server automatically starts without user intervention.
Select active console output devices	Displays the list of available console output devices, as contained in the ConOutDev list. You can select output console devices from the list.
Select active console input devices	Displays the list of available console input devices, as contained in the ConInDev list and the subset detailed in the ConIn variable.

Selection	Description
Select active error devices	Displays the list of available error devices as contained in the ErrOutDev list and the subset detailed in the ErrOut variable.
Cold reset	Performs a platform-specific cold reset of the server. Note: A cold reset typically is a full-platform reset.
Exit	Returns control to the EFI Boot Manager startup options. This will display the active start devices.

Complete the following steps to start the EFI Boot Manager and access the EFI Boot Maintenance Manager main menu:

1. Turn on the server.
2. From the EFI Boot Manager startup options, select the EFI Boot Maintenance Manager main menu.
3. Follow the instructions that appear on the screen.

Using the Configuration/Setup Utility program

Use the Configuration/Setup Utility program to:

- Enable memory mirroring
- Set the date and time
- Set passwords

The following sections provide instructions for starting the Configuration/Setup Utility program and descriptions of the menu choices that are available.

Starting the Configuration/Setup Utility program

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

1. Turn on the server.
2. From the EFI Boot Manager startup options, select the Configuration/Setup Utility program.
3. Follow the instructions that appear on the screen.

Configuration/Setup Utility menu choices

The following choices are on the Configuration/Setup Utility main menu. Depending on the version of the system abstraction layer/extensible firmware interface (SAL/EFI) code in your server, some menu choices might differ slightly from these descriptions.

- **System Summary**

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

- **System Information**

- **System Product Data**

Select this choice to view system information, such as the machine type and model, the server serial number, and the revision level, date, and build level of the SAL/EFI code, diagnostic code, and ASM adapter code.

- **System Card Data**

Select this choice to view identifying information about the PCI-X board, processor board, memory board, power supplies, DASD backplane, and power backplane.

- **Devices and I/O Ports**

Select this choice to view information about, enable, or disable the integrated SCSI and Ethernet controllers.

Notes:

1. The default setting is **Enable** for all of the controllers. If you select **Disable**, the system will not configure the disabled device, and the operating system will not detect the device. (This is equivalent to unplugging the device.)
2. If the integrated SCSI controller is disabled and no other controller for a mass storage device is installed, operating-system startup cannot occur.

- **Date and Time**

Select this choice to set the system date and time and to change the system time that is sent to the Remote Supervisor Adapter when the server is started.

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

- **System Security**

Select this choice to set or change the power-on or administrator password. See “Passwords” on page 14 for more information.

The Remote Control Security Settings menu is located in System Security. This menu is used to set the Failed Login Threshold and the Automatic Lockout Delay. You can also use this menu to save, change, or delete a remote control password.

- **Advanced Setup**

Select this choice to change values for advanced hardware features, such as memory configuration, cache control, PCI configuration, and system management settings.

- **Memory Configuration**

Select this choice to manually enable a set of four DIMMs used for memory mirroring and to enable memory mirroring.

If a memory error is detected during POST or memory configuration, the server can automatically disable the failing DIMM set and continue operating with reduced memory capacity. If this occurs, you must manually enable the DIMM set after the problem is corrected. Use the arrow keys to highlight the set that you want to enable. Press Enter to view detailed information about your selection; then, use the arrow keys to select **Enable**.

- **Cache Control**

Select this choice to enable or disable the Xcel4 cache.

- **PCI Slot Information**

Select this choice to configure and view information about the PCI-X slots and devices in your server and those located in the remote expansion enclosure, if one is attached.

- **System Management Settings**

Select this choice to set the server to restart automatically after a nonmaskable interrupt (NMI) occurs. You can also enable the system to assign the memory mapped I/O (MMIO) above 4 GB.

- **LSI configuration**

Select this choice to access the LSI Logic Configuration program to configure the integrated SCSI controller with RAID capabilities.

- **System Event and Error Log**

Select this choice to view or clear the System Error Log and enable or disable debug options. Use the debug options to define the severity level of messages viewable during POST.

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

- **Save Settings**

Select this choice to save your customized settings (except PCI-X Slot Information changes, the date and time, and password settings).

- **Save Settings and Reboot**

Select this choice to save your customized settings (except PCI-X Slot Information changes, the date and time, and password settings) and restart the server.

- **Restore Settings**

Select this choice to delete your changes (except PCI-X Slot Information changes, the date and time, and password settings) and restore the previous settings.

- **Load Default Settings**

Select this choice to restore the factory settings (except PCI-X Slot Information changes, the date and time, and password settings).

- **Exit Setup**

If you have made any changes and not saved them (except PCI-X Slot Information changes, the date and time, and password settings), the program will prompt you to save the changes or exit without saving the changes.

Passwords

After you select this choice, you can set a power-on password or an administrator password.

Power-on 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 does not complete 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:

- Remove the battery and then reinstall the battery (see "Replacing the battery" in the *Option Installation Guide* on the IBM *xSeries Documentation CD* for more information).

Attention: Before changing any switch settings or moving any jumpers, turn off the server and peripheral devices, and disconnect all power cords and external cables.

- Move the jumper on J20 to positions 2 and 3; then, restart the server. This removes the power-on password. Restart the server and start the Configuration/Setup Utility program to change the power-on password.

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

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

Using the LSI Logic Configuration Utility program

Use the built-in, menu-driven LSI Logic Configuration program to:

- Configure a redundant array of independent disks (RAID)
- 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. You must configure your SCSI controller with RAID capabilities *before* you install your operating system to use RAID level 1 operation.
3. If you install a different type of RAID adapter in your server, use the configuration method supplied with the RAID adapter to view or change SCSI settings for attached devices.
4. The internal hard disk drives can connect only to the integrated SCSI controller with RAID capabilities.

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

1. Turn on the server and watch the monitor screen.
2. From the EFI Boot Manager startup options, select EFI Shell.
3. Type `drivers -b` to display the device driver handle identifiers. Note the device driver handle identifier in the far left column for the LSI Logic Ultra320 SCSI device driver.
4. Type `drvcfg drv` to display the controller identifiers. Note the controller identifier for the LSI Logic Ultra320 SCSI device driver.
5. Type `drvcfg drv ctrl -s.` to run the utility (where *drv* is the device driver handle identifier and *ctrl* is the controller identifier).
6. Type `drvcfg /?` for help.

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. If there is data you want to save, back up the hard disk before continuing this procedure.

4. Use the arrow keys or the End key to scroll to the right.
5. Highlight **Format**; then, press Enter to start.

Setting up the Remote Supervisor Adapter

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

Remote Supervisor Adapter features

The Remote Supervisor Adapter has the following features:

- Continuous health monitoring and control
- Advanced Predictive Failure Analysis[®] (PFA)
- Configurable notification and alerts
- Event logs that are time stamped, saved in nonvolatile memory, and can be attached to e-mail alerts
- Remote graphics console redirection
- LAN, serial, and Advanced System Management (ASM) interconnect remote access
- Point-to-point protocol (PPP) support
- Simple Network Management Protocol (SNMP)
- Domain Name System (DNS) and Dynamic Host Configuration Protocol (DHCP) support
- Remote power control
- Microsoft[®] Windows[®] Server 2003, Enterprise Edition (64-bit) blue-screen capture
- Remote firmware update and access to critical server settings
- Optional, independent power, which enables around-the-clock access to the server, even if the server is powered off

Setup requirements

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

Complete the following tasks before you set up the Remote Supervisor Adapter:

- Install the operating system on the server, using the documentation that comes with the operating system.
- Ensure that the remote alert recipients are IBM Director-enabled servers with UM Server Extensions, if you are configuring remote alert recipients for Director over LAN or Director over modem.
- If you want to use a Web browser to access the Remote Supervisor Adapter remotely, ensure that your Web browser meets the following requirements:
 - Microsoft Internet Explorer 4.0 (with Service Pack 1) or later
 - Netscape Navigator 4.72 or later (version 6.0 is not currently supported)
 - Java[™] enabled Web browser (see your browser documentation or online help for instructions for enabling its Java support)
 - Support for JavaScript[™] 1.2 or later (see your browser documentation or online help for instructions for enabling its JavaScript support)
 - Support of HTTP version 1.0 or later
 - Minimum display resolution of 800 x 600 pixels and 256 colors

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

Cabling and configuring the Remote Supervisor Adapter

Complete the following tasks to cable and configure the Remote Supervisor Adapter.

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

Task 1.

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

Task 2.

Perform the initial configuration to enable remote access to the Remote Supervisor Adapter. See “Enabling remote access to the adapter” on page 19. Completing this task enables you to:

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

Task 3.

Configure the remote-control password to enable the ASM Web interface remote-control features. See “Configuring the remote control password” on page 24.

Task 4.

Install the ASM device drivers. See “Installing Advanced System Management device drivers” on page 24.

For service, assistance, or additional information, see Chapter 3, “Getting help and technical assistance”, on page 31.

Cabling the Ethernet LAN port and serial port

You can manage the server remotely through the Remote Supervisor Adapter using one of the user interfaces and one of the connection methods that are described in Table 1. Perform the cabling procedure for the interface method you want to use.

If you plan to set up an ASM interconnect network, before you begin cabling the server, see “Using the ASM interconnect network” on page 25 for instructions for cabling the ASM interconnect port and setting up the network. You might want to review the information in “ASM interconnect network configuration examples” on page 28 before you connect the cables. Then, return here to start the cabling procedures.

Table 1. Cabling tasks to enable remote access to the Remote Supervisor Adapter

User interface to Remote Supervisor Adapter	Connection to Remote Supervisor Adapter	For the cabling procedure, see
ASM Web interface using the HTTP protocol	LAN using the Ethernet port	“Cabling the Ethernet LAN port” on page 18
Text-based user interface using the Telnet protocol		

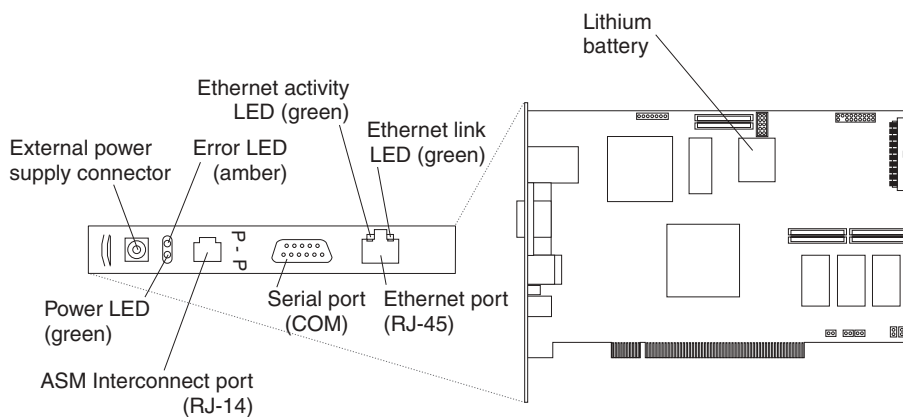
Table 1. Cabling tasks to enable remote access to the Remote Supervisor Adapter (continued)

User interface to Remote Supervisor Adapter	Connection to Remote Supervisor Adapter	For the cabling procedure, see
Text-based user interface using a modem or a null modem	Serial (COM) port	“Cabling the serial (COM) port”
ASM Web interface using point-to-point protocol (PPP)		
Text-based user interface using the Telnet protocol over PPP		

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

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

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



Ethernet activity LED

When the green Ethernet activity LED flashes, it indicates that there is Ethernet activity.

Ethernet link LED

When the green Ethernet link LED is lit, it indicates that the Ethernet cable is connected properly.

If you want to use the serial port connection, continue with “Cabling the serial (COM) port” on page 18; otherwise, go to “Configuring the adapter” on page 19.

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

Continue with “Configuring the adapter” on page 19.

Configuring the adapter

This section describes how to enable remote access to the Remote Supervisor Adapter and install ASM device drivers. These procedures assume that you have a keyboard and pointing device attached to the server.

Enabling remote access to the adapter: The Remote Supervisor Adapter must be configured to enable remote access through the Ethernet connector or the serial connector. Perform the configuration procedure for the interface method you want to use.

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

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

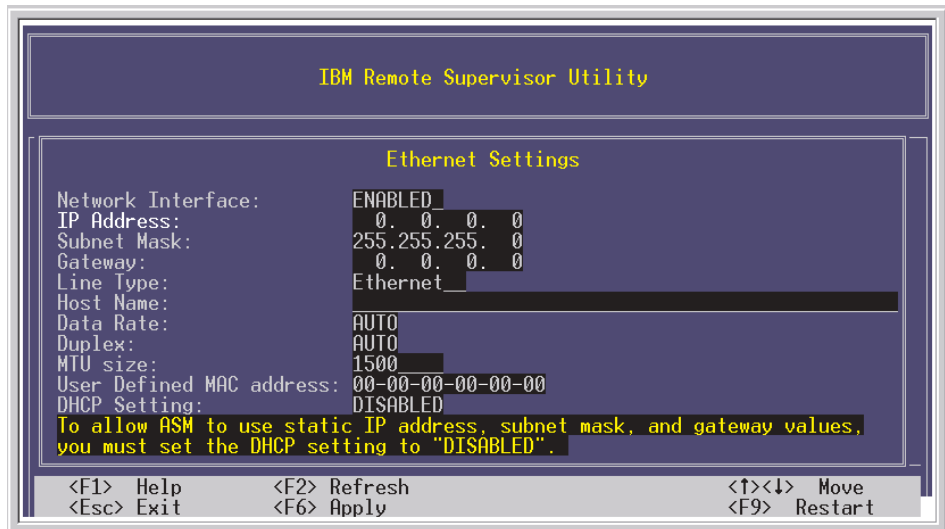
User interface to Remote Supervisor Adapter	Connection to Remote Supervisor Adapter	For the configuration procedure, see
ASM Web interface using the HTTP protocol	LAN using the Ethernet port	"Configuring the Ethernet settings for Web-based remote access"
Text-based user interface using the Telnet protocol		
Text-based user interface using a modem or a null modem	Serial (COM) port	"Configuring the serial port for text-based remote access" on page 21 and "Setting up point-to-point protocol" on page 23
ASM Web interface using point-to-point protocol (PPP)		
Text-based user interface using the Telnet protocol over PPP		

Configuring the Ethernet settings for Web-based remote access: If you have an accessible, active, and configured Dynamic Host Configuration Protocol (DHCP) server on the network, the host name, IP address, gateway address, subnet mask, and DNS server IP address are set automatically. The default value should have no effect on whether you have to do any other configuration. If you need to configure the serial port, go to "Configuring the serial port for text-based remote access" on page 21; otherwise, go to "Configuring the remote control password" on page 24.

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

1. With the server turned off, insert the CD containing the EFI Remote Supervisor Utility program into the drive; then, turn on the server.
2. The utility starts automatically, displaying the Remote Supervisor Utility window.
3. Use the Up Arrow and Down Arrow keys (↑ and ↓) to select **Configuration Settings**; then, press Enter. The Configuration Settings window opens.
4. Use the arrow keys to select **Ethernet Settings**; then, press Enter. The Ethernet Settings window opens, as shown in the following illustration.

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



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

Network Interface

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

IP Address

Type the IP address of the Remote Supervisor Adapter.

Subnet Mask

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

Gateway

Type the IP address of the gateway.

Host Name

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

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

6. Change the DHCP Setting field to **Disabled**. The default value is Enabled.
7. Press F6 to apply the change.
8. Press Esc. After the Warning window opens, press Enter to restart the Remote Supervisor Adapter.
9. Press Esc to return to the Configuration Settings window. If you need to configure the serial port, go to "Configuring the serial port for text-based remote access" on page 21.
10. Press Esc to return to the Utility program main window.
11. Use the arrow keys to select **Exit Utility** from the menu or press Esc to close the Utility program.
12. Remove the diskette or CD from the server. The server restarts automatically.
13. If you also want to configure the serial port, continue with "Configuring the serial port for text-based remote access" on page 21. Otherwise, go to "Installing Advanced System Management device drivers" on page 24.

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

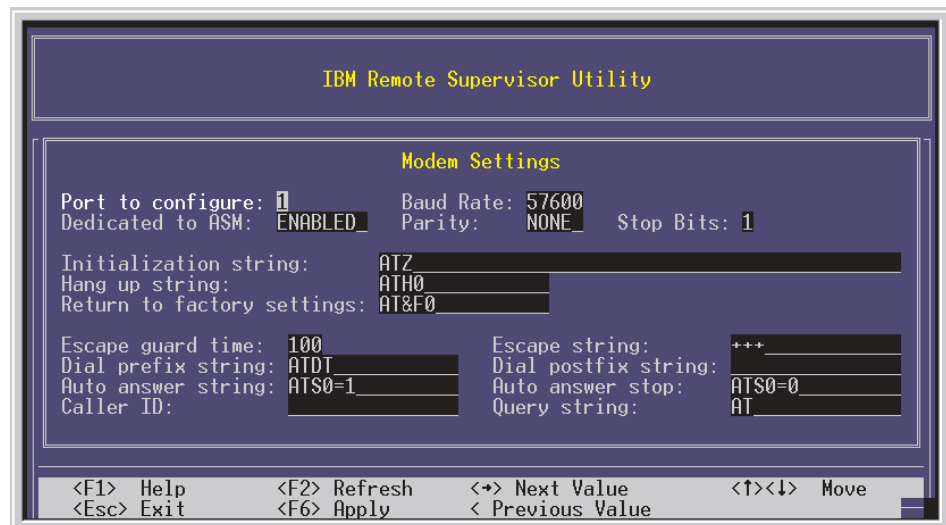
1. With the server turned off, insert the CD containing the EFI Remote Supervisor Utility program into the drive; then, turn on the server.
2. The utility starts automatically, displaying the Remote Supervisor Utility window.
3. Use the Up Arrow and Down Arrow keys (↑ and ↓) to select **Configuration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

The Configuration Settings window opens.

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

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

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



5. Verify the following serial port values:

Baud Rate

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

Dedicated to ASM

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

Note: To use this serial port, you must first install the ASM device drivers as described in “Installing Advanced System Management device drivers” on page 24.

If the serial port is shared with the operating system, it is dedicated to the Remote Supervisor Adapter only while the server is turned off or during POST. The port is returned to the operating system after POST completes. You can view the port using the operating system or any application. The Remote Supervisor Adapter takes over the port from

the operating system only when information about a critical event is received. The Remote Supervisor Adapter dials out and transmits an alert and keeps the port dedicated until the server is restarted. The port is no longer available to the operating system or applications.

Parity The default is None.

Stop Bits

The default is 1.

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

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

6. If you made changes to the serial port settings, press F6 to apply the change.
7. Press Esc to return to the Configuration Settings window. If you need to set up point-to-point protocol, go to "Setting up point-to-point protocol" on page 23.
8. Press Esc to return to the Utility program main window.
9. Use the arrow keys to select **Exit Utility** from the menu, or press Esc to close the Utility program.
10. Remove the diskette or CD from the drive. The Remote Supervisor Adapter restarts automatically.
11. Continue with "Setting up point-to-point protocol" on page 23.

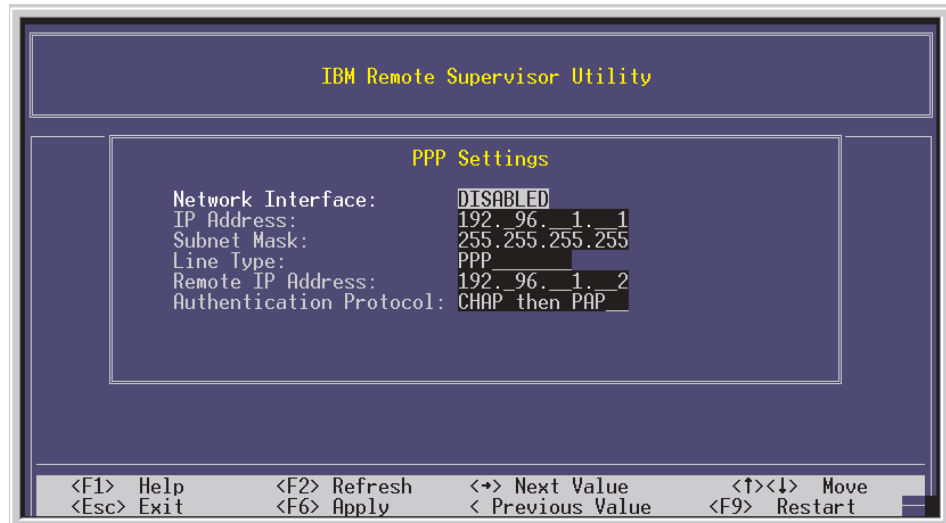
Setting up point-to-point protocol: The Remote Supervisor Adapter serial port supports point-to-point protocol (PPP). PPP enables TCP/IP communication over the serial port, which enables Web-based management and TELNET sessions over a modem. To set up PPP, complete the following steps. If you completed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

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

The Configuration Settings window opens.

4. Use the arrow keys to select **PPP Settings**; then, press Enter.
The PPP Settings window opens, as shown in the following illustration.

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



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

Network Interface

The default is Disabled. Change this field to Enabled.

IP Address

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

Subnet Mask

The default value is 255.255.255.255.

Line Type

The value is set to PPP.

Remote IP Address

The default value is 192.96.1.2.

Authentication Protocol

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

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

6. Press F6 to apply the changes.
7. Press Esc. After the Warning window opens, press Enter to restart the Remote Supervisor Adapter.
8. Press Esc to return to the Configuration Settings window. If you need to configure the serial port, go to "Configuring the serial port for text-based remote access" on page 21.
9. Press Esc to return to the Utility program main window.
10. Use the arrow keys to select **Exit Utility** from the menu or press Esc to close the Utility program.
11. Remove the diskette or CD from the drive. The server restarts automatically.
12. Continue with "Installing Advanced System Management device drivers".

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

Notes:

1. If you are installing device drivers manually, note the following requirements:
 - You must install the operating system on the server before you install the ASM device drivers. For information about installing the operating system, see the documentation that comes with the operating system.
 - Before installing the ASM device drivers for the Remote Supervisor Adapter, stop any system-management application.

After you install the ASM device drivers, go to "Configuring the remote control password" to set the remote control password.

Configuring the remote control password: If you want to use the remote control features of the Remote Supervisor Adapter ASM Web interface, you must configure the remote control password using the Configuration/Setup Utility program.

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

1. Start the server and watch the monitor screen.
2. From the EFI Boot Manager startup options, select the Configuration/Setup Utility program.
3. Use the Up Arrow and Down Arrow keys (↑ and ↓) to select **System Security**; then, press Enter. The System Security window opens.
4. Select **Remote Control Security Settings**; then, press Enter. The Remote Control Security Settings window opens.
5. Enter the Remote Control Password that you will use each time you log into the remote control features of the Remote Supervisor Adapter ASM Web Interface.
6. Select **Save New Remote Control Password**; then, press Enter.

7. In the System Security window, press Esc.
8. Select **Save Settings**; then, press Enter.
9. Confirm your selection; then, exit the Configuration/Setup Utility.
10. Continue with “Completing the configuration”.

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

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

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

Using the ASM interconnect network

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

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

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

Planning and cabling the interconnect network

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

Note: To ensure the stability of the system, you must have the most current level of firmware installed on the Remote Supervisor Adapter that is the main interconnect gateway for the ASM interconnect network. The most current

level of firmware is available on the World Wide Web at <http://www.ibm.com/pc/support>. For more information on updating firmware, see the *Remote Supervisor Adapter User's Guide* on the IBM xSeries Documentation CD.

You must connect an ASM Interconnect module to the Remote Supervisor Adapter and to each xSeries 450 server that you connect to the ASM interconnect network bus.

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

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

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

Forwarding alerts

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

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

When alerts are generated, they are forwarded to the Remote Supervisor Adapter, ASM processor, or ASM PCI adapter on the ASM interconnect network that has the communication resources to forward the alert. If no system on the ASM interconnect network meets the requirements, the alert is set for transmission if the connection type is configured or becomes available later.

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

forward the alert to another system on the ASM interconnect network that has the communication resources to forward the alert.

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

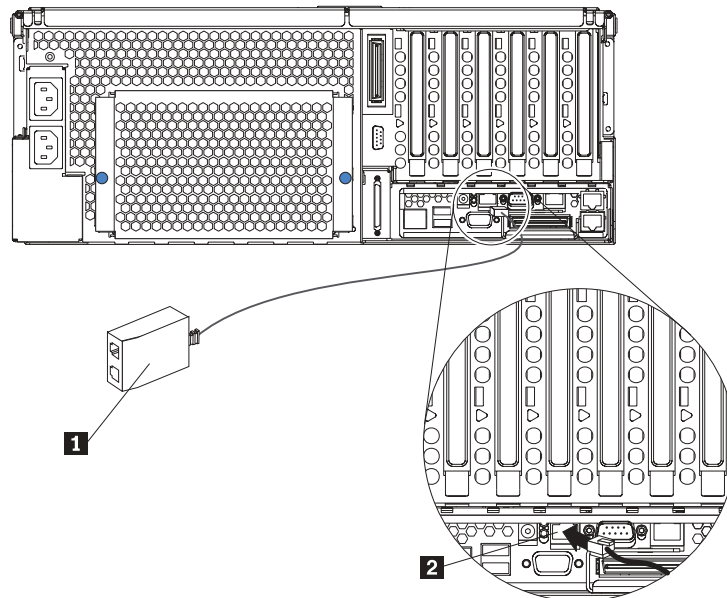
If ASM processor 1 generates an alert and the modem is unplugged from ASM processor 2 45 seconds prior to ASM processor 1 generating the alert, ASM processor 1 forwards the alert to ASM processor 2, having previously determined that ASM processor 2 has an available modem. When ASM processor 2 receives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

Connecting the ASM Interconnect module to the xSeries 450

The ASM Interconnect module connects the Remote Supervisor Adapter to the ASM interconnect network. This module must be purchased separately. To connect the ASM interconnect module to the Remote Supervisor Adapter, complete the following steps.

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

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

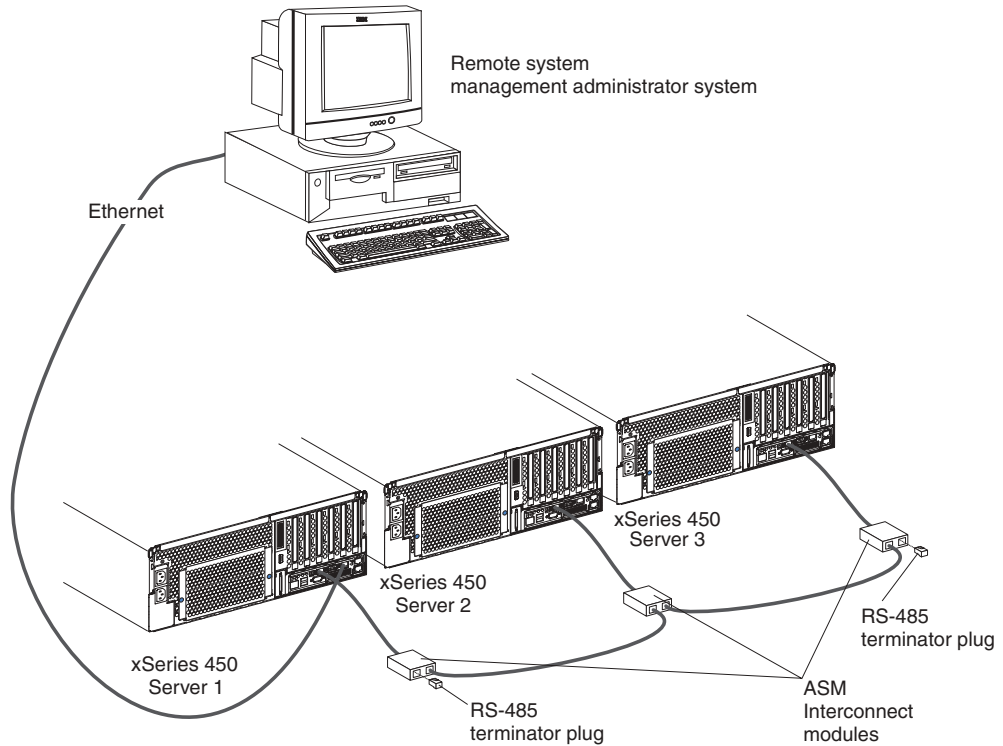


2. Connect one or two Category 3 or Category 5 Ethernet cables to the other end of the ASM Interconnect module.
3. Continue with “ASM interconnect network configuration examples” on page 28.

ASM interconnect network configuration examples

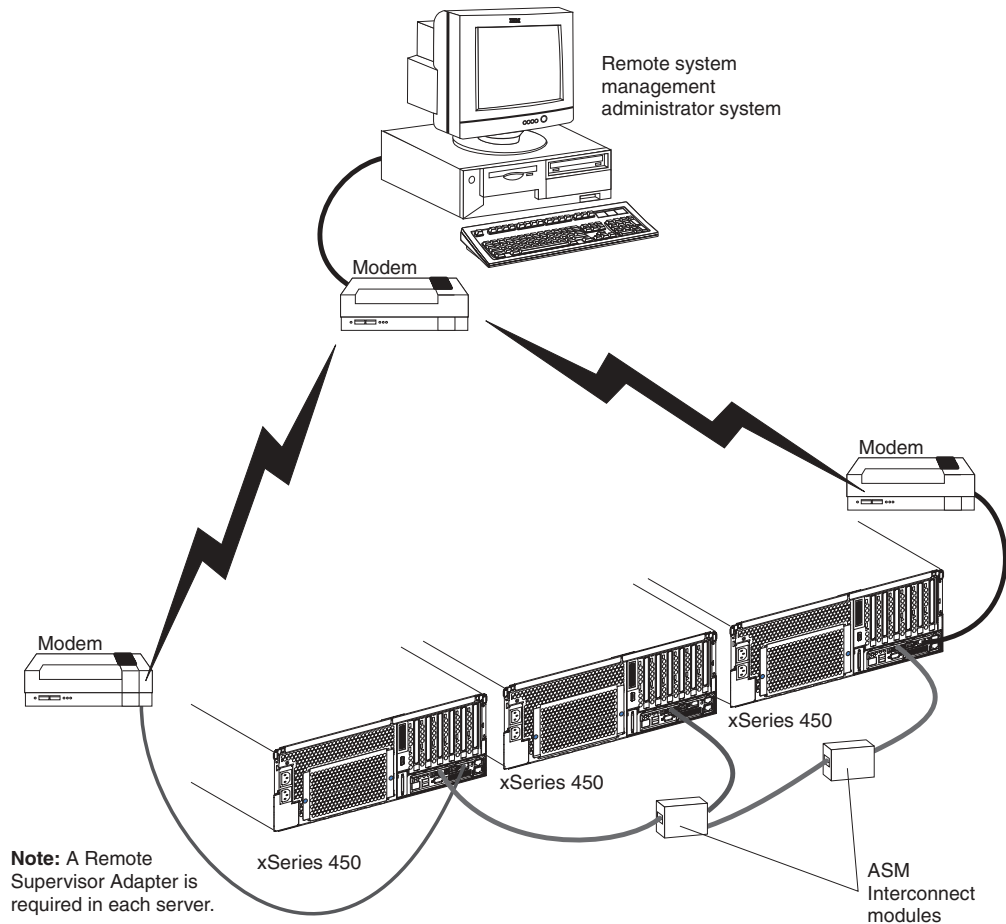
The illustrations in this section show sample ASM interconnect network configurations.

The following illustration shows an Ethernet cable connecting the remote administrator system to the Remote Supervisor Adapter that is installed in an xSeries 450. Server 1 uses the LAN connection to forward system-management data generated by the other xSeries 450s in the ASM interconnect network bus to the remote system-management administrator.



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

The following illustration shows a modem connected to the serial port of the Remote Supervisor Adapter in the xSeries 450 on the left, a modem connected to the serial port of the Remote Supervisor Adapter in the xSeries 450 on the right, and a modem connected to the remote administrator system. Placing modems at opposite ends of the ASM interconnect network bus ensures that if an ASM interconnect connection in the bus fails, all of the servers on the ASM interconnect network have access to a modem to forward system-management data to the remote system-management administrator.



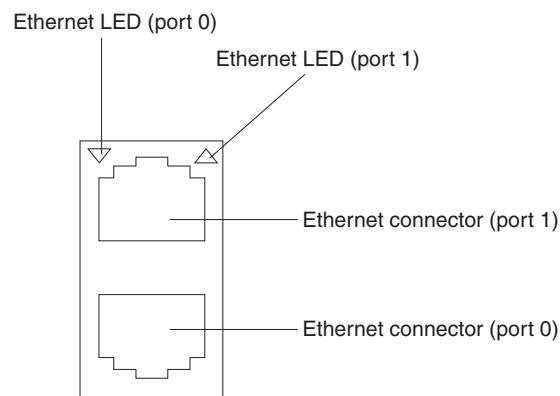
Note: The ASM Interconnect module is connected to the RS485 port on the back panel of the Remote Supervisor Adapter in each server.

Configuring the Gigabit Ethernet controller

The Ethernet controllers are integrated on the system board. They provide an interface for connecting to a 10-Mbps, 100-Mbps, or 1-Gbps network and provide full-duplex (FDX) capability, which enables simultaneous transmission and reception of data on the network. If the Ethernet ports in your server support auto-negotiation, the controllers detect the data-transfer rate (10BASE-T, 100BASE-TX, or 1000BASE-T) and duplex mode (full-duplex or half-duplex) of the network and automatically operate at that rate and mode.

You do not need to set any jumpers or configure the controllers. However, you must install a device driver to enable the operating system to address the controllers. For device drivers and information about configuring the Ethernet controllers, see the *Resource* CD that comes with your server. For updated information about configuring the controllers, go to <http://www.ibm.com/pc/support/>.

The following illustration shows the Ethernet controller port assignments, connectors, and LEDs.



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 appendix 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.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 or region, 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.

This paragraph applies only to products with a warranty period of 3 years on parts and 1 year on labor. 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 450

Country or region	Warranty period	Service delivery method
All	1 year	On-site

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 xSeries and IntelliStation systems 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 XXXXXXXX.
- 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 or region 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 or region. Service methods and procedures vary by country or region, and some service or parts might not be available in all countries and regions. Service centers in certain countries or regions might not be able to service all models of a particular machine type. In addition, some countries or regions 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 1 000 000 bytes, and GB stands for approximately 1 000 000 000 bytes.

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

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

Maximum memory may require replacement of the standard memory with an optional memory module.

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

Product recycling and disposal

This unit contains materials such as circuit boards, cables, electromagnetic compatibility gaskets, and connectors which may contain lead and copper/beryllium alloys that require special handling and disposal at end of life. Before this unit is disposed of, these materials must be removed and recycled or discarded according to applicable regulations. IBM offers product-return programs in several countries. For country-specific instructions, refer to the following Web site:
<http://www.ibm.com/ibm/environment/products/prp.shtml>.

This product may contain a sealed lead acid, nickel cadmium, nickel metal hydride, lithium, or lithium ion battery. Consult your user manual or service manual for specific battery information. The battery must be recycled or disposed of properly. Recycling facilities may not be available in your area. For information on disposal of batteries, contact your local waste disposal facility.

In the United States, IBM has established a collection process for reuse, recycling, or proper disposal of used IBM sealed lead acid, nickel cadmium, nickel metal hydride, and battery packs from IBM equipment. For information on proper disposal of these batteries, contact IBM at 1-800-426-4333. Have the IBM part number listed on the battery available prior to your call.

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. 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 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.

Taiwanese Class A warning 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。

Chinese Class A warning statement

聲 明
此為 A 級產品。在生活環境中，該產品可能會造成無線電干擾。在這種情況下，可能需要用戶對其干擾採取切实可行的措施。

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
02K0546	China
13F9940	Australia, Fiji, Kiribati, Nauru, New Zealand, Papua New Guinea
13F9979	Afghanistan, Albania, Algeria, Andorra, Angola, Armenia, Austria, Azerbaijan, Belarus, Belgium, Benin, Bosnia and Herzegovina, Bulgaria, Burkina Faso, Burundi, Cambodia, Cameroon, Cape Verde, Central African Republic, Chad, Comoros, Congo (Democratic Republic of), Congo (Republic of), Cote D'Ivoire (Ivory Coast), Croatia (Republic of), Czech Republic, Dahomey, Djibouti, Egypt, Equatorial Guinea, Eritrea, Estonia, Ethiopia, Finland, France, French Guyana, French Polynesia, Germany, Greece, Guadeloupe, Guinea, Guinea Bissau, Hungary, Iceland, Indonesia, Iran, Kazakhstan, Kyrgyzstan, Laos (People's Democratic Republic of), Latvia, Lebanon, Lithuania, Luxembourg, Macedonia (former Yugoslav Republic of), Madagascar, Mali, Martinique, Mauritania, Mauritius, Mayotte, Moldova (Republic of), Monaco, Mongolia, Morocco, Mozambique, Netherlands, New Caledonia, Niger, Norway, Poland, Portugal, Reunion, Romania, Russian Federation, Rwanda, Sao Tome and Principe, Saudi Arabia, Senegal, Serbia, Slovakia, Slovenia (Republic of), Somalia, Spain, Suriname, Sweden, Syrian Arab Republic, Tajikistan, Tahiti, Togo, Tunisia, Turkey, Turkmenistan, Ukraine, Upper Volta, Uzbekistan, Vanuatu, Vietnam, Wallis and Futuna, Yugoslavia (Federal Republic of), Zaire
13F9997	Denmark
14F0015	Bangladesh, Lesotho, Maceo, Maldives, Namibia, Nepal, Pakistan, Samoa, South Africa, Sri Lanka, Swaziland, Uganda
14F0033	Abu Dhabi, Bahrain, Botswana, Brunei Darussalam, Channel Islands, China (Hong Kong S.A.R.), Cyprus, Dominica, Gambia, Ghana, Grenada, Iraq, Ireland, Jordan, Kenya, Kuwait, Liberia, Malawi, Malaysia, Malta, Myanmar (Burma), Nigeria, Oman, Polynesia, Qatar, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, Seychelles, Sierra Leone, Singapore, Sudan, Tanzania (United Republic of), Trinidad and Tobago, United Arab Emirates (Dubai), United Kingdom, Yemen, Zambia, Zimbabwe
14F0051	Liechtenstein, Switzerland
14F0069	Chile, Italy, Libyan Arab Jamahiriya
14F0087	Israel

IBM power cord part number	Used in these countries and regions
1838574	Antigua and Barbuda, Aruba, Bahamas, Barbados, Belize, Bermuda, Bolivia, Brazil, Caicos Islands, Canada, Cayman Islands, Costa Rica, Colombia, Cuba, Dominican Republic, Ecuador, El Salvador, Guam, Guatemala, Haiti, Honduras, Jamaica, Japan, Mexico, Micronesia (Federal States of), Netherlands Antilles, Nicaragua, Panama, Peru, Philippines, Taiwan, United States of America, Venezuela
24P6858	Korea (Democratic People's Republic of), Korea (Republic of)
34G0232	Japan
36L8880	Argentina, Paraguay, Uruguay
49P2078	India
49P2110	Brazil
6952300	Antigua and Barbuda, Aruba, Bahamas, Barbados, Belize, Bermuda, Bolivia, Caicos Islands, Canada, Cayman Islands, Colombia, Costa Rica, Cuba, Dominican Republic, Ecuador, El Salvador, Guam, Guatemala, Haiti, Honduras, Jamaica, Mexico, Micronesia (Federal States of), Netherlands Antilles, Nicaragua, Panama, Peru, Philippines, Saudi Arabia, Thailand, Taiwan, United States of America, Venezuela

Index

A

- acoustical noise emissions 3
- activity LEDs
 - CD-ROM drive 6
 - diskette drive 6
- administrator password 14
- advanced setup 13
- alerts, forwarding Remote Supervisor Adapter 26
- ASM
 - device drivers, installing 24
 - interconnect
 - module, installing in the xSeries 360 27
 - network 25
 - network configuration examples 28
 - planning and cabling 25
- attention notices 2

B

- bypassing an unknown power-on password 14

C

- cabling
 - ASM interconnect network 25
 - Ethernet LAN port 18
 - Remote Supervisor Adapter 17
 - serial (COM) port 17, 18
- caution statements 2
- Class A electronic emission notice 47
- configuration
 - completing Remote Supervisor Adapter 25
- Configuration/Setup Utility 11, 12
 - main menu 12
- configuring
 - remote control password 24
 - Remote Supervisor Adapter 19
 - your server 11

D

- danger statements 2
- DIMMs
 - specifications 3, 4
 - supported 3
- diskette drive
 - activity LED 6
- DOS configuration utility 19
- DVD/CD-RW
 - drive specification 3

E

- eject button
 - diskette 6
 - DVD/CD-RW 6

- electrical input 3
- electronic emission Class A notice 47
- environment
 - air temperature 3
 - humidity 3
- Ethernet
 - configuring settings 19
 - LAN port, cabling 18
- Ethernet activity LED 7
- Ethernet controller 4
 - configuring 30
- Ethernet-link status LED 7
- expansion slots 3

F

- FCC Class A notice 47
- features
 - server 4
- features and specifications 3
- forgotten power-on password, bypassing 14

H

- hard disk drive activity LED 6
- hard disk drive status LED 6
- heat output 3

I

- important notices 2
- indicators 6
- information LED 6
- information light 6
- integrated functions 3

J

- jumper
 - power-on password override 14

L

- LAN, connecting 17
- LEDs
 - Ethernet activity 7
 - Ethernet link 7
 - front view 6
 - hard disk drive activity 6
 - hard disk drive error 6
 - information 6
 - locator 6
 - power-on 6
 - rear view 7
 - Remote Supervisor Adapter 7
 - SCSI activity 6
 - system error 6

M

- memory
 - settings 13
 - specifications 3
- memory module
 - specifications 4
- memory module specifications 3
- microprocessor specifications 3

N

- notes 2
- notes, important 46
- notices
 - electronic emission 47
 - FCC, Class A 47
- notices and statements 2

P

- password
 - administrator 14
 - override jumper 14
 - power-on 13
- PCI configuration 13
- planning the ASM interconnect network 25
- point-to-point protocol, setting up 23
- port connectors 7
- power
 - supply specifications 3
- power control button 7
- power cords 49
- power-control button shield 9
- power-on LED 6
- power-on password 13
- product
 - data 12
- publications 1

R

- remote access
 - enabling 19
- remote control password, configuring 24
- Remote Supervisor Adapter
 - cabling and configuring 16
 - completing configuration 25
 - configuration 11
 - enabling remote access 19
 - features 16
 - remote control password 24
 - setup
 - prerequisites 16
- reset button 7

S

- serial port, cabling 17, 18
- setting
 - password override jumper 14

- setup
 - advanced 13
 - prerequisites, Remote Supervisor Adapter 16
- specifications and features 3
- Standby mode 9
- starting the server 9
- statements and notices 2
- system
 - management 4
 - security 13
 - summary 12

T

- TELNET 23
- temperature
 - air 3
- trademarks 46
- turning off the server 9
- turning on the server 9

U

- United States electronic emission Class A notice 47
- United States FCC Class A notice 47
- utility
 - Configuration/Setup 12

V

- video controller
 - specifications 3



Part Number: 48P9736

Printed in U.S.A.

SC48-P973-60



(1P) P/N: 48P9736

