IBM

@server

BladeCenter
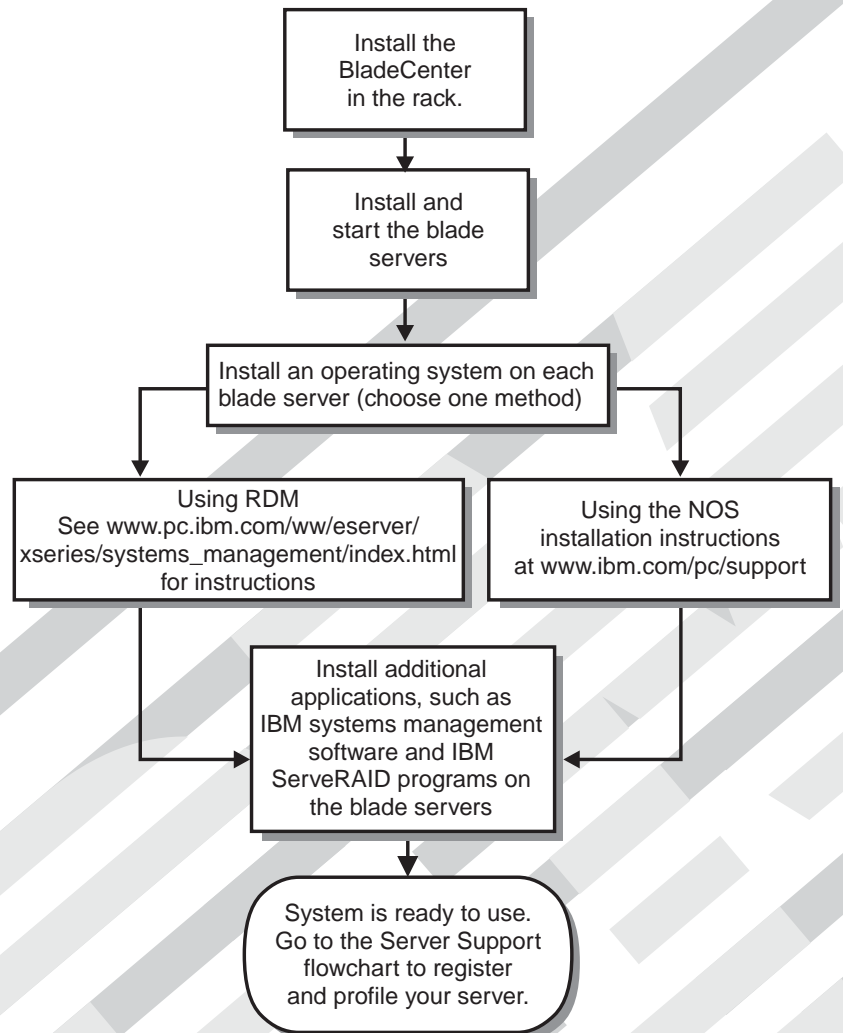## Type 8677

Installation and User's Guide

Welcome. . .

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

This *Installation and User's Guide* contains information for setting up, configuring, and using your BladeCenter unit.

For detailed information about your BladeCenter unit, view the publications on the Documentation CD.

You can also find the most current information about your BladeCenter unit and servers on the IBM Web site at:
http://www.ibm.com/pc/support

Install the BladeCenter in the rack.

↓

Install and start the blade servers

↓

Install an operating system on each blade server (choose one method)

Using RDM
See www.pc.ibm.com/ww/eserver/ xseries/systems_management/index.html for instructions

Using the NOS installation instructions at www.ibm.com/pc/support

Install additional applications, such as IBM systems management software and IBM ServeRAID programs on the blade servers

↓

System is ready to use. Go to the Server Support flowchart to register and profile your server.

IBM

@server

BladeCenter Type 8677

Installation and User's Guide

IBM

Note:

Before using this information and the product it supports, read the general information in Appendix B, "Warranty information", on page 71 and Appendix C, "Notices", on page 83

Contents

Safety

Before installing this product, read the Safety Information.

قبل تركيب هذا المنتج، يجب قراءة الملاحظات الآمنية

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

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

安裝本產品之前，請先閱讀「安全資訊」。

Prije instalacije ovog produkta obavezno pročitajte Sigurnosne Upute.

Před instalací tohoto produktu si přečtěte příručku bezpečnostních instrukcí.

Læs sikkerhedsforskrifterne, før du installerer dette produkt.

Lees voordat u dit product installeert eerst de veiligheidsvoorschriften.

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

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

Vor der Installation dieses Produkts die Sicherheitshinweise lesen.

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

לפני שתתקינו מוצר זה, קראו את הוראות הבטיחות.

A termék telepítése előtt olvassa el a Biztonsági előírásokat!

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

製品の設置の前に、安全情報をお読みください。

본 제품을 설치하기 전에 안전 정보를 읽으십시오.

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

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

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

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

Перед установкой продукта прочтите инструкции по
технике безопасности.

Pred inštaláciou tohto zariadenia si pečítaje Bezpečnostné predpisy.

Pred namestitvijo tega proizvoda preberite Varnostne informacije.

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

Läs säkerhetsinformationen innan du installerar den här produkten.

Statement 1:

DANGER

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

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

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

Statement 2:

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

Do not:
- **Throw or immerse into water**
- **Heat to more than 100°C (212°F)**
- **Repair or disassemble**

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

Statement 3:

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

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

DANGER

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

Class 1 Laser Product
Laser Klasse 1
Laser Klass 1
Luokan 1 Laserlaite
Appareil À Laser de Classe 1

Statement 4:

≥ 18 kg (39.7 lb)	≥ 32 kg (70.5 lb)	≥ 55 kg (121.2 lb)
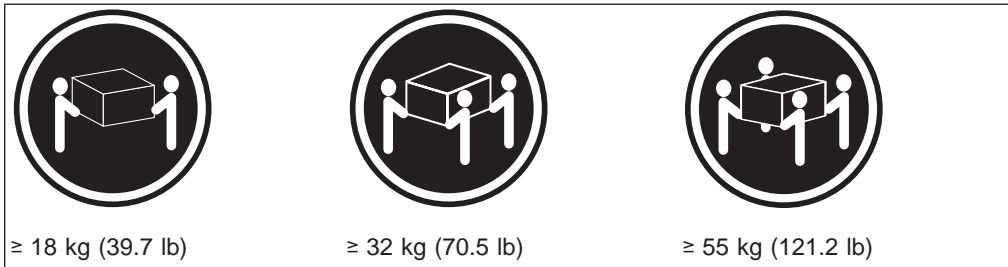
CAUTION:
Use safe practices when lifting.

Statement 5:

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

2
1
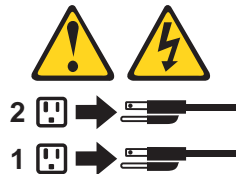
Statement 8:

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

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

Statement 12:

CAUTION:
The following label indicates a hot surface nearby.

Statement 13:

DANGER

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

Statement 20:

CAUTION:
To avoid personal injury, before lifting the unit, remove all the blades to reduce the weight.

Statement 21:

CAUTION:
Hazardous energy is present when the blade is connected to the power source. Always replace the blade cover before installing the blade.

Chapter 1. Introduction

The IBM® @server BladeCenter™ Type 8677 unit is based on IBM Enterprise X-Architecture™ technologies[1].

Your BladeCenter unit is a high-density, high-performance rack-mounted server system developed for medium-to-large businesses. It supports up to 14 blade servers, making it ideally suited for networking environments that require a large number of high-performance servers in a small amount of space. The BladeCenter system provides common resources that are shared by the blade servers, such as power, cooling, system management, network connections, and I/O (diskette drive, CD-ROM drive, ports for USB, keyboard, video, mouse, and network interfaces). The use of common resources enables small size in the blade servers, enables minimal cabling, and eliminates resources sitting idle.

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

This *Installation and User's Guide* provides information to:
- Set up and cable your BladeCenter unit
- Start and configure your BladeCenter unit
- Install options
- Perform basic troubleshooting of your BladeCenter unit

The latest version of this publication is available from the IBM Support Web site at http://www.ibm.com/pc/support/.

Packaged with the *Installation and User's Guide* are software CDs that help you to configure and manage the BladeCenter unit.

This *Installation and User's Guide* and other publications that provide detailed information about your BladeCenter unit are provided in Portable Document Format (PDF) on the IBM *BladeCenter Documentation* CD.

Your BladeCenter unit comes with a three-year limited warranty. If you have access to the World Wide Web, you can obtain up-to-date information about your BladeCenter Type 8677 model and other IBM server products at http://www.ibm.com/eserver/xseries/.

You can register the BladeCenter unit and blade servers on the World Wide Web. To register, go to: http://www.ibm.com/pc/register/

Record information about your BladeCenter unit in the following table. You will need this information when you register your BladeCenter unit with IBM.

---

1. Enterprise X-Architecture technology takes full advantage of existing IBM technologies to build powerful, scalable, and reliable Intel processor-based servers. For more information about IBM Enterprise X-Architecture, go to http://www.ibm.com/pc/us/eserver/xseries/xarchitecture/index.html.

Product name	@server BladeCenter
Machine type	8677
Model number	_____
Serial number	_____

The serial number and model number are on labels on the top, front, and rear of the chassis, as shown in the following illustration.
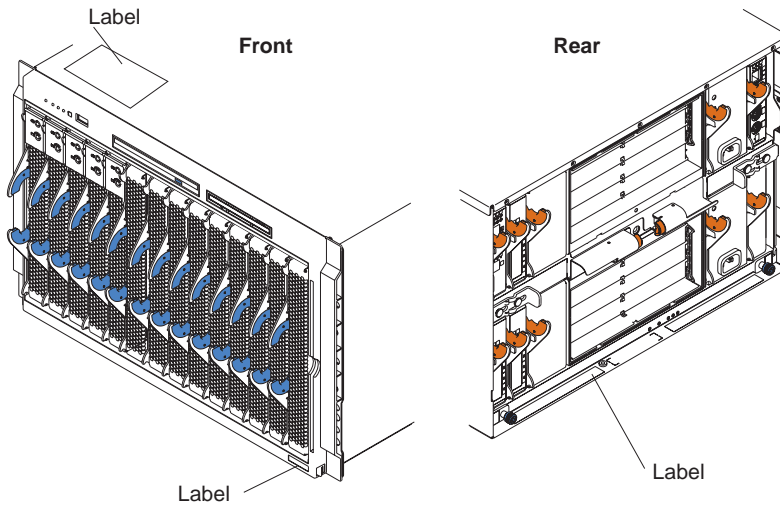
A set of user labels comes with each blade server. Write whatever identifying information you want on a label and place it on the BladeCenter bezel just below the blade server, as shown in the following illustration.
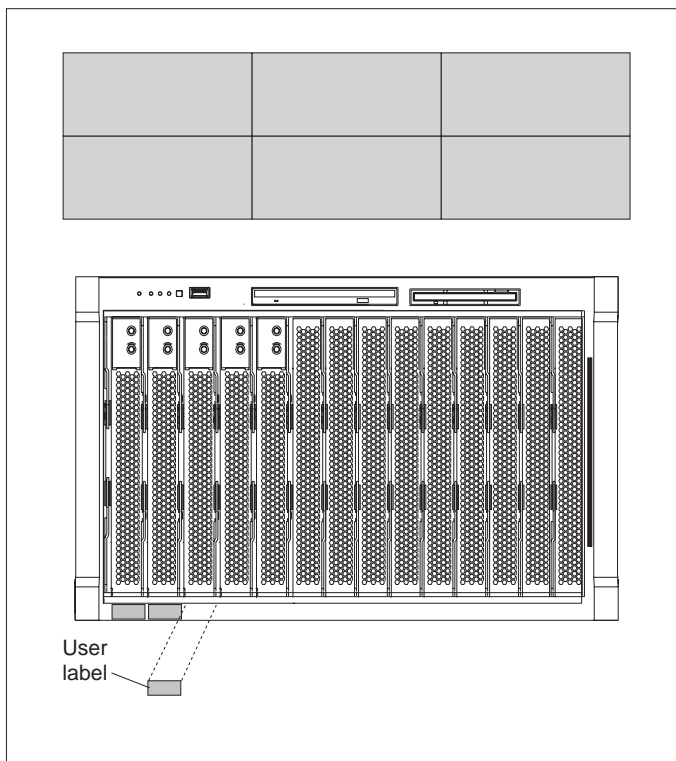
Important: Do not place the label on the blade server itself or in any way block the ventilation holes on the blade server.

About your documentation CD

Your IBM BladeCenter unit comes with the IBM *BladeCenter Type 8677 Documentation* CD, which contains documentation for your system in Portable Document Format (PDF) and includes the IBM Documentation Browser to help you find information quickly.

In addition to the documentation CD, your BladeCenter unit comes with the *Rack Installation Instructions*, which contain a rack-installation template and basic instructions for installing your system into a rack.

System requirements

To run the documentation CD, use a system that has the following minimum hardware and software:

- Microsoft® Windows NT® 4.0 (with Service Pack 3 or later), Windows® 98, or Windows 2000.
- 100 MHz Intel Pentium® microprocessor.
- 32 MB RAM.
- Adobe Acrobat Reader 3.0 or later. Adobe Acrobat Reader software is included on the documentation CD, and you can install it when you run the IBM Documentation Browser.

Starting the IBM Documentation Browser

Use one of the following procedures to start the Documentation Browser:

- If Autostart is enabled, insert the documentation CD into your CD-ROM drive. The Documentation Browser will start automatically.
- If Autostart is disabled, insert the documentation CD into your CD-ROM drive; then, click **Start --> Run**. In the **Open** field, type

  `e:\win32.bat`

  where *e* is the drive letter of your CD-ROM drive, and click **OK**.

Using the IBM Documentation Browser

Use the IBM Documentation Browser to browse the contents of the documentation CD, select from a list of available topics, see brief descriptions of the selected topics, and view selected topics using Adobe Acrobat Reader. The Documentation Browser automatically detects the regional settings in use on your system and presents the information in the language for that region (if available). If a topic is not available in the language for that region, the English version is displayed.

Click **Help** for detailed information about using the IBM Documentation Browser.

Complete the following steps to use the Documentation Browser:

1. Select your product from the **Product** drop-down list.

   The **Topics** list appears. It lists all topics that pertain to the selected product. Topics are in folders or under other topics. A plus sign (+) appears beside each folder or topic that has additional topics under it. Click the plus sign to display the additional topics.

2. Click a topic to select it.

   When you select a topic, a description of the topic contents appears in the **Description** field.

Note: To select multiple topics, press and hold down the Ctrl key while selecting your topics.

3. View selected topics.

Click **View Book**. Adobe Acrobat Reader starts, and the selected topics are displayed.

Using the search feature

Complete the following steps to use the Documentation Browser search feature:

1. Type a key word in the **Search** field.
2. Click **Search**. The topics containing the search word are listed in order based on the number of occurrences.
3. Click a file to open it.
4. Press Ctrl+F and use the Adobe Acrobat search function to search within the file.

Related publications

This *Installation and User's Guide* provides general information about your BladeCenter unit, including information about features, how to configure your BladeCenter unit, and how to get help.

In addition to this *Installation and User's Guide*, the following documentation is provided in PDF on the IBM *BladeCenter Documentation* CD that comes with your BladeCenter unit:

- *Safety Information:* This publication 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.
- *BladeCenter HS20 Installation and User's Guide* for each blade server type: This publication contains instructions for setting up a BladeCenter HS20 blade server and basic instructions for installing some options. It also contains general information about the blade server.
- *BladeCenter HS20 Type 8678 Hardware Maintenance Manual and Troubleshooting Guide*: This publication contains the information to help you solve BladeCenter HS20 problems yourself, and it contains information for service technicians.
- @server *BladeCenter Type 8677 Hardware Maintenance Manual and Troubleshooting Guide*: This publication contains the information to help you solve BladeCenter problems yourself, and it contains information for service technicians.
- @server BladeCenter Type 8677 *Rack Installation Instructions*: This publication contains instructions for installing the BladeCenter unit in a rack.
- *IBM 4-Port Gb Ethernet Switch Module for BladeCenter Installation and User's Guide*: This publication contains instructions for setting up and configuring the IBM 4-Port Gb Ethernet Switch Module for BladeCenter and a description of the switch module features.
- *IBM BladeCenter Management Module User's Guide*: This publication contains instructions for using the Web interface to configure the management modules in a BladeCenter.
- *IBM BladeCenter Management Module Installation Guide*: This publication contains instructions for installing an IBM BladeCenter management module option in a BladeCenter unit and creating the initial configuration.

Additional publications might be included on the IBM *BladeCenter Documentation* CD.

Features and specifications

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

Table 1. Features and specifications

Media tray (on front):	**Switch modules:**	**Acoustical noise emissions:**

• Diskette drive: 1.44 MB
• CD-ROM drive: IDE
• Universal Serial Bus (USB) v1.1 port
• Front system LED panel
 	
Module bays (on rear):
• Four hot-swap 220-volt power-module bays
• Two hot-swap management-module bays
• Four hot-swap switch-module bays
• Two hot-swap blower bays
 	
Blade bays (on front):
 	
14 hot-swap blade bays
 	
Redundant cooling:
 	
Two variable-speed hot-swap blowers
 	
Power modules:
• Standard: Two 1200-watt or greater 220-volt (200-240 V ac) hot-swap power modules
  – Both power modules supply 12 V power to all modules and to blade bays 1 through 6
  – Both power modules provide redundancy to each other
• Maximum: Four
  – Power modules 1 and 2 supply 12 V to all modules and to blade bays 1 through 6
  – Power modules 3 and 4 supply 12 V to blade bays 7 through 14
  – Power modules 1 and 2 provide redundancy to each other
  – Power modules 3 and 4 provide redundancy to each other
	• Standard: None
	• Maximum: Four
	
	Management module:
	• Standard: One hot-swap management module providing the following features:
	  – System-management functions for the BladeCenter system
	  – Video port (analog)
	  – PS/2® keyboard port
	  – PS/2 mouse port
	  – 10/100 Mb Ethernet remote management connection
	• Maximum: Two hot-swap management modules: one active, one redundant
	
	Upgradeable microcode:
	• Management module firmware
	• Ethernet switch module firmware
	• Blade server service processor firmware
	
	Security features:
	• Login password for remote connection
	• Secure socket layer (SSL) security for remote management access
	
	Predictive Failure Analysis® (PFA) alerts:
	• Blowers
	• Blade-dependent features
	
	Size (7U):
	• Height: 304.2 mm (12 in. or 7 U)
	• Depth: 711.2 mm (28 in.)
	• Width: 444 mm (17.5 in.)
	• Weight:
	  – Fully configured with modules and blades: Approx. 108.86 kg (240 lb)
	  – Fully configured without blades: Approx. 44.91 kg (99 lb)
		• Without acoustics module option:
		  – Sound power, idle: 7.4 bels maximum
		  – Sound power, operating: 7.4 bels maximum
		• With acoustics module option:
		  – Sound power, idle: 6.9 bels maximum
		  – Sound power, operating: 6.9 bels maximum
		
		Environment:
		• Air temperature:
		  – BladeCenter unit on: 10° to 35°C (50° to 95°F). Altitude: 0 to 914 m (2998.69 ft)
		  – BladeCenter unit on: 10° to 32°C (50° to 89.6°F). Altitude: 914 m to 2134 m (2998.69 ft to 7000 ft)
		  – BladeCenter off: -40° to 60° C (-40° to 140° F).
		• Humidity:
		  – Server on: 8% to 80%
		  – Server off: 8% to 80%
		
		Electrical input:
		• Sine-wave input (50-60 Hz single-phase) required
		• Input voltage:
		  – Minimum: 200 V ac
		  – Maximum: 240 V ac
		
		Heat output:
		
		Approximate heat output in British thermal units (Btu) per hour
		• Minimum configuration: 1365 Btu/hour (400 watts)
		• Maximum configuration: 9622 Btu/hour (2820 watts)

Notes:

1. For details about the BladeCenter unit port specifications, see "Input/output connectors" on page 27.

2. For information about which types of switch modules can be installed in which switch-module bays, see "Switch modules" on page 16.

3. The operating system in the blade server must provide USB support for the blade server to recognize and use the keyboard, mouse, CD-ROM drive, and diskette drive. The BladeCenter unit uses USB for internal communication with these devices.

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 *BladeCenter 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:

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

What your BladeCenter unit offers

The design of your BladeCenter unit takes advantage of advancements in server technology. It provides up to 14 functionally separate servers and their shared resources in a single center. Your BladeCenter unit combines:

- **IBM Enterprise X-Architecture technology**

  IBM Enterprise X-Architecture technology leverages proven innovative IBM technologies to build powerful, scalable, reliable Intel-processor-based servers. Enterprise X-Architecture technology includes features such as Predictive Failure Analysis (PFA), scalability, and Real Time Diagnostics.

- **Expansion capabilities**

  You can add blade servers to the BladeCenter unit as needed, up to a maximum of 14 blade servers.

  Note: When any blade server or option is in blade bay 7 through 14, power modules must be present in power bays 1 and 2, *and* power modules must be present in power bays 3 and 4.

  Some blade servers have connectors for options that add capabilities to the blade server, such as an I/O expansion card to add a network interface, or a storage expansion unit to add SCSI hard disk drives.

- **Hot-swap capabilities**

  The front bays on the BladeCenter unit are hot-swap blade bays; the rear bays on the BladeCenter unit are hot-swap module bays. You can add, remove, or replace blade servers or management, switch, power, or blower modules in hot-swap bays without removing power from the BladeCenter unit.

  Attention: To maintain proper system cooling, each unoccupied bay must contain a filler blade or filler module.

- **Redundancy capabilities**

  The redundant components in the rear of your BladeCenter unit enable continued operation if one of the components fails.

  – Power modules and blowers: Normally, the redundant power modules and blowers share the load. If one of the power modules or blowers fails, the non-failing power module or blower handles the entire load. You can then replace the failed blower or power module without shutting down the BladeCenter unit.

  – Management modules: Only one management module will be active at a time. If the active management module fails, the secondary, or redundant, management module becomes the active management module, containing current BladeCenter configuration and status information. You can then replace the failed management module without shutting down the BladeCenter unit.

- **Redundant network connection capabilities**

  Configuring a pair of Ethernet switch modules in switch-module bays 1 and 2 identically provides support for Ethernet failover configured on blade servers. See "Configuring a switch module" on page 55 for more information. If the I/O expansion options in your blade servers can be configured for failover, configuring a pair of switch modules in switch-module bays 3 and 4 identically provides support for the failover configured on the I/O expansion options.

  Other network-interface I/O expansion options, such as the IBM HS20 Fibre Channel Expansion Card, can have similar capability for redundant network connections. See the documentation that comes with your I/O expansion and switch module options for more information about configuring for redundant network connections.

- **System-management capabilities**

  Your BladeCenter unit comes with a service processor in the management module. This service processor, in conjunction with the system-management firmware that is provided with your BladeCenter unit and the service processor in each blade server, enables you to remotely manage the BladeCenter unit, its components, and the blade servers. The management module also multiplexes the keyboard, mouse, and video ports and the USB port across the multiple blade servers.

  The service processor in each blade server provides blade server system monitoring, event recording, and alert capability.

  See Chapter 4, "Configuring your BladeCenter unit", on page 39 for more information.

- **Network environment support**

  Your BladeCenter unit supports up to two Ethernet-compatible switch modules or pass-thru modules, for blade server integrated Ethernet controller communication with the network. Each switch module provides one internal connection to each blade server, up to 14 internal connections per switch module.

  The BladeCenter unit also supports two additional switch modules or pass-thru modules, for a total of four switch modules. The two additional switch modules support the network interface on the optional I/O expansion card installed on one or more blade servers in the BladeCenter unit.

  Note: The two additional switch modules must be compatible with the network interface on the optional I/O expansion cards in the blade servers.

  Each of these two additional switch modules provides one internal connection to the optional I/O expansion card, up to 14 internal connections per switch module.

Reliability, availability, and serviceability

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

The following is a list of some of the RAS features that your BladeCenter unit supports:
- Shared key components, such as power, cooling, and I/O
- All components serviced from the front or rear of the chassis
- Automatic error retry and recovery
- Automatic restart after a power failure
- Built-in monitoring for blower, power, temperature, and voltage
- Built-in monitoring for module redundancy
- Customer support center 24 hours a day, 7 days a week[2]
- Error codes and messages
- Fault-resistant startup
- Remote system management through the management module
- Remote management module firmware upgrade
- Remote upgrade of blade server service processor microcode
- Built-in self-test (BIST)
- Predictive Failure Analysis (PFA) alerts
- Redundant components
  - Cooling fans (blowers) with speed-sensing capability
  - Power modules
  - Management modules
- Hot-swap components
  - Cooling fans (blowers) with speed-sensing capability
  - Power modules
  - Management module
  - Switch modules
  - Blade servers
  - Media tray
- System automatic inventory at startup
- System error logging

---

2. Service availability will vary by country. Response time varies; may exclude holidays.

Major components of the BladeCenter Type 8677 unit

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

Note: The illustrations in this document might differ slightly from your hardware.
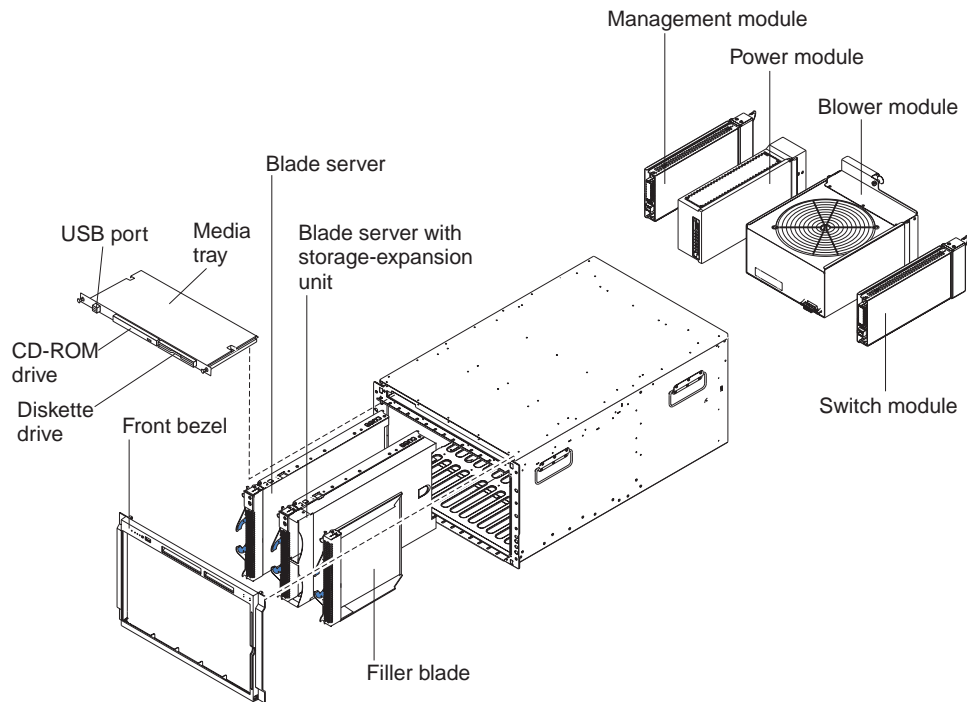
Attention: To maintain proper system cooling, each module bay must contain either a module or a filler module; each blade bay must contain either a blade server or a filler blade.

Front view
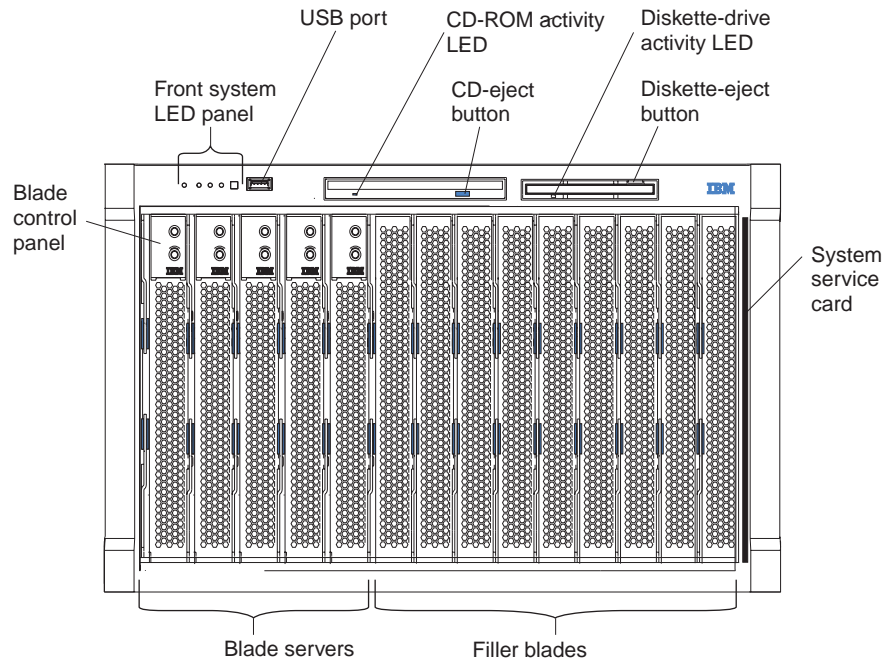
USB port

CD-ROM activity LED

Diskette-drive activity LED

Front system LED panel

CD-eject button

Diskette-eject button

Blade control panel

System service card

Blade servers

Filler blades

See Chapter 3, "BladeCenter unit power, controls, and indicators", on page 31 for details about these components and indicators.

Rear view
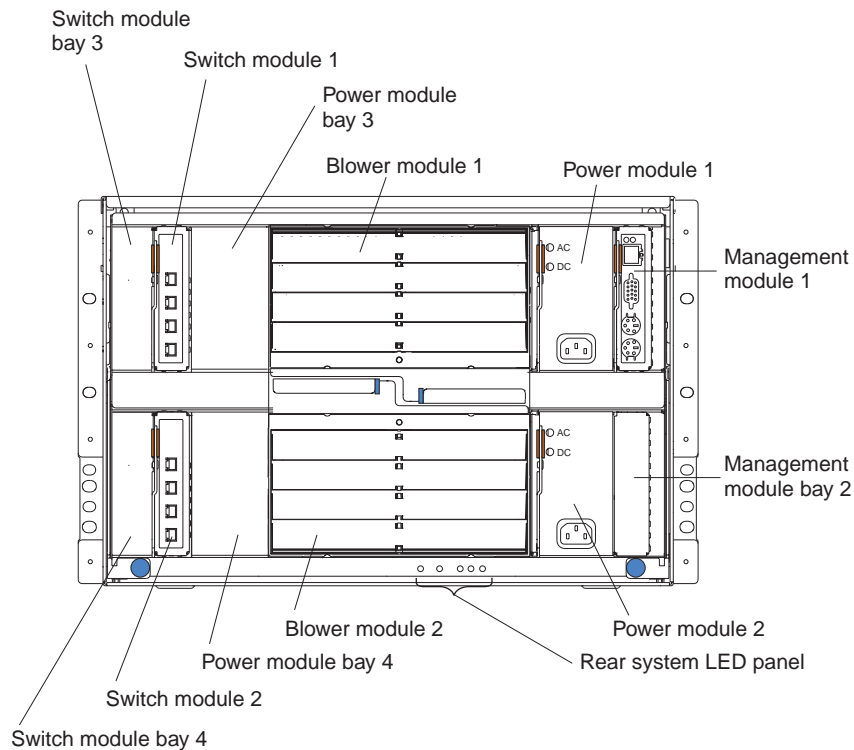
Switch module bay 3

Switch module 1

Power module bay 3

Blower module 1

Power module 1

AC
DC

Management module 1

AC
DC

Management module bay 2

Blower module 2

Power module 2

Power module bay 4

Rear system LED panel

Switch module 2

Switch module bay 4

See Chapter 3, "BladeCenter unit power, controls, and indicators", on page 31 for details about these components and indicators.

Chapter 2. Installing options

This chapter provides instructions for adding options to your BladeCenter unit. Some option-removal instructions are provided in case you need to remove one option to install another.

Installing the BladeCenter unit in a rack

Statement 20:

CAUTION:
To avoid personal injury, before lifting the unit, remove all the blades to reduce the weight.

Statement 4:

≥ 18 kg (39.7 lb)	≥ 32 kg (70.5 lb)	≥ 55 kg (121.2 lb)
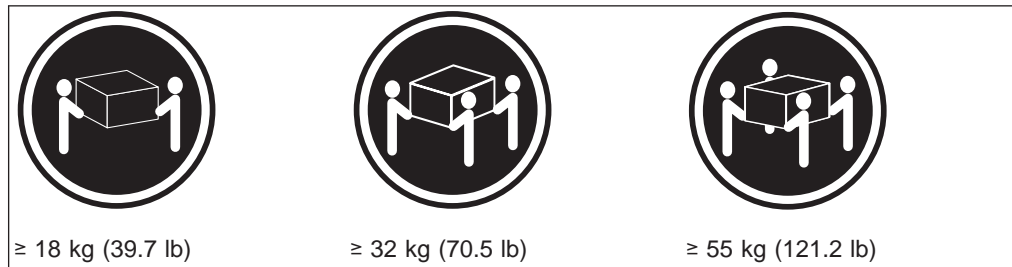
CAUTION:
Use safe practices when lifting.

Install the BladeCenter unit in a rack before installing any blade servers in the BladeCenter unit. If your BladeCenter unit has blade servers already installed, remove them first. Blade servers are installed from the front of the BladeCenter unit, without sliding the BladeCenter unit into or out of the rack. Detailed instructions for installing a BladeCenter unit in a rack are in the *Rack Installation Instructions* that come with your BladeCenter unit.

Installation guidelines

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

- Read the safety information beginning on page vii and the guidelines in "Handling static-sensitive devices" on page 14. This information will help you work safely with your BladeCenter unit and options.
- The orange color on components and labels in your BladeCenter unit identifies hot-swap components. You can install or remove hot-swap modules and, with

13

some restrictions, hot-swap blade servers while the BladeCenter unit is running. For complete details about installing or removing a hot-swap component, see the detailed information in this chapter.

- The blue color on components and labels identifies touch points where you can grip a component, move a latch, and so on.
- You do not need to disconnect the BladeCenter unit from power to install or replace any of the hot-swap modules on the rear of the BladeCenter unit. You need to shut down the operating system and turn off a hot-swap blade server on the front of the BladeCenter unit before removing the blade server, but you do not need to shut down the BladeCenter unit itself.
- For a list of supported options for your BladeCenter unit, go to http://www.ibm.com/pc/compat/ on the World Wide Web.

System reliability considerations

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

- Each of the module bays on the rear of the BladeCenter unit has either a module or filler module installed.
- Each of the blade bays on the front of the BladeCenter unit has either a blade server or filler blade installed.
- Each of the drive bays in a blade server storage expansion option has either a hot-swap drive or a filler panel installed.
- A removed hot-swap module, blade server, or drive is replaced within 1 minute of removal.
- Cables for the option modules are routed according to the illustrations and instructions in this document.
- A failed blower is replaced as soon as possible, to restore cooling redundancy.

Handling static-sensitive devices

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

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

- Limit your movement. Movement can cause static electricity to build up around you.
- Handle the device carefully, holding it by its edges or its frame.
- Do not touch solder joints, pins, or exposed printed circuitry.
- Do not leave the device where others can handle and damage it.
- While the device is still in its static-protective package, touch it to an unpainted metal part of the system unit for at least 2 seconds. This drains static electricity from the package and from your body.
- Remove the device from its package and install it directly into the system unit without setting the device down. If it is necessary to set down the device, place it back into its static-protective package. Do not place the device on your system unit or on a metal surface.
- Take additional care when handling devices during cold weather. Heating reduces indoor humidity and increases static electricity.

Installing and removing modules

The procedures for installing or removing a module on the BladeCenter unit are nearly identical for all modules except the blower modules. To install or remove a blower module, see the BladeCenter *Hardware Maintenance Manual and Troubleshooting Guide* on the *BladeCenter Documentation* CD. To install or remove all other modules, follow the instructions in this section.

Every module is keyed so that it can be inserted only in an appropriate bay. You can insert a switch module only in a switch-module bay, for example. In addition, most modules must be installed in a specific sequence or under specific circumstances.

The BladeCenter modules

Your BladeCenter unit contains the following hot-swap modules: power modules, switch modules, management module, and blower modules. See "Rear view" on page 35 for the location of each module. These modules supply common functions to the blade servers that are installed in the blade bays in the front of the BladeCenter unit.

The chassis and the management module supply I/O (diskette drive, CD-ROM drive, USB port, keyboard, video, and mouse) that is available to all the blade servers, selected by any one blade server at a time. The chassis can contain up to 14 blade servers.

Attention: To help ensure proper cooling, performance, and system reliability, make sure that each of the module bays on the rear of the BladeCenter unit has a module or filler module installed. When replacing a module, do not operate the BladeCenter unit for more than one minute without either a module or a filler module installed in each module bay.

Management module
Your BladeCenter unit comes with one hot-swap management module in the management bay. You can add a management module in management bay 2.

Note: Only one management module will be active; the second management module, if present, provides redundancy.

The management module functions as a service processor and a keyboard/video/mouse (KVM) multiplexor for the multiple blade servers. The management module also configures the BladeCenter unit and modules, configuring information such as the switch IP addresses. The management module provides the following external connections: keyboard, mouse, and video for use by a local console, and one RJ-45 connector for a 10/100 Mbps Ethernet remote management connection.

The service processor in the management module communicates with the service processor in each blade server for functions such as:
- Blade server power-on requests
- Blade server error and event reporting
- Blade server requests for keyboard, mouse, and video
- Blade server requests for diskette drive, CD-ROM drive, and USB port

The management module also communicates with the switch modules, power modules, blower modules, and blade servers to detect presence or absence and any error conditions, sending alerts when required.

Switch modules

For blade server communication with the network, your BladeCenter unit supports from one to four hot-swap switch modules. Table 2 identifies the type of switch module you can install in each switch-module bay. Go to the IBM Support Web site at http://www.ibm.com/pc/support/ to see the list of supported switch modules.

Your BladeCenter unit supports a minimum of one hot-swap Ethernet switch module or pass-thru module, in switch-module bay 1 or 2. This switch module provides an internal connection to an integrated Ethernet controller in all the blade servers in the BladeCenter unit, up to 14 internal connections per switch module. To provide an internal connection for the second integrated Ethernet controller in each blade server, install an Ethernet switch module or pass-thru module in the available switch-module bay of the pair (switch-module bay 1 or bay 2).

Similarly, the BladeCenter unit supports two additional switch modules in switch-module bays 3 and 4. Each of these switch modules provides an internal connection to one of the two network-interface controllers on all the I/O expansion options installed on blade servers in the BladeCenter unit. The switch module must be compatible with the network interface on all the I/O expansion options. For example, if you install a Fibre Channel I/O expansion option on a blade server, the switch modules you install in switch-module bays 3 and 4 must be Fibre Channel or pass-thru.

Notes:

1. Because of electromagnetic interference (EMI), no more than two four-port 1-Gb Ethernet switch modules can be installed in the BladeCenter unit. You can mix four-port 1-Gb Ethernet switch modules with other supported Ethernet switch modules to achieve the total number of Ethernet switch modules you need in the BladeCenter unit.

2. You can use a pass-thru module in any switch-module bay, provided the associated controller in the blade servers or I/O expansion options is compatible with it.

The following table summarizes the types of modules that can be used in each switch-module bay. See "Rear view" on page 35 for the location of the switch-module bays on the BladeCenter unit.

Table 2. Hot-swap switch module types by location

Bays	Switch-module function	Permissible switch module
1 and 2	Network connections 1 and 2 (Ethernet) for all blade servers in the BladeCenter unit	One of the following combinations: • Two Ethernet switch modules • Two pass-thru modules • One Ethernet switch module and one pass-thru module

Table 2. Hot-swap switch module types by location (continued)

Bays	Switch-module function	Permissible switch module
3 and 4	Network connections 3 and 4 (for all I/O expansion options on blade servers in the BladeCenter unit)	One of the following combinations. • Two Ethernet switch modules • Two Fibre Channel switch modules • Two pass-thru modules • One pass-thru module and one Ethernet switch module • One pass-thru module and one Fibre Channel switch module **Important:** • The modules used must support the network interface used on the I/O expansion options. • You cannot combine Ethernet and Fibre Channel switch modules in bays 3 and 4.

Notes:

1. The enumeration of the Ethernet controllers in a blade server is operating-system dependent. You can verify the Ethernet controller designations a blade server uses through your operating system settings.

2. The routing of an Ethernet controller to a particular switch-module bay depends on the type of blade server. You can verify which Ethernet controller is routed to which switch-module bay by using the following test:

   a. Install only one Ethernet switch module or pass-thru module, in switch-module bay 1.

   b. Make sure the ports on the switch module or pass-thru module are enabled (**Switch Tasks → Management → Advanced Switch Management** in the management module Web-based user interface).

   c. Enable only one of the Ethernet controllers on the blade server. Note the designation the blade server operating system has for the controller.

   d. Ping an external computer on the network connected to the switch module.

   If you can ping the external computer, the Ethernet controller you enabled is associated with the switch module in switch-module bay 1. The other Ethernet controller in the blade server is associated with the switch module in switch-module bay 2.

3. If you have installed an I/O expansion option on a blade server, communications from the option are routed to switch-module bays 3 and 4. You can verify which controller on the option is routed to which switch-module bay by performing the test in note 2, using a controller on the I/O expansion option and a compatible switch module or pass-thru module in switch bay 3 or 4.

Power modules

Your BladeCenter unit comes with one pair of 220-volt hot-swap power modules in power bays 1 and 2 that provides power to all the BladeCenter modules and to blade bays 1 through 6. The BladeCenter unit supports a second pair of power modules in power bays 3 and 4 that provides power to blade bays 7 through 14.

Each pair of power modules is redundant. If either power module fails, the remaining power module continues to supply power, but there is no redundancy; the failed power module must be replaced as soon as possible.

To provide true redundant power, BladeCenter power modules 1 and 3 must connect to a different ac power source than power modules 2 and 4. Connect BladeCenter power modules 1 and 3 to a different PDU than power modules 2 and 4; then, connect each PDU to an ac power source (building power source or service entrance) that is controlled by a separate circuit breaker.

The following table summarizes the application for each power module

Bays	Power module function
1 and 2	Provides power to all the BladeCenter modules and to blade bays 1 through 6
3 and 4	Provides power to blade bays 7 through 14

Power modules are not needed in bays 3 and 4 until you begin installing blade servers and options in blade bays 7 through 14.

Note: If you install a blade server that has a storage expansion unit option attached in blade bay 6, the option will use blade bay 7; power modules will be required in power bays 1, 2, 3 and 4.

Each active power module supplies 12 volts of power to the blade bays it services.

Important: Plug one end of each power-module power cord into the power module; plug the other end of the power cord into a 220-volt power distribution unit (PDU).

Blower modules

Your BladeCenter unit comes with two hot-swap blowers for cooling redundancy. The blower speeds vary depending on the ambient air temperature at the front of the BladeCenter. If the ambient temperature is 72°F or below, the BladeCenter blowers will run at 30% of their maximum rotational speed, increasing their speed as required to control internal BladeCenter temperature. If the ambient temperature is above 72°F, the blowers will run at 80% of their maximum rotational speed, increasing their speed as required to control internal BladeCenter temperature. If a blower fails, the remaining blower continues to cool the BladeCenter unit and blade servers.

Important: Replace a failed blower as soon as possible, to restore cooling redundancy (see the *Hardware Maintenance Manual and Troubleshooting Guide* on the *BladeCenter Documentation* CD for instructions).

Installing a module

The following illustration shows how to install a power module, management module, or switch module in the rear of the BladeCenter unit. See the *Hardware Maintenance Manual and Troubleshooting Guide* on the *BladeCenter Documentation* CD for information about replacing a blower module.
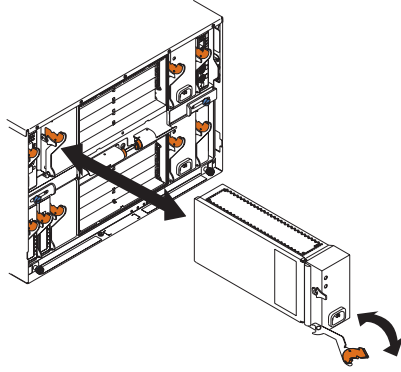
Before you begin, read the documentation that comes with your option.

Statement 8:

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

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

Complete the following steps to install a module:

Note: These instructions assume the BladeCenter unit is connected to power.

 1. Read the safety information beginning on page vii and "Installation guidelines" on page 13 through "Handling static-sensitive devices" on page 14.

 2. Remove the acoustic module option, if installed, from the rear of the BladeCenter unit. See "Installing and removing the acoustic module option" on page 21 for instructions.

 3. Remove the filler module from the bay.

 4. Ensure that the release lever on the module is in the open position (perpendicular to the module).

 5. Slide the module into the appropriate module bay until it stops.

 6. Push the release lever on the front of the module closed.

 7. Attach any cables or cords required by the module. See "Input/output connectors" on page 27 for the location of connectors on the BladeCenter unit. Be sure to route the power cord on a power module through the strain-relief clamp on the power module.

8. Make sure the LEDs on the module indicate that it is operating properly. Verify that:
   - The dc power LED and the ac power LED on each power module are lit.
   - The OK LED on the management module is lit.
   - The OK LED on each switch module is lit.
9. If you have other modules to install, do so now; otherwise, go to step 10.
10. Replace the acoustic module option, if you removed it in step 2.

Removing a module
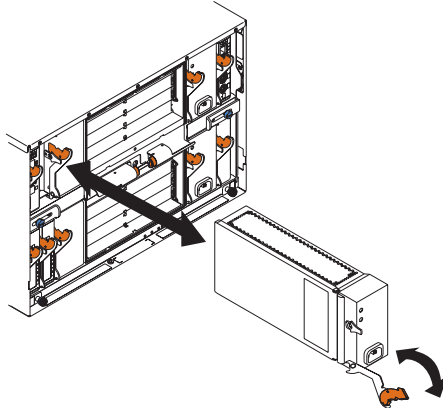
Complete the following steps to remove a power module, management module, or switch module. See the *Hardware Maintenance Manual and Troubleshooting Guide* on the *BladeCenter Documentation* CD for information about replacing a blower module.

Note: These instructions assume the BladeCenter unit is connected to power.

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.

1. Read the safety information beginning on page vii and "Installation guidelines" on page 13 through "Handling static-sensitive devices" on page 14.

2. Remove the acoustic module option, if installed, from the rear of the BladeCenter unit. See "Installing and removing the acoustic module option" for instructions.

   Important:

   a. If you are removing a functional power module, make sure before you remove the module that both the ac power LED and the dc power LED on the remaining power module are lit; otherwise, shut down the operating systems and turn off all blade servers that are supported by the power module you are removing before you remove it. (See the documentation that comes with the blade server for instructions for shutting down the blade server operating system and turning off the blade server.)

   b. If you are removing a management module, you might prefer to stop all management module local and remote sessions before proceeding, to avoid unexpected termination of sessions.

3. Disconnect any cables from the module. For a power module, disconnect the power cord from the module.

4. Pull the release lever all the way toward the bottom of the module until it stops, as shown in the illustration. The module moves out of the bay approximately 0.6 cm (0.25 inch).

5. Slide the module out of the bay and set it aside. Within 1 minute, place either another module of the same type or a filler module in the bay.

6. If you placed another module in the bay, reconnect any cables or power cords you disconnected in step 3; then, make sure the LEDs on the module indicate that it is operating properly. Verify that:

   • The dc power LED and the ac power LED on each power module are lit.

   • The OK LED on the management module is lit.

   • The OK LED on each switch module is lit.

7. Replace the acoustic module option, if you removed it in step 2.

Installing and removing the acoustic module option

For server environments where noise reduction is essential, you might choose to install the BladeCenter Acoustic Attenuation Module option (acoustic module), on your BladeCenter unit. The acoustic module reduces the sound level of the BladeCenter unit to below 6.9 bel using a T-shaped baffle. The acoustic module is installed on the back of the BladeCenter unit, directly covering the blower modules and partially covering the other modules. The system LED panel is replicated on the acoustic module for visibility. Installing an acoustic module increases the length of a BladeCenter unit and requires use of an enterprise rack.

Installing the acoustic module option

Acoustic module

Locking
handle
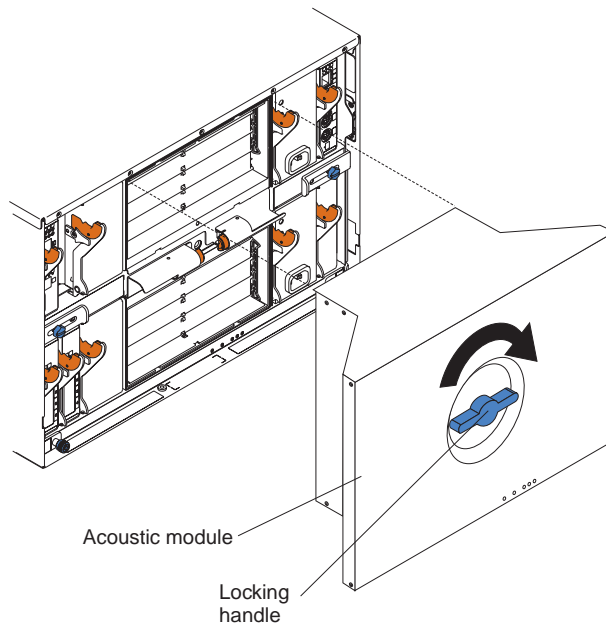
Complete the following steps to install an acoustic module option on the
BladeCenter unit:

1. Place the acoustic module over the blower modules, aligning the corners of the
   acoustic module back with the guides on the chassis, and pushing the shaft into
   the hole between the blower modules.
2. Rotate the acoustic module handle approximately 2 turns clockwise until it
   tightens the acoustic module firmly into place.

Removing the acoustic module option

Acoustic module

Locking
handle
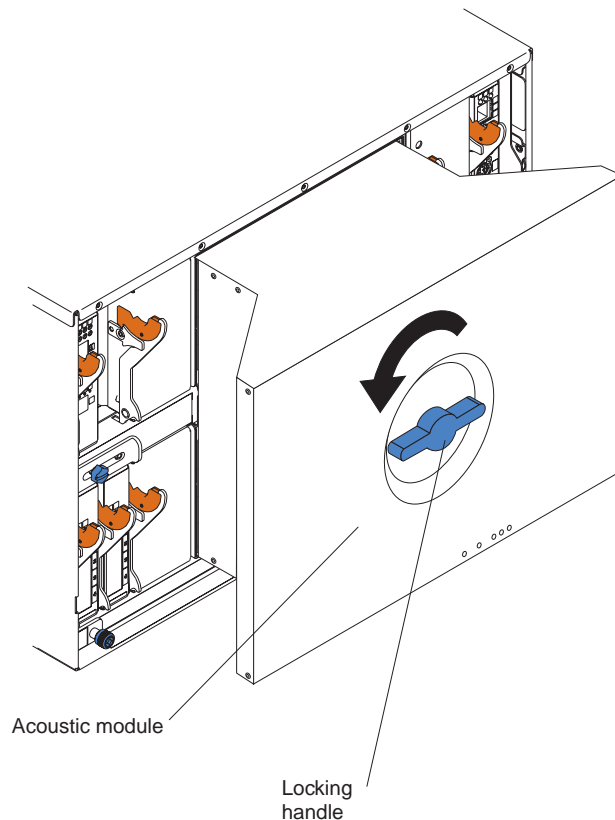
Complete the following steps to remove an acoustic module option from the
BladeCenter unit:

1. Rotate the acoustic module handle approximately 2 turns counter-clockwise until
   it stops.
2. Carefully pull the acoustic module away from the BladeCenter unit and set it
   aside.

Installing and removing blade servers

Your BladeCenter unit supports up to 14 high-performance blade servers. Each
blade server is an enclosure that contains microprocessors, memory, a control chip
set, an I/O bus, Ethernet controllers, hard disk drives, and customer interface
controls, and connectors for expansion options. The blade server receives its
power, network connection, and I/O devices (CD-ROM and diskette drives,
keyboard, mouse, and video ports, USB port, remote monitoring port) from the
BladeCenter unit, reducing the server physical size and reducing the number of
cables needed.

Blade server expansion options

Some blade servers contain connectors for options that add capabilities to the blade
server. You can add these options before installing the blade server in the
BladeCenter unit.

Go to http://www.ibm.com/pc/compat/ on the World Wide Web for a list of available
options for your IBM blade server.

I/O expansion option

Some blade servers have connectors for adding an I/O expansion option, such as the IBM HS20 Fibre Channel Expansion Card. The BladeCenter unit routes network communication signals from the I/O expansion option to switch modules 3 and 4 on the BladeCenter unit. The I/O expansion option is attached directly to the blade server but does not occupy an additional blade bay.

Note: If an I/O expansion option is installed on any blade server, switch modules for that network interface must be installed in switch-module bays 3 and 4 on the BladeCenter unit. See "Switch modules" on page 16 for more information.

Storage-expansion option

Some blade servers have a connector for adding a SCSI expansion unit, such as the IBM HS20 SCSI Storage Expansion Unit. The storage expansion unit supports up to two hot-swap SCSI hard disk drives. The expansion option is attached directly to the blade server; the blade server and expansion option together use two blade bays.

Installing a blade server
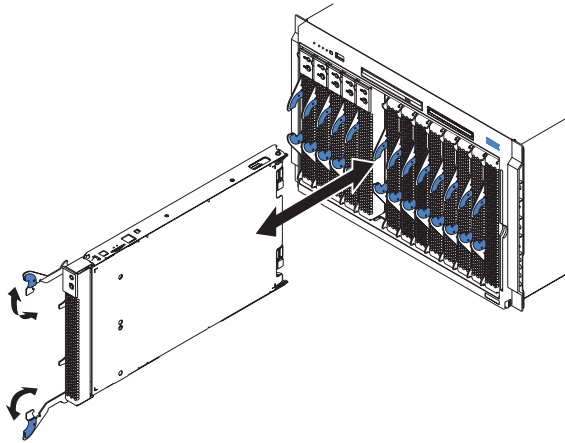
Complete the following steps to install a blade server in the BladeCenter unit.

Statement 21:

CAUTION:
Hazardous energy is present when the blade is connected to the power source. Always replace the blade cover before installing the blade.

1. Read the safety information beginning on page vii and "Installation guidelines" on page 13 through "Handling static-sensitive devices" on page 14.
2. Install any options needed, such as disk drives or memory, in the blade server. See the documentation that comes with the blade server for instructions.
3. Select the bay for the blade server.

   Notes:

   a. If a blade server has a SCSI storage expansion option installed on it, the blade server and expansion option require two adjacent blade bays.

b. If you install a blade server or option in bay 7 through 14, you must install power modules in power bays 3 and 4.

4. Remove the filler blade from the bay and store in a safe place.

   Attention: To help ensure proper cooling, performance, and system reliability, make sure that each of the blade bays on the front of the BladeCenter unit has a blade server or filler blade installed. When replacing a blade server, do not operate the BladeCenter unit for more than one minute without either a blade server or a filler blade installed in each blade bay.

5. Ensure that the release levers on the blade server are in the open position (perpendicular to the blade server).

6. Slide the blade server into the bay until it stops. The spring-loaded doors that cover the bay opening move out of the way as you insert the blade server.

7. Push the release levers on the front of the blade server until they are closed.

8. Turn on the blade server by pressing the power-control button on the blade server control panel. See the documentation that comes with the blade server for more instructions.

9. Verify that the power LED on the blade server control panel is lit, indicating that the blade server is receiving power.

10. If desired, write identifying information on one of the user labels that come with the blade server; then, place the label on the BladeCenter bezel just below the blade server, as shown in the following illustration.
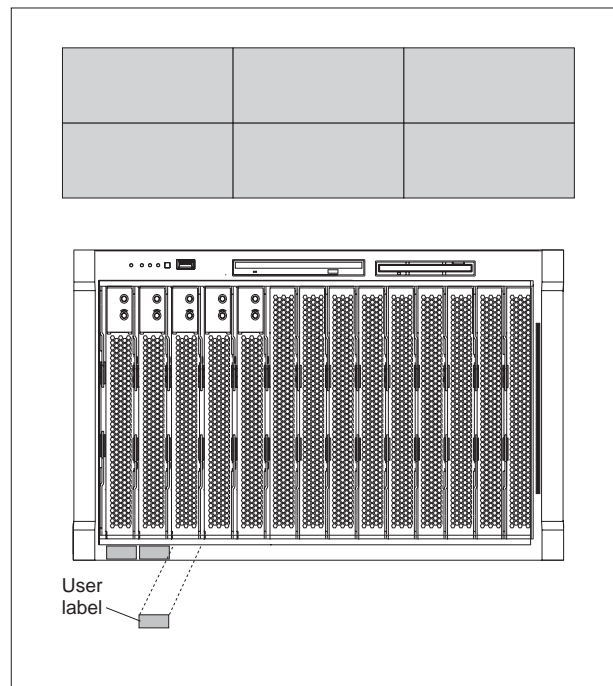
   Important: Do not place the label on the blade server or in any way block the ventilation holes on the blade server.

11. If you have other blade servers to install, do so now.

Important: Reinstalling a blade server into a different bay than the one from which it was removed could have unintended consequences. Some configuration information and update options are established according to bay number. You might need to reconfigure the blade server.

If this is the initial installation for a blade server in the BladeCenter unit, you need to configure the blade server with the blade server Configuration/Setup Utility program and install the blade server operating system. See the documentation that comes with the blade server for instructions.

Removing a blade server

The following illustration shows how to remove a blade server from the BladeCenter unit.
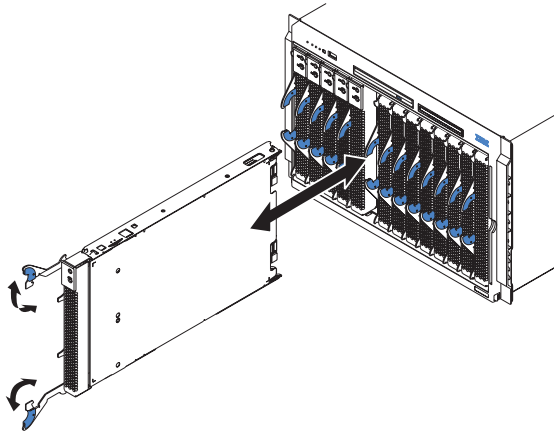
Attention:

- To maintain proper system cooling, do not operate the BladeCenter unit for more than one minute without either a blade server or a filler blade installed in each blade bay. If you fail to replace a blade server or filler blade within one minute, system performance might be affected.
- Make note of the bay number. Some configuration information and update options are established according to bay; if you reinstall the blade server in a different bay than the one from which it was removed, unintended consequences could occur.

Complete the following steps to remove a blade server from the BladeCenter unit.

1. Read the safety information beginning on page vii and "Installation guidelines" on page 13 through "Handling static-sensitive devices" on page 14.

    Note: Improper shutdown of a blade server will not allow that blade server to be restarted using Wake on LAN.

2. Shut down the blade server operating system; then, press the blade server power-control button (behind the blade server control panel door) to turn off the blade server. Wait at least 30 seconds until the drives stop spinning, before proceeding to the next step.

3. Open the two release levers as shown in the illustration. The blade server moves out of the bay approximately 0.6 cm (0.25 inch).

4. Pull the blade server out of the bay. Spring-loaded doors move down to cover the bay temporarily.

5. Place either a filler blade or another blade server in the bay within one minute. The spring-loaded doors will move out of the way as you insert the blade server or filler blade.

Completing the installation

After you connect the cables to the modules and route the cables (if necessary, see the *Rack Installation Instructions* for information about routing the cables), start the BladeCenter unit (if it is not already started) and verify that it is working properly, as follows:

1. Start the BladeCenter unit by connecting the power-module power cords to a 220-volt power source (a 220-volt power distribution unit (PDU) that is connected to a 220-volt ac power outlet).

2. Make sure the LEDs on the modules indicate that they are operating properly. Verify that:
   - The dc power LED and the ac power LED on each power module are lit.
   - The OK LED on each management module is lit.
   - The OK LED on each switch module is lit.

3. Make sure the Power-on LED on each blade server is lit, either steady or blinking.

See Chapter 3, "BladeCenter unit power, controls, and indicators", on page 31 for information about starting the BladeCenter unit and the location of the LEDs on the modules. See the *BladeCenter HS20 Type 8678 Installation and User's Guide* on the *BladeCenter Documentation* CD for the location of the LEDs on the blade servers.

Input/output connectors

The BladeCenter unit has the following ports:
- One video
- One PS/2 keyboard
- One PS/2 mouse
- One Universal Serial Bus (USB) on the front of the BladeCenter unit
- One 10/100 Mbps Ethernet for remote console and management

The following illustration shows the I/O connectors on the rear of your BladeCenter.
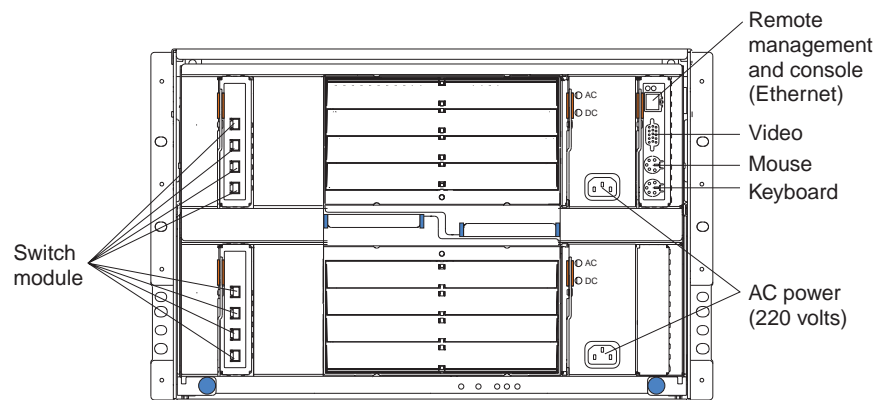
Video connector

Your BladeCenter management module contains one standard video connector. The integrated video controller on each blade server is compatible with SVGA and VGA and communicates through this video port.

Use this connector to connect a video monitor to the BladeCenter unit.
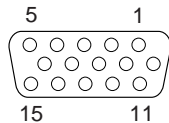
Keyboard connector

Your BladeCenter management module contains one PS/2-style keyboard connector.

Use this connector to connect a PS/2 keyboard to the BladeCenter unit.
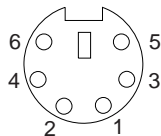
Mouse connector

Your BladeCenter management module contains one PS/2-style mouse connector.

Use this connector to connect a PS/2 mouse to the BladeCenter unit.
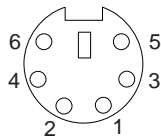
Remote management and console Ethernet connector

Your BladeCenter management module contains one 10/100 Mb Ethernet connector that provides the remote connection to the network management station on the network.

Use this port for remote management and remote console.

The network management station, through this port, can access control functions running in the service processor on each blade server or within each switch module. However, it cannot use this port to communicate with application programs running in the blade servers. The network management station must direct those communications through a network connected to the external ports in the switch modules in the BladeCenter unit.

The following illustration shows the Ethernet connector that is on the management module.
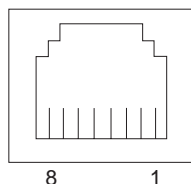
Switch-module connectors

See the documentation that comes with each switch module for a description of the connectors on the switch module.

Chapter 3. BladeCenter unit power, controls, and indicators

This section describes the controls and light-emitting diodes (LEDs) and how to start and shut down the BladeCenter unit.

Starting the BladeCenter unit

Important: For the LEDs on each system LED panel to function correctly, be sure to install the management module before starting the BladeCenter unit. See Chapter 2, "Installing options", on page 13 for instructions for installing the management module.

The BladeCenter unit does not have a power switch. To start the BladeCenter unit, plug one end of each power cord into a power module on the rear of the BladeCenter unit, and the other end of each power cord into a 220-volt power distribution unit (PDU) that is plugged into an appropriate electrical outlet.

After you start the BladeCenter unit, it has ac power. The blade servers in the BladeCenter unit are connected to ac power but are not turned on. Press the power-control button on the front of each blade server to obtain full power for the blade server and start its operating system (see the documentation that comes with your blade server for information about turning on the blade server). Be sure to shut down the operating system before turning off the blade server, to avoid damaging the hard disk drives.

Notes:
1. If a power failure occurs, the BladeCenter unit restarts automatically when power is restored.
2. The blade server power button turns on or turns off the blade server if local power control has not been disabled through the management module.
3. The blade server power button turns on the blade server only if the green power light on the blade server is flashing slowly. If the light flashes rapidly, the blade server has not yet synchronized with the management module and the power button will have no effect.

Shutting down the BladeCenter unit

You can shut down the BladeCenter unit by turning off the blade servers and disconnecting the BladeCenter unit from the power source.

Complete the following steps to shut down the BladeCenter unit:

1. Refer to your blade server operating-system documentation for the proper procedure to shut down the operating system in the blade servers; then, shut down each 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.
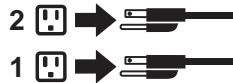
2. Press the power-control button on the front of each blade server. Wait at least 30 seconds for the blade server drives to stop spinning.

3. Disconnect all power cords on the BladeCenter unit from all the power modules.

    Note: After you disconnect the BladeCenter unit from power, wait at least 5 seconds before you connect the BladeCenter unit to power again.

BladeCenter components, controls, and LEDs

This section identifies the components, controls, and LEDs on the front and rear of your BladeCenter unit.

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

Front view

This section identifies the components, controls, and LEDs on the front of your BladeCenter unit.
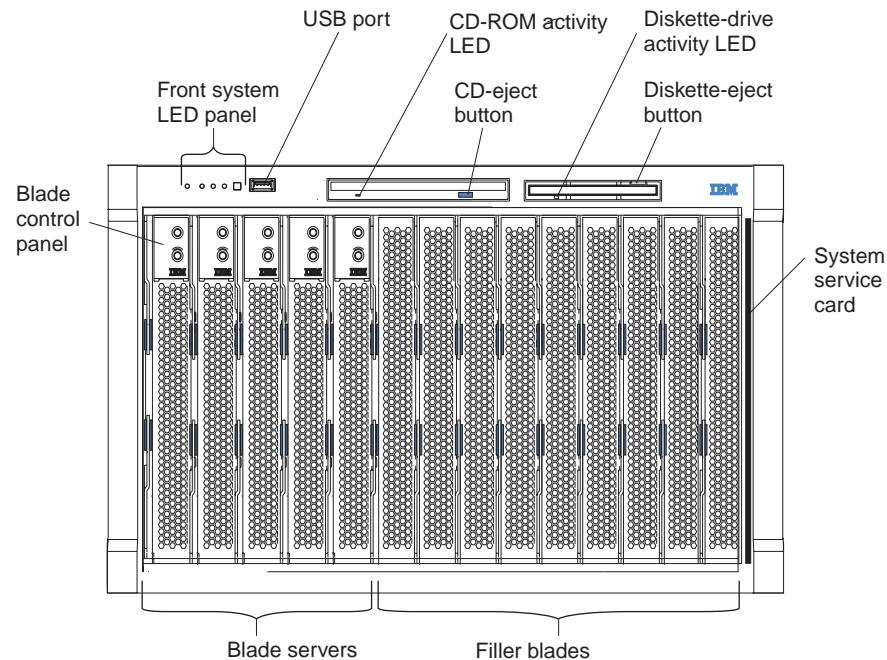
Front system LED panel: The LEDs on this panel provide status information for your BladeCenter unit. See "System LED panel" on page 38 for more information.

USB port: Use this port to attach an external USB device.

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

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

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

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

Blade control panel: This panel contains indicators and controls for the blade server. See the documentation that comes with your blade server for information about the blade control panel.

System service card: This card contains system service instructions and a writable area for your use.

Writeable area

System service card
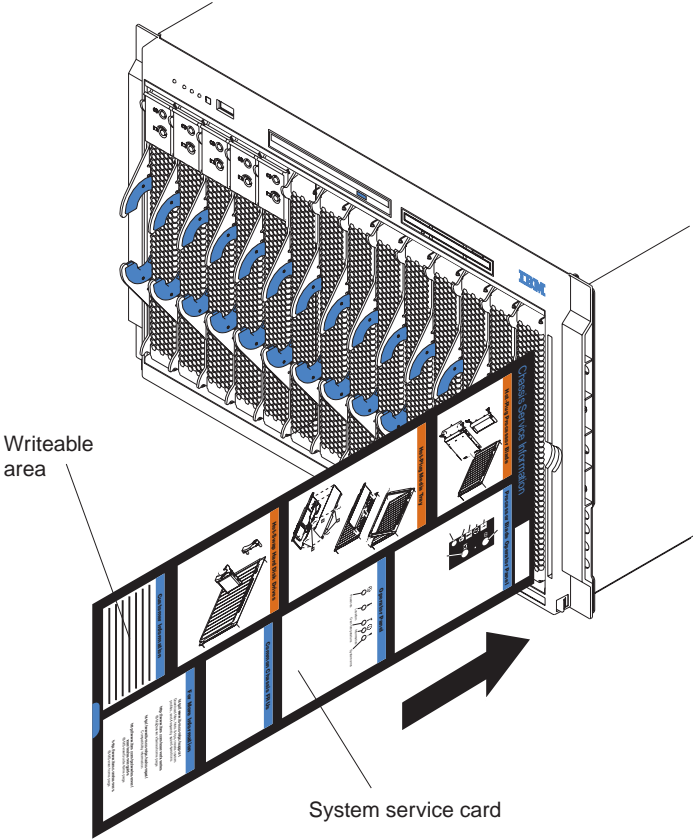
Rear view

This section identifies the components and indicators on the rear of your BladeCenter unit.
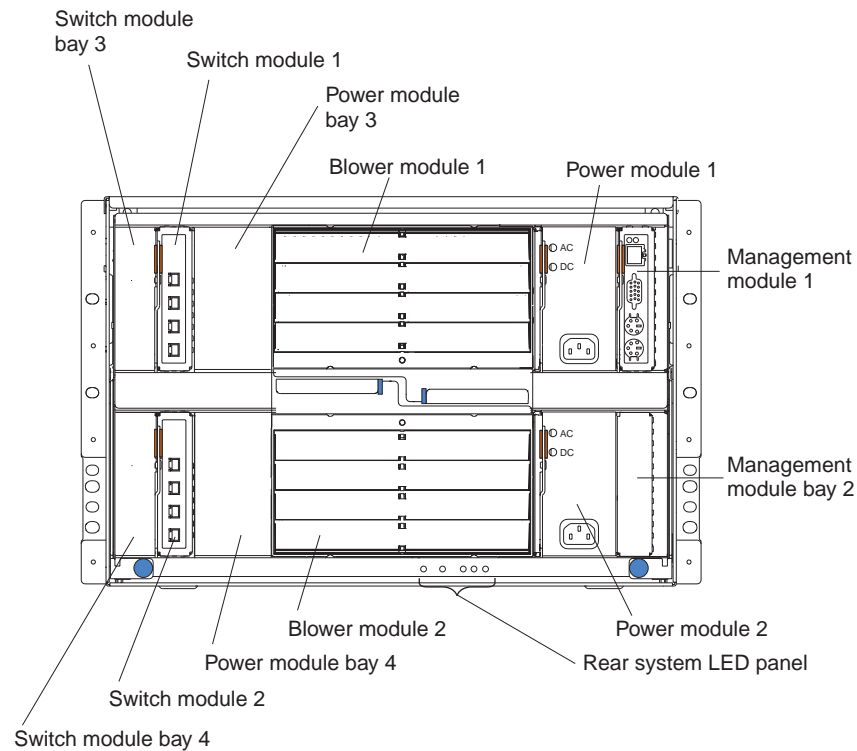
Rear system LED panel

The LEDs on this panel provide status information for your BladeCenter unit. These LEDs duplicate the LEDs in the front system LED panel. See "System LED panel" on page 38 for more information about these LEDs.

Blower module
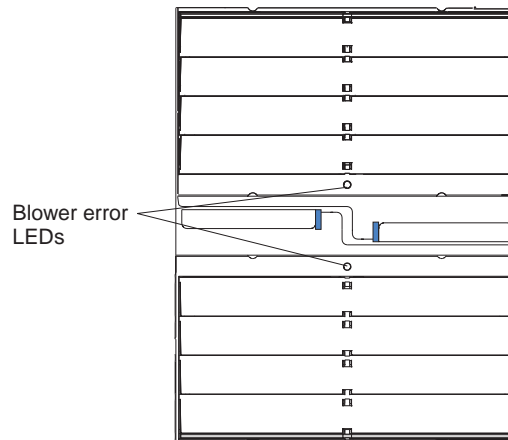
Blower LEDs: The LED on each blower provides status information about the blower. For additional information, see the "Light Path Diagnostics™" section in the BladeCenter *Hardware Maintenance Manual and Troubleshooting Guide* on the IBM *BladeCenter Documentation* CD.

- **Blower error:** This amber LED is lit and stays lit when an error has been detected in the blower. The system error LED on the BladeCenter system LED panels is also lit.

Switch module

See the documentation that comes with each switch module for a description of the LEDs on the switch module.

Power module
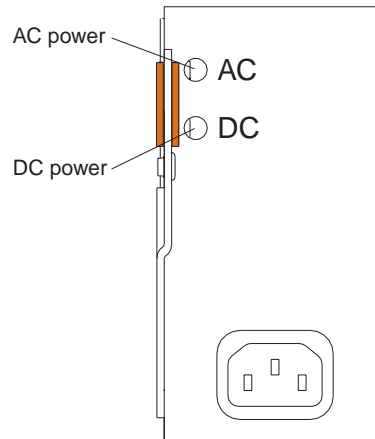
Power module LEDs: These green LEDs indicate the condition of the power module. For additional information, see the "Light Path Diagnostics" section in the BladeCenter *Hardware Maintenance Manual and Troubleshooting Guide* on the IBM *BladeCenter Documentation* CD.

- **AC power:** When this LED is lit, ac input to the power module is present and within specifications. During typical operation, both the ac and dc power LEDs are lit. For any other combination of LEDs, see the *Hardware Maintenance Manual and Troubleshooting Guide* on the IBM *BladeCenter Documentation* CD.

- **DC power:** When this LED is lit, the dc output from the power module to the other components and blade servers is present and within specifications. During typical operation, both the ac and dc power LEDs are lit. For any other combination of LEDs, see the *Hardware Maintenance Manual and Troubleshooting Guide* on the IBM *BladeCenter Documentation* CD.

Management module
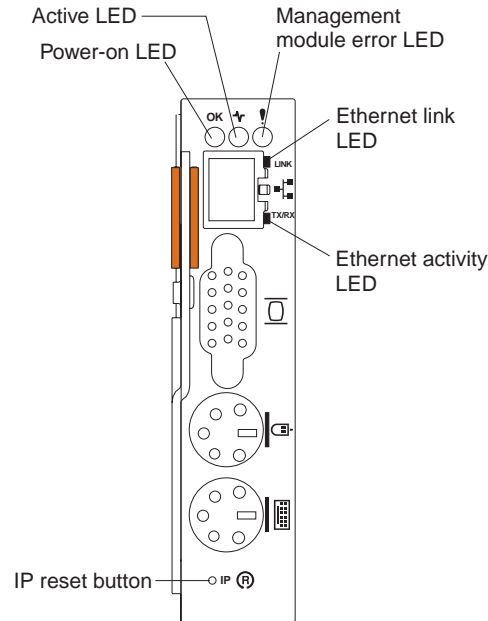
Management module LEDs: These LEDs provide status information about the management module and remote management connection. For additional information, see the "Light Path Diagnostics" section in the *Hardware Maintenance Manual and Troubleshooting Guide* on the IBM *BladeCenter Documentation* CD.

- **Power-on:** When this green LED is lit, the management module has power.
- **Active:** When this green LED is lit, it indicates that this management module is actively controlling the BladeCenter unit.
- **Management module error:** When this amber LED is lit, it indicates that an error has been detected somewhere on this management module. When this indicator is lit, the system error LED on each of the BladeCenter system LED panels is also lit.
- **Ethernet link:** When this green LED is lit, there is an active connection through the port to the network.
- **Ethernet activity:** When this green LED is flashing, it indicates that there is activity through the port over the network link.

Management module IP reset button: Do not press this button unless you intend to erase your configured IP addresses for the management module and lose connection with the remote management station, the switch modules, and the blade servers. If you press this button, you will need to reconfigure the management module settings (see the information beginning with "Setting up the remote connection" on page 41 for instructions).

Press this recessed button to reset the IP configuration of the management module network interfaces (Ethernet 1, Ethernet 2, gateway address, and so forth) to the factory defaults and then restart the management module.

Use a straightened paper clip to press the button.

A newly-installed (out-of-the-box) BladeCenter unit tries to locate a DHCP server on the network before it will default to the factory-configured static IP address in the management module. This is the initial configuration setting. When there is no

DHCP server on the network the BladeCenter unit is connected to, it takes two minutes before the management module uses the default (static) IP address.

When the DHCP search times out and the management module uses the static IP address, you can change the management module configuration so that it will not attempt to locate a DHCP server (**MM Control → Network Interfaces → External Network Interface → DHCP**, select **Static only**).

System LED panel

The following illustration shows the status LEDs on the system LED panels on the front and rear of the BladeCenter unit.
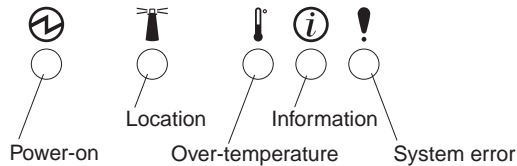
Attention: If the power-on LED is off, it does not mean there is no electrical current present in the BladeCenter unit. The LED might be burned out. To remove all electrical current from the BladeCenter unit, you must disconnect all power cords from all power modules.

Note: You can turn off the location LED and the information LED through the Web interface or the IBM Director console.

Power-on: When this green LED is lit, power is present in the BladeCenter unit. When this LED is off, the power subsystem, the ac power, or the LED has failed, or the management module is not present or not functioning.

Location: When this blue LED is lit or flashing, it has been turned on by the system administrator, to aid in visually locating the BladeCenter unit. If a blade server requires attention, the location LED on the blade server usually will also be lit. After the BladeCenter unit has been located, you can have the system administrator turn off the location LED.

Over-temperature: When this amber LED is lit, the temperature in the BladeCenter unit exceeds the temperature limits or a blade server reports an over-temperature condition. The BladeCenter unit might have already taken corrective action, such as increasing the blower speed. This LED turns off automatically when there is no longer an over-temperature condition.

Information: When this amber LED is lit, a noncritical event has occurred that requires attention, such as the wrong switch module inserted in a bay or power demands that exceed the capacity of power modules currently installed. The event is recorded in the event log. Check the LEDs on the BladeCenter unit and the blade servers to isolate the component (see the *Hardware Maintenance Manual and Troubleshooting Guide* on the IBM *BladeCenter Documentation* CD for instructions for viewing the event log and checking the LEDs). After the situation is handled, have the system administrator turn off the information LED.

System-error: When this amber LED is lit, it indicates that a system error has occurred, such as a failed module or a system error in a blade server. An LED on one of the components or on a blade server is also lit to further isolate the error. (For more information, see the *Hardware Maintenance Manual and Troubleshooting Guide* on the IBM *BladeCenter Documentation* CD.)

Chapter 4. Configuring your BladeCenter unit

The BladeCenter unit automatically detects the modules and blade servers that are installed and stores the vital product data (VPD) information. When the BladeCenter unit is started, it automatically configures the remote management port on the management module, so that you can configure and manage the BladeCenter unit and blade servers. You configure and manage the BladeCenter unit remotely, through the management module, using the Web-based user interface and the HTTP.

Note: You can also configure the switch modules directly through an external switch module port, using a Telnet interface or a Web browser. See the documentation that comes with the switch module for more information.

For the management module to communicate with the switch modules in the BladeCenter unit, you will need to configure the IP addresses for the following internal and external ports:

- The external Ethernet (remote management) port on the management module (see the information beginning on page 51 for instructions). The initial management module autoconfiguration enables the network management station to connect to the management module to configure the port completely and to configure the rest of the BladeCenter unit.
- The internal Ethernet port on the management module for communication with the switch modules (see the information beginning on page 51 for instructions).
- The management port on each switch module, for communication with the management module. You configure this port by configuring the IP address for the switch module (see the information beginning on page 50 for instructions).

   Note: The pass-thru module has no management port.

To communicate with the blade servers for functions such as deploying an operating system or application program, you also will need to configure at least one external (in-band) port on an Ethernet switch module. See "What to configure" on page 55 for information about configuring external ports on switch modules.

Note: If a pass-thru module is installed in switch-module bay 1 or 2 (instead of an Ethernet switch module), you will need to configure the network switch that the pass-thru module is connected to.

The management module supports the following Web browsers for remote access. The Web browser that you use must be Java-enabled, must support JavaScript 1.2 or later, and must have the Java 1.4 Plug-In installed.

- Microsoft Internet Explorer 4.0 (with Service Pack 1), or later
- Netscape Navigator 4.72, or later (version 6.0 is not supported)

Notes:

1. For best results when using the Web browser, set the monitor to 256 colors. Use only the video resolutions and refresh rates given in the following table. These are the only video resolution and refresh rate combinations that are supported for all system configurations.

Resolution	Refresh rate
640x480	60 Hz
640x480	72 Hz
640x480	75 Hz
640x480	85 Hz
800x600	60 Hz
800x600	72 Hz
800x600	75 Hz
800x600	85 Hz
1024x768	60 Hz
1024x768	75 Hz

2. The Web interface does not support the double-byte character set (DBCS) languages.

The Web-based user interface communicates with the management and configuration program that is part of the firmware that comes with the management module. You can use this program to perform tasks such as:

- Defining the login IDs and passwords
- Selecting recipients for alert notification of specific events
- Monitoring the status of the BladeCenter unit and blade servers
- Controlling the BladeCenter unit and blade servers
- Accessing the switch modules to configure them
- Changing the drive startup sequence in a blade server
- Setting the date and time
- Using a remote console for the blade servers
- Changing ownership of the keyboard, video, and mouse
- Changing ownership of the CD-ROM drive, diskette drive, and USB port. (The CD-ROM drive and diskette drive in the BladeCenter unit are viewed as USB devices by the blade server operating system.)

Note: The IBM Director program is a system-management product that comes with the BladeCenter unit. To configure the remote alert recipients for IBM Director over LAN, the remote alert recipient must be an IBM Director-enabled server.

You also can use the management and configuration program to view some of the blade server configuration settings. See "Using the management and configuration program" on page 44 for more information.

Setting up the remote connection

To configure and manage the BladeCenter unit and blade servers, you must first set up the remote connection through the external Ethernet port on the management module.

Cabling the Ethernet port

Complete the following steps to connect the Ethernet cable to the management module:

1. Connect one end of a Category 5 or higher Ethernet cable to the Ethernet port on the management module. 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 Ethernet LEDs.
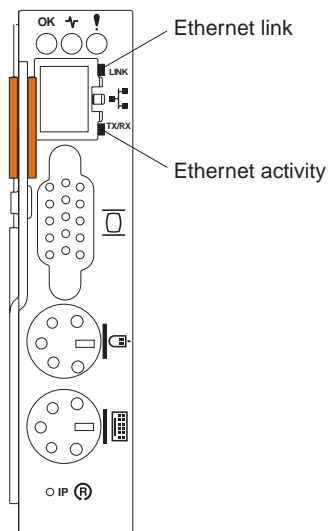
Ethernet link LED
>   When this green LED is lit, it indicates that there is an active connection through the port to the network.

Ethernet activity LED
>   When this green LED is flashing, it indicates that there is activity through the port over the network link.

Configuring the management module for remote access

After you connect the management module to the network, the Ethernet port connection is configured in one of the following ways:

- 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.

- If the DHCP server does not respond within 2 minutes after the port is connected, the management module uses the static IP address and subnet address.

Either of these actions enables the Ethernet connection.

If you do not want to use the default static values, you can configure the static IP address, host name, and subnet mask for the management module through the

Web interface. The default IP address is 192.168.70.125, the default subnet address is 255.255.255.0, and the default host name is MM*xxxxxxxxxxxx*, where *xxxxxxxxxxxx* is the burned-in medium access control (MAC) address. The MAC address is on a label on the management module, below the IP reset button.
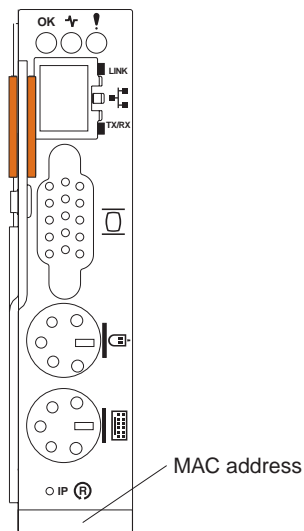
MAC address

Notes:

1. If the IP configuration is assigned by the DHCP server, the network administrator can use the MAC address of the management-module network interface to find out what IP address and host name are assigned.

2. Set your mobile computer to have an address with the same subnet as the management module; then, enter the address of the management module in your Web browser if you want to access the management module with a mobile computer.

Communicating with the IBM Director software

Notes:

1. See the illustration on page 58 for an example of a typical network configuration. See the *IBM @server BladeCenter Planning and Installation Guide* for more examples of network configurations. You can obtain the planning guide from http://www.ibm.com/pc/eserver/bladecenter/.

2. The IBM Director CD comes with the BladeCenter unit.

To communicate with the BladeCenter unit, the IBM Director software needs a managed object (in the Group Contents pane of the IBM Director Management Console main window) that represents the BladeCenter unit. If the BladeCenter management module IP address is known, the network administrator can create an IBM Director managed object for the unit. If the IP address is not known, the IBM Director software can automatically discover the BladeCenter unit (out-of-band, using the Ethernet port on the BladeCenter management module) and create a managed object for the unit.

For the IBM Director software to discover the BladeCenter unit, your network must initially provide connectivity from the IBM Director server to the BladeCenter management-module Ethernet port. To establish connectivity, the management module attempts to use DHCP to acquire its initial IP address for the Ethernet port.

If the DHCP request fails, the management module uses a static IP address. Therefore, the DHCP server (if used) must be on the management LAN for your BladeCenter unit.

Notes:

1. All management modules are preconfigured with the same static IP address. You can use the management-module Web interface to assign a new static IP address for each BladeCenter unit. If DHCP is not used and you do not assign a new static IP address for each BladeCenter unit before attempting to communicate with the IBM Director software, only one BladeCenter unit at a time can be added onto the network for discovery. Adding multiple units to the network without a unique IP address assignment for each BladeCenter unit results in IP address conflicts.

2. For switch communication with the IBM Director server through the management-module external Ethernet port, the switch module internal network interface and the management-module internal and external interfaces must be on the same subnet.

Configuring Wake on LAN in the BladeCenter unit

Complete the following steps to configure the Wake on LAN feature in the BladeCenter unit:

1. Write down the MAC addresses of the integrated Ethernet controllers of each blade server. This information can be found using the Configuration/Setup Utility program for each blade server (**Devices and I/O Ports → System MAC Addresses**). The blade server MAC addresses can also be found on a bar code label that is on the bottom of the blade server enclosure. There might also be a loose label that comes with the blade server that has the MAC addresses printed on it. The MAC addresses are needed to configure a remote system to start the blade servers using the Wake on LAN feature: the remote system issues the Wake on LAN command (magic packet) by broadcasting it to a MAC address.

2. Make sure that the Wake on LAN feature is enabled in the BladeCenter management module.

3. Make sure that the external ports of the Ethernet switch modules are enabled. If the external ports are not enabled, the BladeCenter unit will not be able to communicate with the external network.

Verifying your Wake on LAN configuration

Complete the following steps to verify that the Wake on LAN feature was properly configured and is functioning:

1. Start the blade server operating system.

2. Attempt to ping the remote computer that will issue the Wake on LAN command (magic packet). This verifies network connectivity.

3. Shut down the blade server, insert a DOS startable diskette into the diskette drive, and then restart the blade server.

4. When the A:\ prompt appears, turn off the blade server using the power-control button.

5. Issue the Wake on LAN command (magic packet) from the remote computer.

   If the Wake on LAN feature was properly configured and is functioning, the single blade server will wake up. This is a good procedure to determine whether it is a single blade or BladeCenter configuration problem, or a device driver problem within the operating system.

Linux-specific configuration

Complete the following steps when configuring the Wake on LAN feature under Linux (Red Hat or SuSE):

1. Type the following command:

   `insmod bcm5700.o enable_wol=1,1`

   Where the `1,1` in the switch `enable_wol=1,1` instructs the device driver to enable the Wake on LAN feature for both Broadcom controllers on board a single blade. Because there are two Broadcom controllers, you must issue a `1` for each of them.

2. Recompile the device driver for your Linux image. For example, a device driver compiled in Red Hat Linux is not guaranteed to function for SuSE Linux. See the documentation that comes with your operating system for information about compiling device drivers.

   To compile the Broadcom device drivers successfully in Red Hat Linux, a default installation is not sufficient because all files needed to compile successfully are not included. A custom installation of Red Hat Linux, in which the packages for software and kernel development are chosen, will include the files required for successful compilation of the device drivers.

Using the management and configuration program

This section provides the instructions for using the management and configuration program in the management module.

Starting the management and configuration program

Complete the following steps to start the management and configuration program:

1. Open a Web browser. In the address or URL field, type the IP address or host name defined for the management module remote connection (see "Configuring the management module for remote access" on page 41 for more details).

   The Enter Network Password window opens.

2. Type your user name and password. If you are logging in to the management module for the first time, you can obtain your user name and password from your system administrator. All login attempts are documented in the event log.

   Note: The initial user ID and password for the management module are:
   - User ID: USERID (all capital letters)
   - Password: PASSW0RD (note the zero, not O, in PASSW0RD)

3. Follow the instructions that appear on the screen. Be sure to set the timeout value you want for your Web session.

The monitor attached to the BladeCenter management module normally shows the video output from the blade server that is the current owner of the keyboard, video, and mouse (KVM). When there is no actively selected video from any blade server, the video from blade server 14 is routed to the management module. While the management module is restarting, there is temporarily no current KVM owner. The video from blade server 14 displays on the monitor briefly until the management module uses its NVRAM values to reestablish ownership of the KVM and media tray (CD-ROM drive, diskette drive, and USB port). After that, the video from the blade server that is the current KVM owner is displayed on the monitor.

The BladeCenter management and configuration window opens.

IBM. BladeCenter Management Module @server

Bay 1: SN#xxxxx

Warnings and System Events
• System Running Nonredundant Power

The following links can be used to view the status of different components.

Blade Servers
Switch and Concentrator Modules
Management Modules
Power Modules
Blowers
Front Panel

- Monitors
  - System Status
    Event Log
    LEDs
    Hardware VPD
    Firmware VPD
- Blade Tasks
    Power/Restart
    Remote Control
    Firmware Update
    Configuration
- Switch Tasks
    Power/Restart
    Management
- MM Control
    General Settings
    Login Profiles
    Alerts
    Network Interfaces
    Network Protocols
    Security
    Configuration File

Blade Servers ❷

Click the icons in the Status column for details about individual blade servers.

Bay	Status	Name	Pwr	Owner** KVM	Owner** MT*	Network	WOL*	Local Control Pwr	Local Control KVM	Local Control MT*	BSE*
1		No blade present									
2	●	SN#J1P4A296152	On	X		Eth	On	X	X	X	
3	●	SN#J1P4A28Y19B	Off			Eth	On	X	X	X	
4	●	SN#J1P4A28Y199	Off		X	Eth	On	X	X	X	

Note: The upper left corner of the management and configuration window shows the location and identity of the active management module.

IBM. BladeCente

Bay 1: SN#

Monitors
System Status

System St
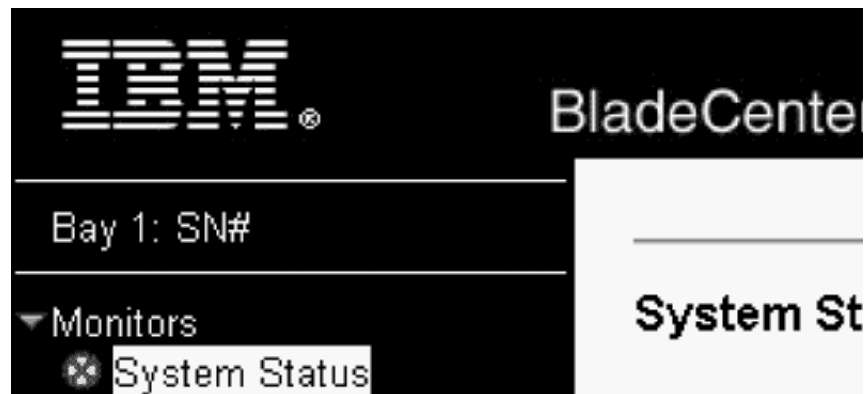
Management and configuration program options

From the management and configuration program main menu, you can select settings that you want to view or change.

The navigation pane (on the left side of the management module window) contains navigational links that you use to manage your BladeCenter unit and check the status of the components (modules and blade servers). Descriptions of the links are as follows:

Monitors
Use the choices in this section to view the status, settings, and other information for components in the BladeCenter unit.

System status
Select this choice to view the overall system status, a list of outstanding events that require immediate attention, and the overall status of each of the blade servers and switch modules.

Blades:

- **Bay** - The lowest-number bay the blade server occupies.
- **Status** - An icon that indicates good, warning, or bad status for the blade server. Click the icon for more detailed status information.
- **Name** - The name of the blade server.
- **Pwr** - The power state (on or off) of the blade server.
- **Owner** - An indication of whether the blade server is the current owner of the following BladeCenter resources:
  - **KVM** - Keyboard, video, and mouse.
  - **MT** - The CD-ROM drive, diskette drive, and USB port.
- **Network** - An indication of which network interfaces are on the blade server (Ethernet or Fibre Channel).
- **WOL** - An indication of whether the Wake on LAN feature is currently enabled for the blade server. The Wake on LAN feature is enabled by default in blade server BIOS code and cannot be disabled. The BladeCenter management module provides a single point of control for the Wake on LAN feature, enabling the settings to be controlled for either the entire BladeCenter unit or a single blade server. Wake on LAN settings made in the management module override the settings in the blade server BIOS code.
- **Local Control** - An indication of whether the following options are enabled:
  - Local power control
  - Local keyboard, video, and mouse switching
  - Local CD-ROM drive, diskette drive, and USB port switching
- **BSE** - An indication of whether a SCSI expansion unit occupies the blade bay.

Switch and concentrator modules:

- **Bay** - The number of the bay the switch module occupies.
- **Status** - An icon that indicates good, warning, or bad status for the switch module.
- **Type** - The type of switch module in the bay, such as Ethernet, Fibre Channel, or pass-thru.
- **MAC Address** - The medium access control (MAC) address of the switch module.

  Note: A pass-thru module has no MAC address nor IP address.
- **IP Address** - The IP address of the switch module.
- **Pwr** - The power state (on or off) of the switch module.
- **Details** - Text information about the status of the switch module.

Management module:

- **Bay** - The number of the bay that the management module occupies.
- **Status** - An icon that indicates good, warning, or critical status for the management module. Click the icon for more detailed status information.

- **IP Address** - The IP address of the remote connection (external Ethernet port) on the management module.
- **Primary** - An indication of which management module is the primary, or active, management module.

Power Modules:
- **Bay** - The number of the bay that the power module occupies.
- **Status** - An icon that indicates good, warning, or critical status for the power module.
- **Details** - Text information about the status of the power module.

Blowers:
- **Bay** - The number of the bay that the blower module occupies.
- **Status** - An icon that indicates good, warning, or critical status for the blower module.
- **Speed** - The current speed of the blower module, as a percentage of the maximum revolutions per minute (RPMs). The blower speed varies with the thermal load. An entry of `Offline` indicates that the blower is not functioning.

Front panel: The temperature status for the front of the BladeCenter unit.

Event log

Select this choice to view entries that are currently stored in the management module event log. This log includes entries for events that are detected by the blade servers. The log displays the most recent entries first. Information about all remote access attempts is recorded in the event log, and the management module sends out the applicable alerts if configured to do so.

The maximum capacity of the event log is 750 entries. When the log is 75 percent full, the BladeCenter Information LEDs light. When the log is full, new entries overwrite the oldest entries, and the BladeCenter Error LEDs light.

You can sort and filter entries in the event log.

LEDs Select this choice to view the state of the BladeCenter system LED panel and blade server control panel LEDs. You also can use this choice to turn off the information LED and turn on, turn off, or blink the location LED on the BladeCenter unit and the blade servers.

- **Front Panel LEDs** - The state of the following LEDs on the BladeCenter system LED panel. You can change the state of the information and location LEDs.
  – System error
  – Information
  – Over temperature
  – Location
- **Blade Server LEDs** - The state of the following LEDs on the blade server control panel. You can change the state of the information and location LEDs.
  – Power
  – Error

- Information
- Keyboard, video, and monitor select
- Media (CD-ROM, diskette drive, USB port) select
- Location

Hardware VPD

Select this choice to view the hardware vital product data (VPD) for the BladeCenter unit. When the BladeCenter unit is started, the management module collects the vital product data and stores it in nonvolatile memory. The management module then modifies the stored VPD as components are added to or removed from the BladeCenter unit. You can also view the log of modules inserted or removed from the BladeCenter unit.

Firmware VPD

Select this choice to view the vital product data (VPD) for the firmware in all blade servers, the switch modules, and the management modules in the BladeCenter unit. The firmware VPD identifies the firmware type, build ID, release date, and revision number. The VPD for the firmware in the management modules includes the file name of the firmware components. (Selecting this choice takes up to 4 minutes to refresh and display information.)

Blade tasks

Select the choices in this section to view and change the settings or configurations of blade servers in the BladeCenter unit.

Power/restart

Select this choice to perform the following actions on any blade server in the BladeCenter unit:

- Turn on or turn off the selected blade server (set the power state on or off).
- Enable or disable local power control. When local power control is enabled, a local user can turn on or turn off the blade server by pressing the power-control button on the blade server.
- Enable or disable the Wake on LAN feature.
- Restart the blade server or the service processor in the blade server.

Select the blade servers you want to perform an action on; then, click the appropriate link below the table for the action you want to perform.

Remote control

Select this choice to:

- View the current owners of the keyboard, monitor, and mouse (KVM), and of the CD-ROM drive, diskette drive, and USB port (Media tray).
- View the details of any remote control session currently active (user ID, client IP address, start time).
- Redirect a blade server console to the remote console. On the remote console, you can:
  - Disable local switching of the KVM and of the media tray for all blade servers until they are explicitly enabled again. This prevents a local user from switching the console display to a different blade server while you are performing tasks.

– Change the owner of the KVM and of the media tray.

– View the current blade server display.

– Control the blade server as if you were at the local console, including restarting the blade server and viewing the POST process, with full keyboard and mouse control.

Notes:

1. Only one remote control session is allowed at a time. If a remote control session is already active, you can end the current session and start a new one.

2. The timeout value for a remote control session is the same as the timeout value that you set for the Web session when you logged in.

3. When you redirect a blade server Linux X Window System session console to the remote console, the ability of the remote console applet to accurately track the location of the mouse cursor depends on the configuration of the X Window system. Complete the following procedure to configure the X Window System for accurate mouse tracking. Type the commands through the remote console or at the keyboard attached to the BladeCenter unit. Note that the changes require root privileges.

   a. Enter the following commands:

      `init 3` (Switch to text mode if necessary)

      `rmmod mousedev` (Unload the mouse device driver)

   b. Add the following statement to .xinitrc in the user's home directory:

      `xset m 1 1` (Turn off mouse acceleration)

   c. Add the following statement to /etc/modules.conf:

      `options mousedev xres=`x` yres=`y`   (Notify the mouse device driver of the video resolution) where x and y specify the video resolution

   d. Enter the following commands:

      `insmod mousedev` (Reload the mouse device driver)

      `init 5` (Return to GUI mode if necessary)

Firmware update

Select this choice to update the service processor firmware on a blade server. Select the target blade server and the firmware file to use for the update; then, click **Update**. You can obtain the firmware files from the IBM Support Web site at http://www.ibm.com/pc/support/.

Configuration

Select this choice to:

• Define a name for a blade server.

• Enable or disable the following items on all blade servers in the BladeCenter unit:

   – Local power control

   – Local KVM control

   – Local media tray control

   – The Wake on LAN feature

- View or define the startup (boot) sequence for one or more blade servers. The startup sequence prioritizes the following boot-record sources for a blade server:
  - IDE drive 1 (HDD1)
  - IDE drive 2 (HDD2)
  - CD-ROM
  - Diskette
  - Network
    - **PXE** - Attempt a PXE/DHCP network startup the next time the selected blade server is turned on or restarted.

  Note: To use the CD-ROM drive or diskette drive as a boot-record source for a blade server, the blade server must have been designated as the owner of the CD-ROM drive, diskette drive, and USB port. You set ownership either by pressing the CD/diskette/USB select button on the blade server or through the **Remote Control** choice described on page 48.

Switch Tasks

Select the choices in this section to view and change the settings or configuration on network-interface switch modules in the BladeCenter unit.

Note: Some choices do not apply to, and are not available for, pass-thru modules.

Power/Restart

Select this choice to display the power status of the switch modules and perform the following actions:
- Turn a switch on or off
- Reset a switch

Management

Select this choice to view or change the IP configuration of the Ethernet or Fibre Channel switch modules, ping a switch module, return a switch module to the default configuration, and start the configuration and management firmware that is in the switch module.

Note: The initial user ID and password for the switch module firmware are:
- User ID: USERID (all capital letters)
- Password: PASSW0RD (note the zero, not O, in PASSW0RD)

See "Configuring a switch module" on page 55 for more information about basic configuration of Ethernet switch modules in switch-module bays 1 and 2.

See the documentation that comes with the switch module for details about the configuration and management firmware for the switch module. Documentation for the Ethernet switch module is on the IBM *BladeCenter Documentation* CD.

MM Control

Select the choices in this section to view and change the settings or configuration on the management module whose Web interface you are logged into. This includes configuring the following items:
* The name of the management module
* Up to 12 login profiles for logging in to the management module
* How alerts are handled
* The management module Ethernet connections for remote console and for communicating with the switch modules
* Settings for the SNMP, SMTP, and DNS protocols
* Settings for secure socket layer (SSL) security

This also includes performing the following tasks:
* Backing up and restoring the management-module configuration
* Updating the management-module firmware
* Restoring the default configuration
* Restarting the management module
* Switching from the current active management module to the redundant management module

General Settings

Select this choice to view or change the following settings:
* The name of the management module
* The name of the contact person responsible for the module
* The physical location of the management module
* The real-time clock settings in the management module

Login Profiles

Select this choice to configure up to 12 login profiles for logging in to the management module, and to specify the lockout period after five unsuccessful login attempts. For each profile, specify the following values:
* Login ID
* Authority level (default is Read Only)
* Password (requires confirmation)

Attention: If you change the default login profile on your management module, be sure to keep a record of your login ID and password in a safe place. If you forget the management-module login ID and password, you must replace the management module.

Alerts Select this choice to specify which alerts (from lists of Critical, Warning, and System alerts) are monitored, which alert notifications are sent to whom, how alert notifications are sent (SNMP, e-mail, IBM Director), whether to include the event log with the notification, and other alert parameters.

Network Interfaces

Select this choice to configure the two Ethernet interfaces: external (remote management and console), and internal (communication with the switch modules).

Notes:

1. When you use the management module Web interface to update the Ethernet or Fibre Channel switch module configuration, the management module firmware writes its

settings for the switch module only to the management module NVRAM; it does not write its settings for the switch module to the switch module NVRAM.

If the switch module restarts when the management module is not able to apply the IP address it has in NVRAM for the switch module, the switch module will use whatever IP address it has in its own NVRAM. If the two IP addresses are not the same, you might not be able to manage the Ethernet switch module any more.

The management module cannot apply the switch IP address from its NVRAM if:

- The management module is restarting
- The management module has failed
- The management module has been removed from the chassis

You must use the Telnet interface to log into the switch module, change the IP address to match the one you assigned through the management module, and save the switch settings in the Telnet session (**Basic Setup → Save Changes**).

2. For switch communication with a remote management station, such as the IBM Director server, through the management module external Ethernet port, the switch module internal network interface and the management module internal and external interfaces must be on the same subnet.

- **External Network Interface (eth0)** - This is the interface for the remote management and console port.
  - **Interface** - Select **Enabled** (the default) to use the Ethernet connection.
  - **DHCP** - Select one of the following choices:
    - **DHCP with rollover to static** (this is the default).
    - **DHCP only**
    - **Static only**
  - **Hostname** - (Optional) This is the IP host name you want to use for the management module (maximum of 63 characters).
  - **Static IP configuration** - You need to configure this information only if DHCP is disabled.
    - **IP address** - The IP address for the management module. The IP address must contain four integers from 0 to 255, separated by periods, with no spaces or consecutive periods. The default setting is 192.168.70.125.
    - **Subnet mask** - The subnet mask must contain four integers from 0 to 255, separated by periods, with no spaces. The default setting is 255.255.255.0
    - **Gateway address** - The IP address for your network gateway router. The gateway address must contain four integers from 0 to 255, separated by periods, with no spaces.
- **Internal Network Interface (eth1)** - This interface communicates with the network-interface switch modules, such as Ethernet or Fibre Channel.

- Specify the IP address to use for this interface. The subnet mask must be the same as the subnet mask in the external network interface (eth0).
- View the data rate, duplex mode, maximum transmission unit (MTU), locally-administered MAC address, and burned-in MAC address for this interface. You can configure the locally-administered MAC address; the other fields are read-only.

Network Protocols

Select this choice to view or change the settings for the SNMP, SMTP, and DNS protocols.

Security

Select this choice to view or change the secure socket layer (SSL) settings. You can enable or disable (the default) SSL, and choose between self-signed certificates and certificates provided by a certificate authority (CA).

> **Note:** The first time you select **Security**, you are directed to an IBM Web page for downloading the SSL installation key. After you load the key, the **Security** choice functions as described.

Configuration File

Select this choice to back up or restore the management-module configuration file.

Firmware Update

Select this choice to update the management-module firmware; if a second management module is installed, you can choose to apply the firmware update only to the active management module. Click **Browse** to locate the firmware file you want; then, click **Update**.

You can obtain the firmware files from the IBM Support Web site at http://www.ibm.com/pc/support/.

Restore Defaults

Select this choice to restore the factory default configuration of the management module.

Restart MM

Select this choice to restart (reset) the management module. If a second management module is present, select this choice to change to the redundant management module.

Saving and restoring the configuration file

After you have configured the management module, you can save the configuration file to a diskette or other external media. Then, if the configuration in the management module becomes damaged or the management module is replaced, you can restore the saved configuration file to the management module. Use the management-module Web interface to save and restore the configuration file (**MM Control** → **Configuration File**).

> **Note:** If you cannot communicate with a replacement management module through the Web interface or the IBM Director programs, the IP address might be different from the IP address of the management module just removed. Press the IP reset button to set the management module to the factory default IP addresses; then, access the management module using the

factory IP address (see "Configuring the management module for remote access" on page 41 for the factory IP addresses) and configure the management module or load the saved configuration file.

Using IBM Director

The IBM Director program is a system-management product that comes with the BladeCenter unit. Through the remote connection on the management module, you can use the IBM Director software at the IBM Director console to configure the BladeCenter unit, modify the configuration, and set up more advanced features.

Notes:

1. Some tasks, such as software distribution, require an in-band connection from the Director server through a campus (public) LAN to a switch module port.

2. See the IBM Support Web site at http://www.ibm.com/pc/support/ for the version of IBM Director software that you can use to manage redundant management modules.

The IBM Director software includes the IBM BladeCenter Deployment Wizard.

About the wizard

The BladeCenter Deployment Wizard is integrated into the IBM Director management software. The wizard walks you through initial startup and configuration of one or more BladeCenter units.

In addition to performing initial configuration on BladeCenter units, you can use the built-in IBM Director tasks in the wizard to modify the configuration and to set up more advanced features.

You can also create a reusable profile in the wizard for configuring or reconfiguring BladeCenter units. The profile is a noninteractive script that can run as scheduled or as part of an Event Action Plan. With this feature you can define policies to reconfigure a BladeCenter unit on demand, responding to hardware failures or other IBM Director events.

Specifically, you can use the BladeCenter Deployment wizard to perform the following tasks:

- Perform all initial network configuration, including configuring IP addresses for the management module and the switch module internal configuration ports.
- Set up the initial security profile for the BladeCenter unit, including user names, passwords, enablement or disablement of management services, and so forth.
- Optionally configure external switch module ports for multi-port link aggregation (trunking).

Starting the wizard

Start the wizard from the IBM Director Management Console on the Director server.

1. Select one or more BladeCenter units from the middle (contents) pane of the console window.

    Note: A lock icon beside a newly discovered BladeCenter unit indicates that the Director server cannot log into the management module for that BladeCenter unit, which can mean that the management module has not been configured yet. You might want to select that BladeCenter unit for initial configuration through the wizard.

2. Perform either of the following actions:
   - Right-click the selected BladeCenter units (managed objects).
   - Drag the wizard task from the right-most pane (under BladeCenter in the task list) to any of the selected BladeCenter units (managed objects).

   The wizard starts, and guides you through the login and configuration tasks needed.

The following illustration shows the main window on the BladeCenter Deployment wizard.
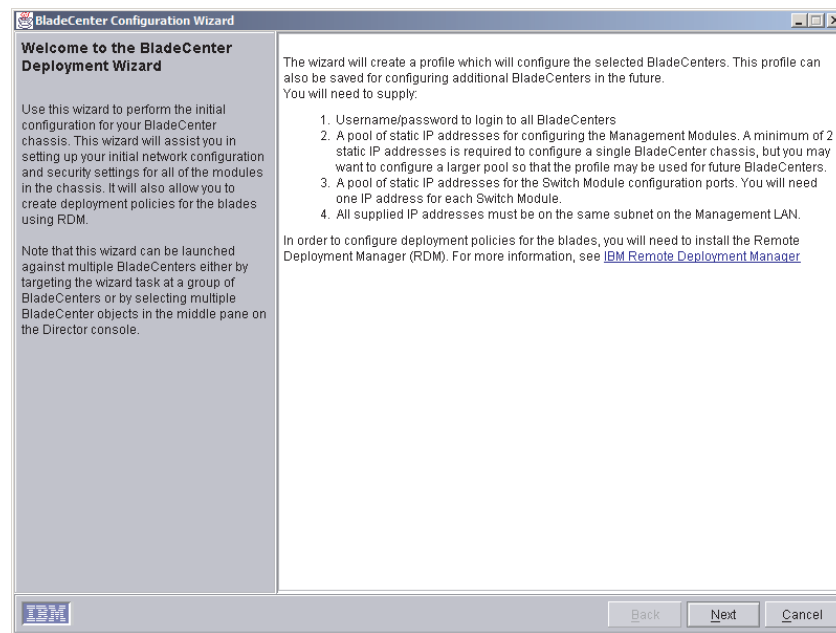
Using Remote Deployment Manager Version 4.1 or later

You can use the Remote Deployment Manager (RDM) Version 4.1 (or later) program to install a supported Microsoft Windows operating system or a BIOS update onto a blade server. Follow the instructions in the documentation that comes with the RDM program to log into the BladeCenter system and install a supported Microsoft Windows operating system or BIOS update.

Go to the following Web site for updated information about the RDM program and to download the software:
http://www.pc.ibm.com/ww/eserver/xseries/systems_management/index.html/

Configuring a switch module

To connect any of the blade servers to the network, you must have an Ethernet switch module installed in switch-module bay 1 or 2, or a pass-thru module in switch-module bay 1 or 2 connected to an external Ethernet switch. See "Switch modules" on page 16 for information about the location and purpose of each switch module.

What to configure

You need to configure the switch IP addresses and subnet mask through the management module Web interface in order to have switch communication with the

management module and remote management station (IBM Director server and console, for example). This is in addition to the IP addresses configured in the management module. You might also need to use the firmware in the switch module to configure the switch external ports to operate in the correct link aggregation (trunking) mode, or to configure any VLANs or other special conditions.

Note: To access the firmware in the switch module, make sure the following configuration items in the management module are set to **Enabled**:

- Switch module external ports
- External management for the external ports

In the management module Web interface, click **Switch Tasks → Management → Advanced Switch Management → Advanced Setup** and enable the items.

Because all blade servers in the BladeCenter chassis share access to the external LAN through the switch ports, you can configure the ports on a switch module to operate together as an aggregate link, or trunk. An aggregate link provides more bandwidth than a single link to the attached LAN.

Notes:

1. The attaching LAN switch must have a compatible multi-port trunk configuration.
2. Configure link aggregation before you attach cables between the external ports and your LAN equipment.

You configure the switch through the firmware on the switch module, which you can access through the Web interface to the management module (click **Switch Tasks → Management** in the navigation panel).

Note: You can also access the firmware on the switch module directly through an external switch module port, using a Telnet interface or a Web browser and the switch IP address. See the documentation that comes with the switch module for more information.

You can configure the IP addresses, subnet mask, and protocols through the IBM BladeCenter Deployment Wizard, which is a function of the IBM Director product. You can also configure external switch module ports for multi-port link aggregation through the Wizard.

Important: For a remote management station, such as the IBM Director server, to communicate with the switch modules in the BladeCenter unit, the switch modules must be on the same subnet as the management module.

Supporting Ethernet failover

To have the BladeCenter unit support Ethernet failover on the blade servers, set up the BladeCenter unit and blade servers as follows:

- Configure the Ethernet controllers in one or more blade servers for failover (see the blade server documentation and the operating-system documentation for information).

  Note: When failover occurs on a blade server, the secondary Ethernet controller takes over network communication, using the switch module associated with that controller.

- Install a pair of Ethernet switch modules in switch-module bays 1 and 2.

- Configure the Ethernet switch modules and your network infrastructure so that they can direct traffic to the same destinations.

## Configuring the Ethernet controllers in the blade servers

> **Note:** The BladeCenter unit does not include an Ethernet switch module; this is an optional feature that must be purchased separately. An Ethernet switch module or a pass-thru module that connects to an external Ethernet switch must be installed in the BladeCenter unit in switch-module bay 1 or 2, or both, before the Ethernet controllers integrated on each blade server system board can be used.

The Ethernet controllers are integrated on each blade server system board. The Ethernet controllers provide 1000-Mbps full-duplex capability only, which enables simultaneous transmission and reception of data to the external ports on the Ethernet switches. You do not need to set any jumpers or configure the controller for the blade server operating system. However, you must install a device driver in the blade server to enable the blade server operating system to address the Ethernet controller. For blade server device drivers and information about configuring the Ethernet controllers, see the *Broadcom NetXtreme Ethernet Software* CD that comes with the BladeCenter unit.

BladeCenter networking guidelines

Your networking administrator should assist in the configuration of the network infrastructure prior to connecting the BladeCenter unit to the LAN switch or similar network device. This section provides additional guidelines that might be useful in setting up your system.

A BladeCenter chassis with two Ethernet switch modules and one management module has the following internal configuration:
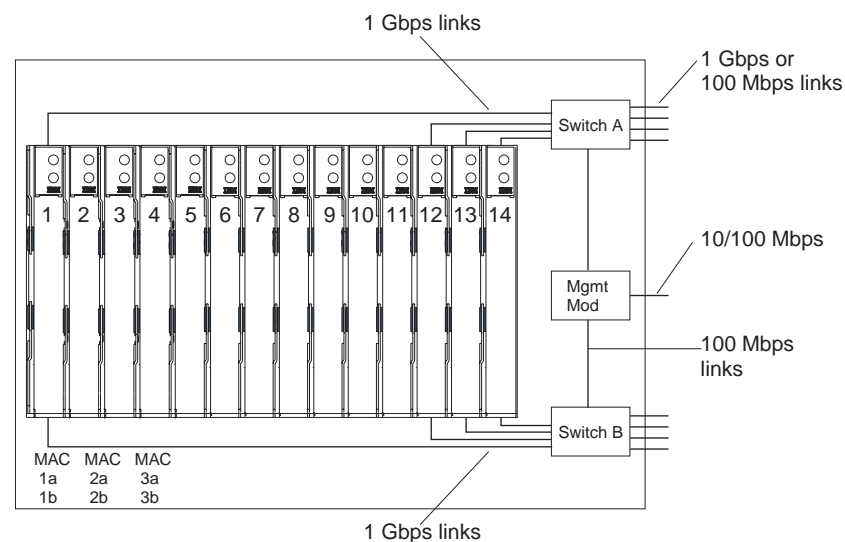

Note: 2nd switch module is optional

Each blade server has two independent Ethernet controllers, each with its own MAC address and a dedicated 1000-Mbps link to one of the switch modules (Controller 1 to Switch A and Controller 2 to Switch B in this diagram). In this

configuration (the default), the blade servers share access to four external ports on each switch. There is no internal data path between the two switches within the BladeCenter chassis; an external network device is required for data packets to flow from one internal switch to the other.

The management module has a separate internal 100-Mbps link to each switch. These links are for internal management and control only. No data packets are allowed to flow from application programs on the blade servers to the management module over this path. A separate, nonswitched path (not shown) is used for communication between the management module and a service processor on each blade server.

A typical, preferred BladeCenter network topology is shown in the following illustration. See the *IBM @server BladeCenter Planning and Installation Guide* for more information and other topologies and guidelines.
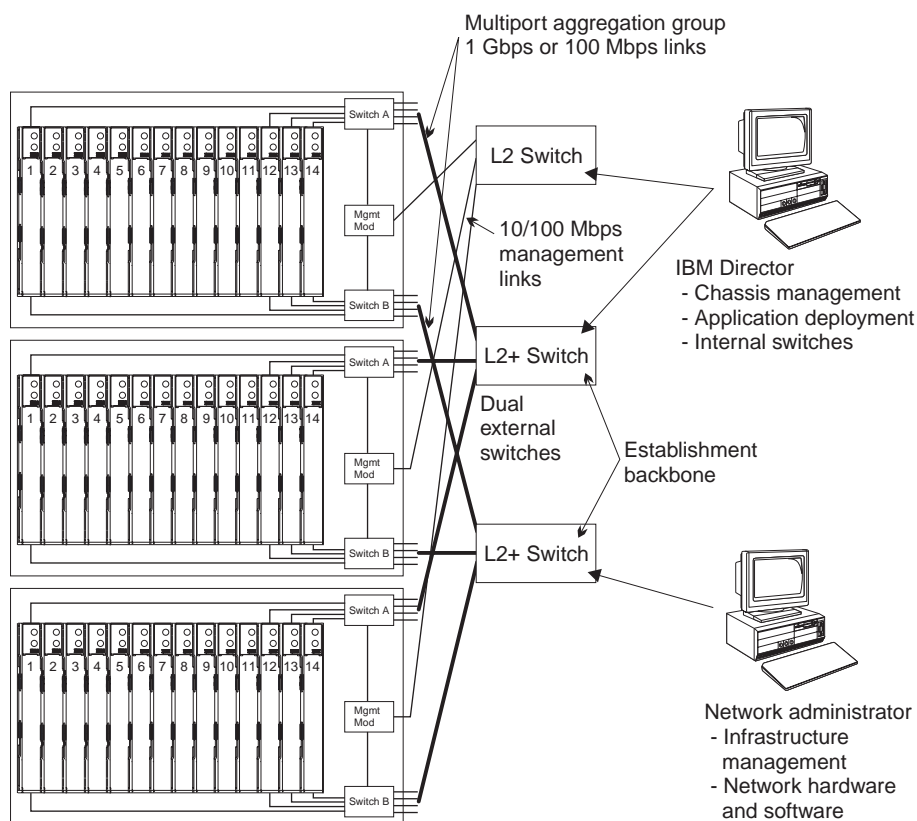
In this configuration, each BladeCenter unit contains two Ethernet switch modules and one management module. The external ports on the switch modules are configured for multi-port link aggregation groups, or trunks, as are the corresponding ports on the attaching external LAN switches. Additionally, every port in the switch module in switch-module bay 1 (switch A in this illustration) in the BladeCenter units is connected to the same external LAN switch and every port in the switch module in switch-module bay 2 (switch B in this illustration) in the BladeCenter units is connected to the second external LAN switch.

Observe the following guidelines when creating this topology:
1. The external ports on the BladeCenter switch modules are designed for point-to-point, full-duplex operation to a compatible LAN switch or router. Configure a corresponding multi-port link aggregation group, or trunk, in both

the switch module and the attaching LAN switch prior to installing the cables. The connection options are as follows, in order of preference:

- Multi-port Link Aggregation Group or Trunk, 1 Gbps (1000 Mbps) per port
- Single-uplink port, 1 Gbps
- Multi-port Link Aggregation Group or Trunk, 100 Mbps per port

2. Connect the management module 10/100 Mbps Ethernet port to a separate Layer 2 network if possible, for the best security. If a separate network is not available, you can attach the Ethernet ports of the management module and switch modules to the same Layer 2 network.

3. Avoid network configurations that could lead to data loops, if possible. Loops will be created if you connect multiple ports from the same switch module to the same Layer 2 network device without first enabling link aggregation. If you implement configurations that include data loops, it is essential that you enable Spanning Tree Protocol on the switch module external ports.

Chapter 5. Sharing resources among the blade servers

Your @server BladeCenter Type 8677 unit provides resources that are available to all blade servers at all times, such as power modules, cooling, system management, and network switches; no user intervention is required. Some resources are selectable for use by a single blade server at a time, such as the CD-ROM drive, diskette drive, and USB port unit (media tray), or the keyboard-video-mouse unit. There are several ways to select resources for a blade server:

- Each blade server has two selection buttons on the front of the blade: CD and ▯◯▯.

  - To switch the keyboard, video, and mouse to a specific blade server, press the ▯◯▯ button on that blade server.
  - To switch the CD-ROM, diskette drive, and USB port to a specific blade server, press the CD button on that blade server.

  The management module immediately assigns the resource to the blade server requesting it.

- You can use the management module Web interface to change ownership of the keyboard, video, and mouse, or the CD-ROM drive, diskette drive, and USB port (**Blade tasks➔ Remote control**).
- You can press keyboard keys in the following sequence to switch KVM control between blade servers:

      NumLock NumLock *blade_server_number* Enter

  Where *blade_server_number* is the two-digit number for the blade bay in which the blade server is installed. When using some keyboards, such as the 28L3644 (37L0888) keyboard, you will need to hold down the Shift key while entering this key sequence.

Notes:
1. It can take up to 20 seconds for the operating system in the switched-to blade server to recognize the CD-ROM drive, diskette drive, and USB port, or the keyboard, video, and mouse.
2. If you install Microsoft Windows 2000 on a blade server while it is not the current owner of the keyboard, video, and mouse, the first time the blade server requests ownership after the operating system has been installed, it can take up to 1 minute for the operating system to recognize the devices (this is a one-time-only occurrance).
3. The operating system in the blade server must provide USB support for the blade server to recognize and use the keyboard, mouse, CD-ROM drive, and diskette drive. The BladeCenter unit uses USB for internal communication with these devices.
4. You can use the management-module Web interface to enable or disable the select buttons (**Blade tasks➔ Remote control**) on the blade servers.

Attention: Do not switch the CD-ROM drive, diskette drive, and USB port to another blade server while a transaction is taking place on either the CD-ROM or the diskette drive. (Activity lights on the CD-ROM drive and diskette drive must be off.) Data damage can occur.

Chapter 6. Solving problems

This section provides basic troubleshooting information to help you solve some common problems that might occur while setting up your BladeCenter unit.

If you cannot locate and correct the problem using the information in this section, see the *Hardware Maintenance Manual and Troubleshooting Guide* on the IBM *BladeCenter Documentation* CD for more information.

Diagnostic tools overview

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

- **Troubleshooting charts**

  These charts list problem symptoms and steps to correct the problems. See the "Troubleshooting charts" on page 64 for more information.

- **Diagnostic programs and error messages**

  The built-in self-test (BIST) program checks the BladeCenter unit during startup and generates error messages if problems are found.

  The system diagnostic program, Real Time Diagnostics Version 1.3, tests the major components of your BladeCenter unit. It is run from the IBM Director Management Console window (under the **BladeCenter** task in the Task panel).

  Complete the following steps to obtain the Real Time Diagnostics program:

  1. Go to http://www.ibm.com/pc/support/.
  2. Select **Servers** from the list on the left side of the window.
  3. Select **Downloadable files** from the list on the left side of the window.
  4. In the **Downloadable files by category** list, select **Diagnostic**.
  5. Click the entry for Real Time Diagnostics and follow the instructions on that page.

- **Light Path Diagnostics feature**

  Use the Light Path Diagnostics feature to identify system errors quickly. On the BladeCenter unit, the Light Path Diagnostics feature consists of the LEDs on the front and rear of the BladeCenter chassis and on the front of the modules and blade servers.

Troubleshooting charts

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

Note: The symptoms for monitor, keyboard, and mouse apply only to the devices connected to the management module; they do not apply to the remote console.

See the *Hardware Maintenance Manual and Troubleshooting Guide* on the IBM *BladeCenter Documentation* CD for more detailed information about testing the BladeCenter unit. If you have run the diagnostic test programs or if running the tests does not reveal the problem, call for service.

Attention: If diagnostic error messages appear that are not listed in the *Hardware Maintenance Manual and Troubleshooting Guide*, make sure that your BladeCenter unit has the latest level of firmware code installed.

If you have just added a new option and your system is not working, complete the following procedure before using the troubleshooting charts:

1. Remove the option that you just added.
2. Run the diagnostic tests to determine if your system is running correctly.
3. Reinstall the new device.

Monitor problems

Note: The monitor screen remains blank until directed to a blade server that is turned on; this is normal behavior.

Some IBM monitors have their own self-tests. If you suspect a problem with your monitor, see the information that comes with the monitor for instructions for testing and adjusting the monitor. If you cannot diagnose the problem, call for service.

Device	Suggested action
The monitor screen goes blank when you direct it to a working blade server or goes blank when you start some application programs in the blade servers.	Make sure that the monitor cable is connected to the video connector on the BladeCenter management module and that the management module LEDs indicate that the module is functioning. Some IBM monitors have their own self-tests. If you suspect a problem with your monitor, see the information that comes with the monitor for adjusting and testing instructions. If you cannot diagnose the problem, try replacing the management module. If the problem remains, replace the monitor.
The screen is blank.	Make sure that: • The BladeCenter unit power cord is connected to a BladeCenter power module and a working 220-volt PDU. • The monitor cables are connected correctly. • The monitor is turned on and the brightness and contrast controls are adjusted correctly. • The monitor is owned by a blade server that is turned on. If the problem remains, call for service.
Only the cursor appears.	Try switching the monitor to another blade server. • If the problem goes away, troubleshoot the blade sever for which only the cursor appears. • If the problem remains, call for service.

Device	Suggested action
The monitor has screen jitter, or the screen image is wavy, unreadable, rolling, or distorted.	If the monitor self-tests show the monitor is working correctly, consider the location of the monitor. Magnetic fields around other devices (such as transformers, appliances, fluorescent lights, and other monitors) can cause screen jitter or wavy, unreadable, rolling, or distorted screen images. If this happens, turn off the monitor. (Moving a color monitor while it is turned on might cause screen discoloration.) Then move the device and the monitor at least 305 mm (12 in.) apart. Turn on the monitor.
	Notes:
	1. To prevent diskette drive read/write errors, make sure that the distance between the monitor and diskette drive is at least 76 mm (3 in.).
	2. Non-IBM monitor cables might cause unpredictable problems.
	3. An enhanced monitor cable with additional shielding is available for the 9521 and 9527 monitors. For information about the enhanced monitor cable, contact your IBM marketing representative or authorized reseller.
	If the problem remains, call for service.
All other symptoms	Troubleshoot the blade server that is the current owner of the keyboard, video, and monitor.

Power problems

Device	Suggested action
The BladeCenter unit does not start.	• Make sure that the power cables are properly connected to the power modules in the BladeCenter unit. • Make sure that the 220-volt PDU or electrical outlet is working correctly. • Make sure that the LEDs on the power module are on. • If you just installed an option, remove it, and restart the BladeCenter unit. If the BladeCenter unit now starts, you might have installed more options than the power module supports. If the problem remains, call for service.

Management module problems

Device	Suggested action
Management module does not complete changeover to redundant module on hardware failure.	Call for service.

Options problems

Device	Suggested action
An IBM option that was just installed does not work.	Make sure that: • The option is designed for the BladeCenter unit. See the "Server Support" flowchart on the inside of the front cover for information about obtaining ServerProven® compatibility information from the World Wide Web. • You followed the installation instructions that come with the option. • The option is installed correctly. • You have not loosened any other installed options or cables. If the problem remains, call for service.

Device	Suggested action
An IBM option that used to work does not work now.	• Make sure that all of the option hardware and cable connections are secure. • If the option comes with test instructions, use those instructions to test the option. If the problem remains, call for service.

Light Path Diagnostics feature

On the BladeCenter system, the Light Path Diagnostics feature consists of the LEDs on the front and rear of the BladeCenter chassis and on the front of the modules and blade servers. If the system-error LED on the system LED panel on the front or rear of the BladeCenter unit is lit, one or more error LEDs on the BladeCenter components also might be on. These LEDs help identify the cause of the problem.

Identifying problems using the Light Path Diagnostics feature

This section provides the information to identify, using the Light Path Diagnostics feature, problems that might arise during installation.

To locate the actual component that caused the error, you must locate the lit error LED on that component.

The following example illustrates how to use the Light Path Diagnostics feature to diagnose a system error:

1. Note that the BladeCenter system-error LED is lit on the system LED panel.
2. Locate the module or blade server that also has an error LED lit (see "BladeCenter components, controls, and LEDs" on page 33 for the location of error LEDs; see the documentation that comes with your blade server for the location of error LEDs on the blade server).
   a. If the component is a module, replace the module.
   b. If the component is a blade server with its system error LED lit, follow the instructions in the documentation that comes with the blade server to isolate and correct the problem.

Light Path Diagnostics LEDs

The system-error LED on the system LED panel is lit when certain system errors occur. If the system-error LED on your BladeCenter unit is lit, use the following table to help determine the cause of the error and the action you should take.

Table 3. Light Path Diagnostics

Lit LED	Cause	Action
BladeCenter system LED panel		
Location	A condition has occurred in the BladeCenter unit that has caused the remote system management to identify the BladeCenter unit as needing attention.	Look for any information or error LEDs on the system LED panels, the modules, and the blade servers in this BladeCenter unit, and follow the instructions in this table for those LEDs.
Over-temperature	The system temperature has exceeded a threshold level.	• Determine whether a blower module has failed. If it has, replace the blower module as soon as possible, to regain redundancy. • Make sure that the room temperature is not too high. (See "Features and specifications" on page 6 for temperature information.) • Determine whether a blade server has a temperature LED lit. If it does, see the documentation that comes with the blade server. • Make sure that there is a blade server, module, or filler installed in each bay. If the problem remains, call for service.
Information	A noncritical event has occurred that should be looked at, such as the wrong switch module inserted in a bay, or power needs that exceed the capacity of power modules currently installed.	Check the error log for the messages. Check the LEDs on the BladeCenter unit and the blade servers to isolate the component.
System error	A critical system error has occurred, such as nonredundancy on the power modules or a system error in a blade.	• Check the error log for messages. • Look for an error LED on the modules and blade servers to locate the component: – If the error LED is on a module, follow the instructions for the module in this table. – If the error LED is on a blade server, see the documentation that comes with the blade server.
Management module		
System error	A critical error has occurred in the management module.	• If your BladeCenter unit has only one management module: 1. Try reseating the management module. 2. Restart the management module. If the problem remains, replace the management module. • If your BladeCenter unit has two management modules, the BladeCenter unit continues to function using the redundant module. Replace the failed management module.

Table 3. Light Path Diagnostics (continued)

Lit LED	Cause	Action
Power module		
System error	A critical error has occurred in the power module.	Reseat the power module. If the problem remains, replace the module. If your BladeCenter unit has a redundant module for this power module, the BladeCenter unit continues to function using the redundant module.
Blower module		
System error	The blower has failed or is operating too slowly.	Reseat the blower module. If the problem remains, replace the blower module as soon as possible, to regain cooling redundancy. The BladeCenter unit continues to function. The redundant blower module provides cooling to the BladeCenter unit and blade servers.
Switch module		
System error	A critical error has occurred in the switch module.	Reseat the switch module. If the problem remains, replace the module.

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

Getting help and information from the World Wide Web

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

69

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 @server BladeCenter units, 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 B. 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 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 - @server BladeCenter Type 8677

Country or region	Warranty period	Service delivery method
Worldwide	Parts - 3 years Labor - 3 years	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 @server BladeCenter, 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

71

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 @server 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 @server BladeCenter, 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 XXXXXXX.
- Identification of software problem sources.
- Installation of customer replaceable units (CRUs).
- Installation and configuration of BIOS code, firmware, or device drivers that are designated as customer installable.

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

Please have the following information ready when you call:
- The machine type and model of your IBM hardware product (if available)
- Serial numbers of your IBM hardware products
- A description of the problem
- The exact wording of any error messages
- Hardware and software configuration information

International Warranty Service

If you travel with your @server 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 C. Notices

This publication was developed for products and services offered in the U.S.A.

IBM may not offer the products, services, or features discussed in this document in other countries. Consult your local IBM representative for information on the products and services currently available in your area. Any reference to an IBM product, program, or service is not intended to state or imply that only that IBM product, program, or service may be used. Any functionally equivalent product, program, or service that does not infringe any IBM intellectual property right may be used instead. However, it is the user's responsibility to evaluate and verify the operation of any non-IBM product, program, or service.

IBM may have patents or pending patent applications covering subject matter described in this document. The furnishing of this document does not give you any license to these patents. You can send license inquiries, in writing, to:

> IBM Director of Licensing
> IBM Corporation
> North Castle Drive
> Armonk, NY 10504-1785
> U.S.A.

INTERNATIONAL BUSINESS MACHINES CORPORATION PROVIDES THIS PUBLICATION "AS IS" WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF NON-INFRINGEMENT, MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. Some jurisdictions do not allow disclaimer of express or implied warranties in certain transactions, therefore, this statement may not apply to you.

This information could include technical inaccuracies or typographical errors. Changes are periodically made to the information herein; these changes will be incorporated in new editions of the publication. IBM may make improvements and/or changes in the product(s) and/or the program(s) described in this publication at any time without notice.

Any references in this publication to non-IBM Web sites are provided for convenience only and do not in any manner serve as an endorsement of those Web sites. The materials at those Web sites are not part of the materials for this IBM product, and use of those Web sites is at your own risk.

IBM may use or distribute any of the information you supply in any way it believes appropriate without incurring any obligation to you.

Edition notice

Trademarks

The following terms are trademarks of International Business Machines Corporation in the United States, other countries, or both:

Active Memory	Predictive Failure Analysis
Active PCI	PS/2
Active PCI-X	ServeRAID
Alert on LAN	ServerGuide
BladeCenter	ServerProven
C2T Interconnect	TechConnect
Chipkill	Tivoli
EtherJet	Tivoli Enterprise
e-business logo	Update Connector
FlashCopy	Wake on LAN
IBM	XA-32
IntelliStation	XA-64
Light Path Diagnostics	X-Architecture
NetBAY	XceL4
Netfinity	XpandOnDemand
NetView	xSeries
OS/2 WARP	

Lotus, Lotus Notes, SmartSuite, and Domino are trademarks of Lotus Development Corporation and/or IBM Corporation in the United States, other countries, or both.

ActionMedia, LANDesk, MMX, Pentium, and ProShare are trademarks of Intel Corporation in the United States, other countries, or both.

Microsoft, Windows, and Windows NT are trademarks of Microsoft Corporation in the United States, other countries, or both.

UNIX is a registered trademark of The Open Group in the United States and other countries.

Java and all Java-based trademarks and logos are trademarks or registered trademarks of Sun Microsystems, Inc. in the United States, other countries, or both.

Linux is a registered trademark of Linus Torvalds.

Other company, product, or service names may be trademarks or service marks of others.

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.

IBM makes no representation or warranties regarding non-IBM products and services that are ServerProven, including but not limited to the implied warranties of merchantability and fitness for a particular purpose. These products are offered and warranted solely by third parties.

IBM makes no representations or warranties with respect to non-IBM products. Support (if any) for the non-IBM products is provided by the third party, not IBM.

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

Electronic emission notices

Federal Communications Commission (FCC) statement

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

Properly shielded and grounded cables and connectors must be used in order to meet FCC emission limits. 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

声　　明
此为 A 级产品。在生活环境中，
该产品可能会造成无线电干扰。
在这种情况下，可能需要用户对其
干扰采取切实可行的措施。

Japanese Voluntary Control Council for Interference (VCCI) statement

この装置は、情報処理装置等電波障害自主規制協議会（ＶＣＣＩ）の基準に
基づくクラスＡ情報技術装置です。この装置を家庭環境で使用すると電波妨害を
引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求
されることがあります。

Power cords

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

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

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

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

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

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

IBM power cord part number	Used in these countries and regions
13F9940	Argentina, Australia, China (PRC), New Zealand, Papua New Guinea, Paraguay, Uruguay, Western Samoa

IBM power cord part number	Used in these countries and regions
13F9979	Afghanistan, Algeria, Andorra, Angola, Austria, Belgium, Benin, Bulgaria, Burkina Faso, Burundi, Cameroon, Central African Rep., Chad, China (Macau S.A.R.), Czech Republic, Egypt, Finland, France, French Guiana, Germany, Greece, Guinea, Hungary, Iceland, Indonesia, Iran, Ivory Coast, Jordan, Lebanon, Luxembourg, Malagasy, Mali, Martinique, Mauritania, Mauritius, Monaco, Morocco, Mozambique, Netherlands, New Caledonia, Niger, Norway, Poland, Portugal, Romania, Senegal, Slovakia, Spain, Sudan, Sweden, Syria, Togo, Tunisia, Turkey, former USSR, Vietnam, former Yugoslavia, Zaire, Zimbabwe
13F9997	Denmark
14F0015	Bangladesh, Burma, Pakistan, South Africa, Sri Lanka
14F0033	Antigua, Bahrain, Brunei, Channel Islands, China (Hong Kong S.A.R.), Cyprus, Dubai, Fiji, Ghana, India, Iraq, Ireland, Kenya, Kuwait, Malawi, Malaysia, Malta, Nepal, Nigeria, Polynesia, Qatar, Sierra Leone, Singapore, Tanzania, Uganda, United Kingdom, Yemen, Zambia
14F0051	Liechtenstein, Switzerland
14F0069	Chile, Ethiopia, Italy, Libya, Somalia
14F0087	Israel
1838574	Thailand
6952301	Bahamas, Barbados, Bermuda, Bolivia, Brazil, Canada, Cayman Islands, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Guatemala, Guyana, Haiti, Honduras, Jamaica, Japan, Korea (South), Liberia, Mexico, Netherlands Antilles, Nicaragua, Panama, Peru, Philippines, Saudi Arabia, Suriname, Taiwan, Trinidad (West Indies), United States of America, Venezuela

Index

A
ac power LED   36
acoustic attenuation module
   about   21
   installing   22
   removing   23
acoustical noise emissions   6
activity LED
   CD-ROM drive   33
   diskette drive   33
availability features   9

B
blower error LED   36
blower module   18
Broadcom NetXtreme Software CD   57

C
cabling
   remote connection Ethernet port   41
   switch module connectors   29
CD-ROM drive
   activity LED   33
   eject button   33
   specifications   6
Class A electronic emission notice   85
components
   location of   10
   major   10
configuration file
   restoring   53
   saving   53
Configuration/Setup Utility program   44
configuring
   BladeCenter unit   39
   Ethernet controllers   57
connector
   Ethernet
      remote management and console   28
   input/output   27
   keyboard   28
   PS/2 mouse   28
   remote management   28
   Universal Serial Bus   33
   video   27
controls   33
cooling   6

D
dc power LED
   power module   36
diagnostic tools   63
difficulty communicating with replacement module   53

diskette
diskette
   eject button   33
diskette drive
   activity LED   33
   specifications   6

E
eject button
   CD   33
   diskette   33
electrical input   6
electronic emission Class A notice   85
environment   6
error log.
   See event log
Ethernet
   configuring   57
   configuring remote connection   41
   integrated on blade server system board   57
   port, cabling   41
Ethernet connector, remote management and
  console   28
Ethernet failover, supporting   56
Ethernet-link status LED   41
   management module   37
event log   47
event log in alerts   51
event log, viewing   47

F
failover   56
failover, Ethernet   56
FCC Class A notice   85
features
   BladeCenter unit   6
   reliability, availability, and serviceability   9
   server   7

H
handling
   static-sensitive devices   14
hardware problems   63
heat output   6

I
information LED
   BladeCenter   38
information LED, system LED panel   38
installing
   blade   23
   in a rack   13
   module   18
   options   13

IBM®

Part Number: 59P6578

Printed in U.S.A.