



BladeCenter H

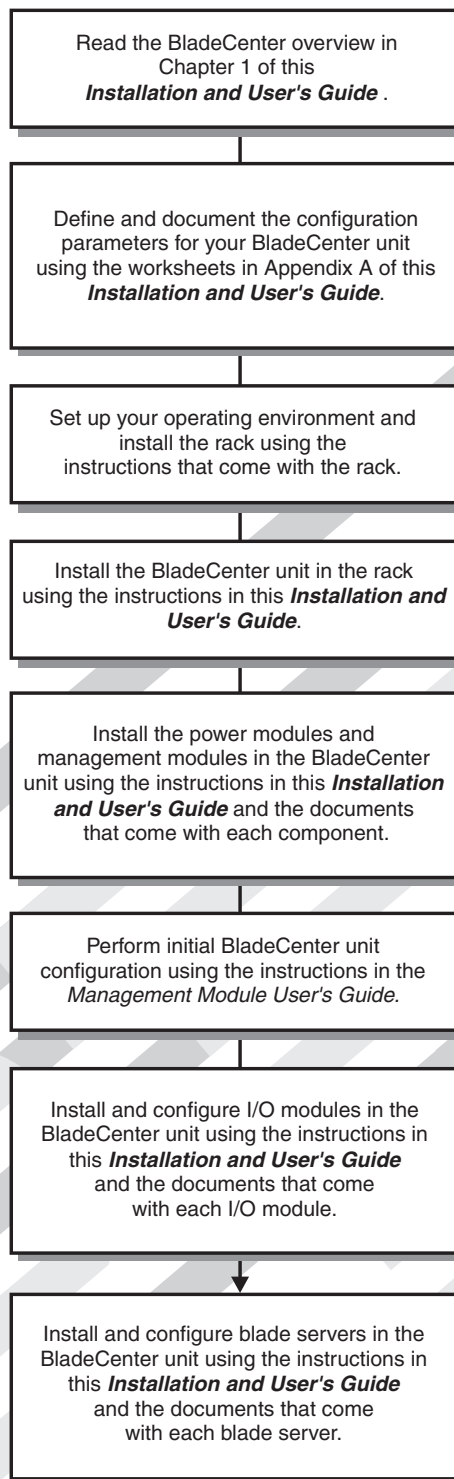
Types 8852, 7989, and 1886

Installation and User's Guide

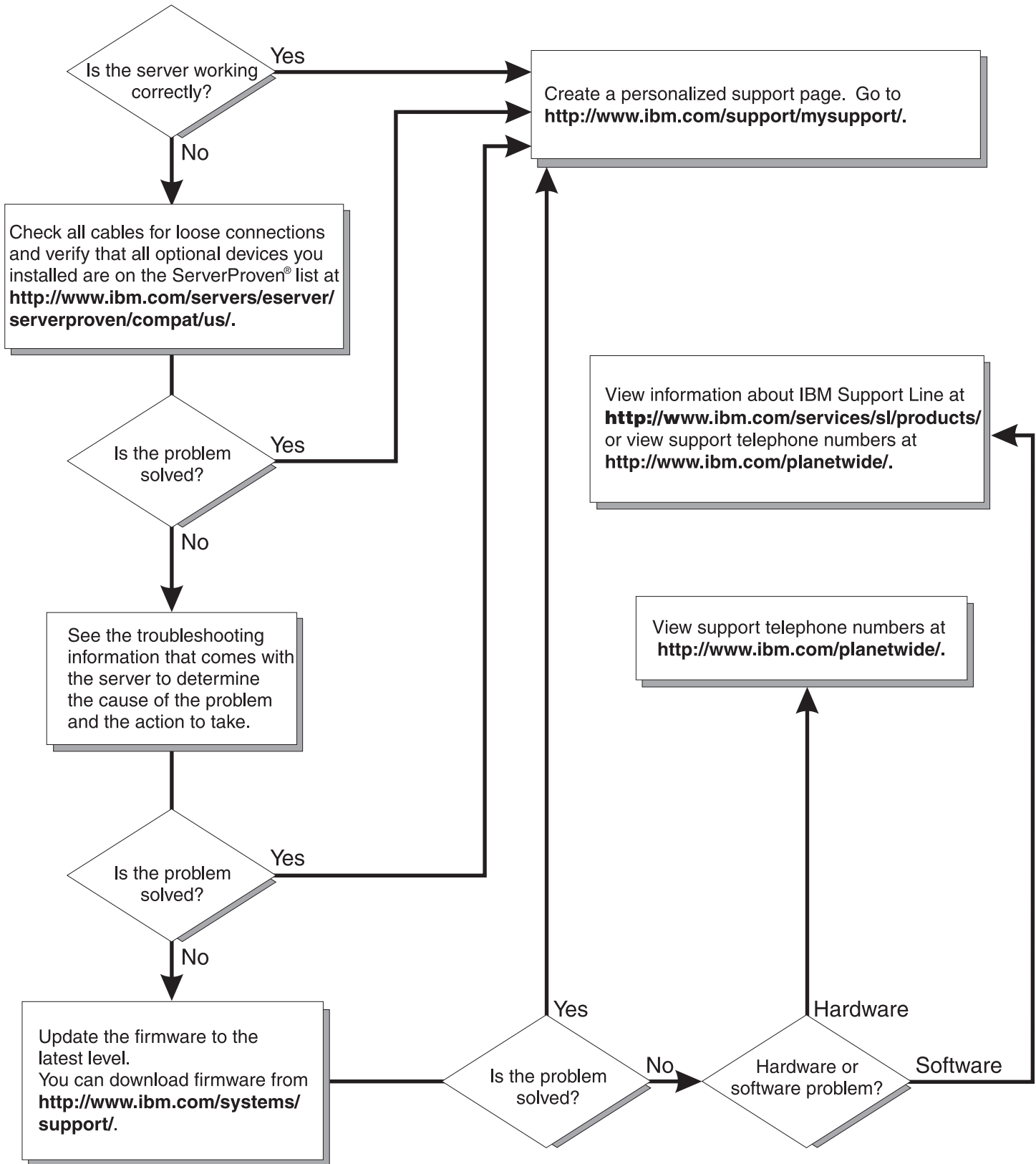
Welcome.

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

For additional information about your BladeCenter device view the publications on the Documentation CD. You can also find the most current information about BladeCenter devices at <http://www.ibm.com/support/>.



Server Support



BladeCenter H Type 8852, 7989, and 1886



Installation and User's Guide

Note:

Before using this information and the product it supports, read the general information in Appendix B, "Getting help and technical assistance," on page 51 and Appendix C, "Notices," on page 53.

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Safety

Before installing this product, read the Safety Information.

قبل تركيب هذا المنتج، يجب قراءة الملاحظات الأمنية

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

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

安裝本產品之前，請先閱讀「安全資訊」。

Prije instalacije ovog produkta obavezno pročitajte Sigurnosne Upute.

Před instalací tohoto produktu si přečtěte příručku bezpečnostních instrukcí.

Læs sikkerhedsforskrifterne, før du installerer dette produkt.

Lees voordat u dit product installeert eerst de veiligheidsvoorschriften.

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

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

Vor der Installation dieses Produkts die Sicherheitshinweise lesen.

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

לפני שתתקינו מוצר זה, קראו את הוראות הבטיחות.

A termék telepítése előtt olvassa el a Biztonsági előírásokat!

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

製品の設置の前に、安全情報をお読みください。

본 제품을 설치하기 전에 안전 정보를 읽으십시오.

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

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

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

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

Перед установкой продукта прочтите инструкции по технике безопасности.

Pred inštaláciou tohto zariadenia si pečítajte Bezpečnostné predpisy.

Pred namestitvijo tega proizvoda preberite Varnostne informacije.

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

Läs säkerhetsinformationen innan du installerar den här produkten.

Important:

Each caution and danger statement in this document is labeled with a number. This number is used to cross reference an English-language caution or danger statement with translated versions of the caution or danger statement in the *Safety Information* document.

For example, if a caution statement is labeled "Statement 1", translations for that caution are in the *Safety Information* document under "Statement 1".

Be sure to read all caution and danger statements in this document before you perform the procedures. Read any additional safety information that comes with the server or optional device before you install the device.

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:

1. Turn everything OFF.
2. First, attach all cables to devices.
3. Attach signal cables to connectors.
4. Attach power cords to outlet.
5. Turn device ON.

To Disconnect:

1. Turn everything OFF.
2. First, remove power cords from outlet.
3. Remove signal cables from connectors.
4. Remove all cables from devices.

Statement 2:



CAUTION:

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

Do not:

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

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

Statement 3:



CAUTION:

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

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



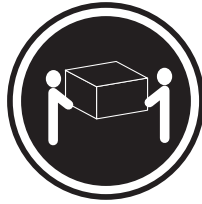
DANGER

Some laser products contain an embedded Class 3A or Class 3B laser diode. Note the following.

Laser radiation when open. Do not stare into the beam, do not view directly with optical instruments, and avoid direct exposure to the beam.

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

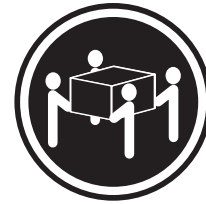
Statement 4:



≥ 18 kg (39.7 lb)



≥ 32 kg (70.5 lb)



≥ 55 kg (121.2 lb)

CAUTION:

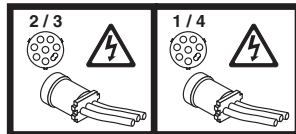
Use safe practices when lifting.

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.



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

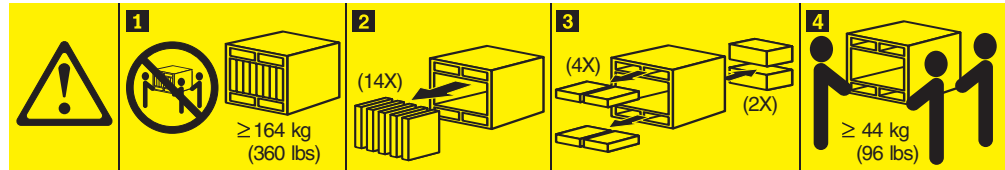
Overloading a branch circuit is potentially a fire hazard and a shock hazard under certain conditions. To avoid these hazards, ensure that your system electrical requirements do not exceed branch circuit protection requirements. Refer to the information that is provided with your device for electrical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

United Kingdom - 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.

Chapter 1. Introduction

The IBM® BladeCenter® Type 8852, 7989, and 1886 unit is a high-density, high-performance rack-mounted server system. The BladeCenter unit provides 14 bays for blade servers and other BladeCenter devices, integrating common resources that are shared by the blade servers. The use of common resources provides a small server-system footprint that contains high-performing servers with minimal cabling. The BladeCenter unit has the following features:

- Hot-swap that enable you to add, remove, or replace blade servers, management modules, I/O modules, power modules, or blower modules without removing power from the BladeCenter unit.
- A midplane that connects all BladeCenter components.
- A management module that functions as a system-management processor. There are two management module bays.
- Power modules that provide redundant power for all BladeCenter components. There are four power modules that operate in redundant pairs. Each pair provides power to selected BladeCenter components.
- Blowers that provide cooling for most BladeCenter components. There are two blower modules.
- There are three fans attached to each power module that provide cooling for the power modules and other components.
- Ten input/output (I/O) module bays that support external network interface connections to network resources and other devices.
- A media tray that contains an optical drive and two Universal Serial Bus (USB) ports that can be used by any blade server.

Note: The optical drive is an option on some BladeCenter units.

This *Installation and User's Guide* provides information about the following tasks:

- Defining and recording your BladeCenter network configuration information
- Installing and cabling the BladeCenter unit
- Installing basic BladeCenter unit optional devices:
 - Management modules
 - I/O modules
 - Power modules
 - Blower modules
 - Blade servers
- Performing basic troubleshooting of the BladeCenter unit

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

You can obtain up-to-date information about your BladeCenter Type 8852, 7989, and 1886 unit and other IBM server products at <http://www.ibm.com/bladecenter/>.

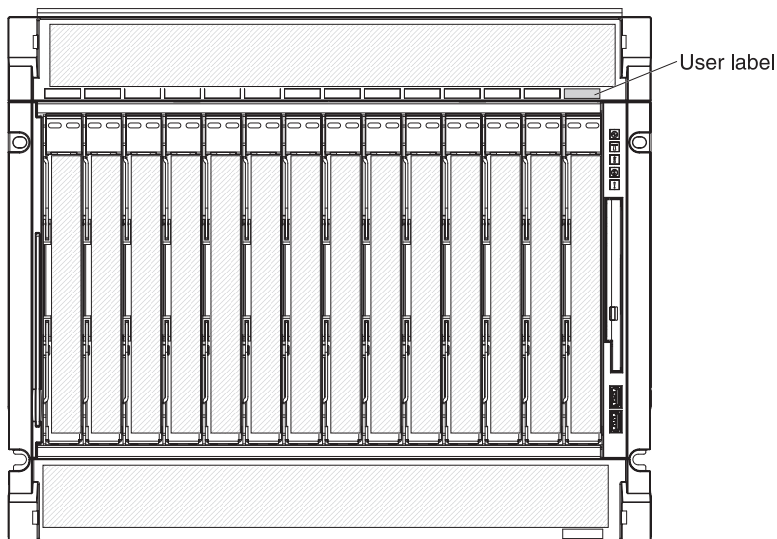
Locating and recording BladeCenter unit information

Record information about your BladeCenter unit in the following table. You will need this information for future reference.

Product name	BladeCenter H
Machine type	8852 7989 1886
Model number	_____
Serial number	_____

The serial number and model number are on labels on the top, front, and rear of the chassis.

A set of blank labels comes with each blade server. Record identifying information on a label and place it on the BladeCenter unit top bezel, just above the blade server. Do not place the label on the blade server itself or in any way block the ventilation holes on the blade server.



Features and specifications

The following table provides a summary of the features and specifications of the BladeCenter unit. Depending on the model, some features might not be available, or some specifications might not apply.

Media tray (on front): <ul style="list-style-type: none">• Optical drive (optional)• Two USB v2.0 ports• Front system LED panel Blade bays (on front): 14 hot-swap blade-server bays	Upgradeable microcode: <ul style="list-style-type: none">• Management-module firmware• I/O-module firmware (not all I/O module types)• Blade-server firmware Security features: <ul style="list-style-type: none">• Login password for remote connection• Secure Sockets Layer (SSL) security for remote management access Predictive Failure Analysis (PFA) alerts: <ul style="list-style-type: none">• Blowers• Blade-dependent features Size (9 U): <ul style="list-style-type: none">• Height: 400.1 mm (15.75 in. or 9 U)• Depth: 711.2 mm (28 in.)• Width: 482.6 mm (19 in.)• Weight:<ul style="list-style-type: none">– Full configured weight with blade servers: Approximately 158.8 kg (350 lbs)– Empty chassis without modules or blade servers: Approximately 40.82 kg (90 lbs)	Environment: <ul style="list-style-type: none">• Air temperature:<ul style="list-style-type: none">– BladeCenter unit on:<ul style="list-style-type: none">- Altitude: 0 to 914 m (3000 ft) 10° to 35°C (50° to 95°F)- Altitude: 914 m to 2134 m (3000 ft to 7000 ft) 10° to 32°C (50° to 90°F)– BladeCenter unit off: -40° to 60°C (-40° to 140°F).• Humidity: 8% to 80%• Acoustics: declared sound power level: 7.5 bels¹ Electrical input: <ul style="list-style-type: none">• Sine-wave input (50-60 Hz single-phase) required• Input voltage:<ul style="list-style-type: none">– Minimum: 200 V ac– Maximum: 240 V ac Heat output: Approximate heat output in British thermal units (Btu) per hour: <ul style="list-style-type: none">• Minimum configuration: 1024 Btu/hour (300 watts)• Maximum configuration: 32757 Btu/hour (9600 watts) Airflow: Approximate airflow in cubic feet per minute (cfm): <ul style="list-style-type: none">• Minimum airflow: 450 cfm• Maximum airflow: 975 cfm
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Notes:

1. Government regulations (such as those prescribed by Occupational Safety and Health Administration or European Community Directives) might govern noise level exposure in the workplace and might apply to you and your server installation. The actual sound pressure levels in your installation depend on a variety of factors, including the number of racks in the installation; the size, materials, and configuration of the room where you designate the racks to be installed; the noise levels from other equipment; the room ambient temperature; and employees' location in relation to the equipment. Compliance with such government regulations also depends on a variety of additional factors, including the duration of employees' exposure and whether employees wear hearing protection. It is recommended that you consult qualified experts in this field to determine whether you are in compliance with the applicable regulations.

The BladeCenter modules

The BladeCenter unit contains the following hot-swap modules:

- Advanced management modules
- I/O modules
- Power modules
- Blower modules

See “Major components of the BladeCenter H unit” on page 9 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 BladeCenter unit and the active management module make optional I/O devices (optical drive, USB port, keyboard, video, and mouse) available to all the blade servers, selected by any one blade server at a time.

Advanced management module

The BladeCenter unit comes with one hot-swap management module in management-module bay 1. You can add a second management-module in management-module bay 2 to provide redundancy.

The management module is a hot-swap module that you use to configure and manage BladeCenter components. See the *User's Guide* that comes with the management module for more information.

I/O modules

The BladeCenter unit has 10 hot-swap I/O module bays that are compatible with three types of I/O modules (see “Rear view” on page 15 for the location of the I/O module bays). These bays can be used as follows:

- The modules in bays 1 and 2 such as Ethernet switches or pass-thru modules, provide a communication links for the first and second network interface controllers (NICs) on each blade server. The modules in these bays must support Ethernet.
- The modules in bays 3 and 4 can be either of the following types, but the modules in both bays must be of the same type:
 - Switch modules, which provide a communication link for the third and fourth NICs in each blade server. The modules in these bays must support the type of network interface that is used in the corresponding blade-server NICs. When these bays are used this way, they are similar in function to bays 1 and 2.
 - Bridge modules, which provide links to bays 7 through 10 that can be used as additional outputs for the I/O modules in those bays. When these bays are used this way, the modules in these bays are not directly linked to the blade servers but bay 3 provides redundancy for the module in bay 5 and bay 4 provides redundancy for bay 6.
- The modules in bays 5 and 6, such as bridge modules, provide links to bays 7 through 10 that can be used as additional outputs for the I/O modules in those bays. Bays 5 and 6 are not directly linked to the blade servers.
- The modules in bays 7 through 10, such as Infiniband switches, provide high-speed communication links to the fifth through eighth NICs in each blade server. The modules in these bays must support the type of network interface that is used in the corresponding blade-server NICs.

Blade servers

The BladeCenter unit provides 14 bays for blade servers or other BladeCenter devices. A blade server is a hot-swap, independent server with its own processors, memory, storage, network controllers, operating system, and applications. The blade server is installed in a bay in the BladeCenter unit and shares power, fans, switches, and ports with other blade servers.

Power modules

The BladeCenter unit comes with two or four hot-swap power modules.

Power modules are needed in bays 1 and 2 if you install blade servers in blade bays 1 through 7 or if you install I/O modules in I/O module bays 1 through 4 or 7 through 10.

Power modules are needed in power module bays 3 and 4 if you install blade servers in blade bays 8 through 14 or if you install I/O modules in any of I/O module bays 5 through 10.

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.

Blower modules

The 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 unit and the temperature of internal BladeCenter components. If the ambient temperature is 25°C (77°F) or below, the BladeCenter unit blowers will run at their minimum rotational speed, increasing their speed as required to control internal BladeCenter temperature. If the ambient temperature is above 25°C (77°F), the blowers will run faster, increasing their speed as required to control internal BladeCenter unit temperature. If a blower fails, the operating speed of the remaining blower might increase and continue to cool the BladeCenter unit and blade servers. Replace a failed blower as soon as possible, to restore cooling redundancy.

Your BladeCenter might be equipped with standard blower modules (part number 44E5083), or it might be equipped with high-efficiency blower modules (part number 68Y8205). The standard and high-efficiency blower modules are not interchangeable and should not be mixed in the same BladeCenter unit.

For a list of supported options for the BladeCenter, see the ServerProven® list at <http://www.ibm.com/servers/eserver/serverproven/compat/us/>.

The IBM Documentation CD

The IBM BladeCenter *Documentation* CD contains documentation for your BladeCenter unit in Portable Document Format (PDF) and includes the IBM Documentation Browser to help you find information quickly.

Hardware and software requirements

The IBM BladeCenter *Documentation* CD requires the following minimum hardware and software:

- Microsoft Windows NT 4.0 (with Service Pack 3 or later), Windows 2000, or Red Hat Linux
- 100 MHz microprocessor
- 32 MB RAM
- Adobe Acrobat Reader 3.0 (or later) or xpdf, which comes with Linux operating systems. Acrobat Reader software is included on the CD, and you can install it when you run the Documentation Browser.

Using the Documentation Browser

Use the Documentation Browser to browse the contents of the CD, read brief descriptions of the documents, and view documents, using Adobe Acrobat Reader or xpdf. The Documentation Browser automatically detects the regional settings in use in 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.

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

- If Autostart is enabled, insert the CD into the drive. The Documentation Browser starts automatically.
- If Autostart is disabled or is not enabled for all users:
 - If you are using a Windows operating system, insert the CD into the drive; then, click **Start → Run**. In the **Open** field, type
`e:\win32.bat`
where *e* is the drive letter of your optical drive, and click **OK**.
 - If you are using a Red Hat Linux, insert the CD into the drive and run the following command from the `/mnt/cdrom` directory:
`sh runlinux.sh`

Select your computer from the **Product** menu. The **Available Topics** list displays all the documents for your BladeCenter product. Some documents might be in folders. A plus sign (+) indicates each folder or document that has additional topics under it. Click the plus sign to display the additional documents.

When you select a document, a description of the document appears under **Topic Description**. To select more than one document, press and hold the Ctrl key while you select the documents. Click **View Book** to view the selected document or documents in Acrobat Reader or xpdf. If you selected more than one document, all the selected documents are opened in Acrobat Reader or xpdf.

To search all the documents, type a word or word string in the **Search** field and click **Search**. The documents in which the word or word string appears are listed in order of the most occurrences. Click a document to view it, and press Ctrl+F to use the Acrobat search function or press Alt+F to use the xpdf search function within the document.

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

Related documentation

In addition to this *Installation and User's Guide*, the following related documentation is provided in Portable Document Format (PDF) at <http://www.ibm.com/support/> or on the *BladeCenter Documentation* CD that comes with your BladeCenter unit:

- *Warranty*: This document contains information about the terms of the warranty.
- *Safety Information*: This document 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* document.
- *BladeCenter H Rack Installation Instructions*: This document contains instructions for installing the BladeCenter unit in a rack.

- *BladeCenter Advanced Management Module User's Guide*: This document provides general information about your management module, including information about features, how to configure the management module, and how to get help.
- *BladeCenter Advanced Management Module Command-Line Interface Reference Guide*: This document explains how to use the management-module command-line interface to directly access BladeCenter management functions as an alternative to using the Web-based user interface. The command-line interface also provides access to the text-console command prompt on each blade server through a Serial over LAN (SOL) connection.
- *BladeCenter H Problem Determination and Service Guide*: This document contains the information to help you solve problems, and it contains information for service technicians.
- *BladeCenter Advanced Management Module Installation Guide*: This document contains instructions for installing the management module in the BladeCenter unit and creating the initial configuration.
- *BladeCenter Advanced Management Module Messages Guide*
This document contains a complete list of all non-device specific events and recommended actions, sorted by event ID. Device specific event information is in the documentation for the device.
- *Serial over LAN Setup Guide*
This document explains how to update and configure BladeCenter components for Serial over LAN (SOL) operation. The SOL connection provides access to the text-console command prompt on each blade server and enables the blade servers to be managed from a remote location.

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

Notices and statements in this document

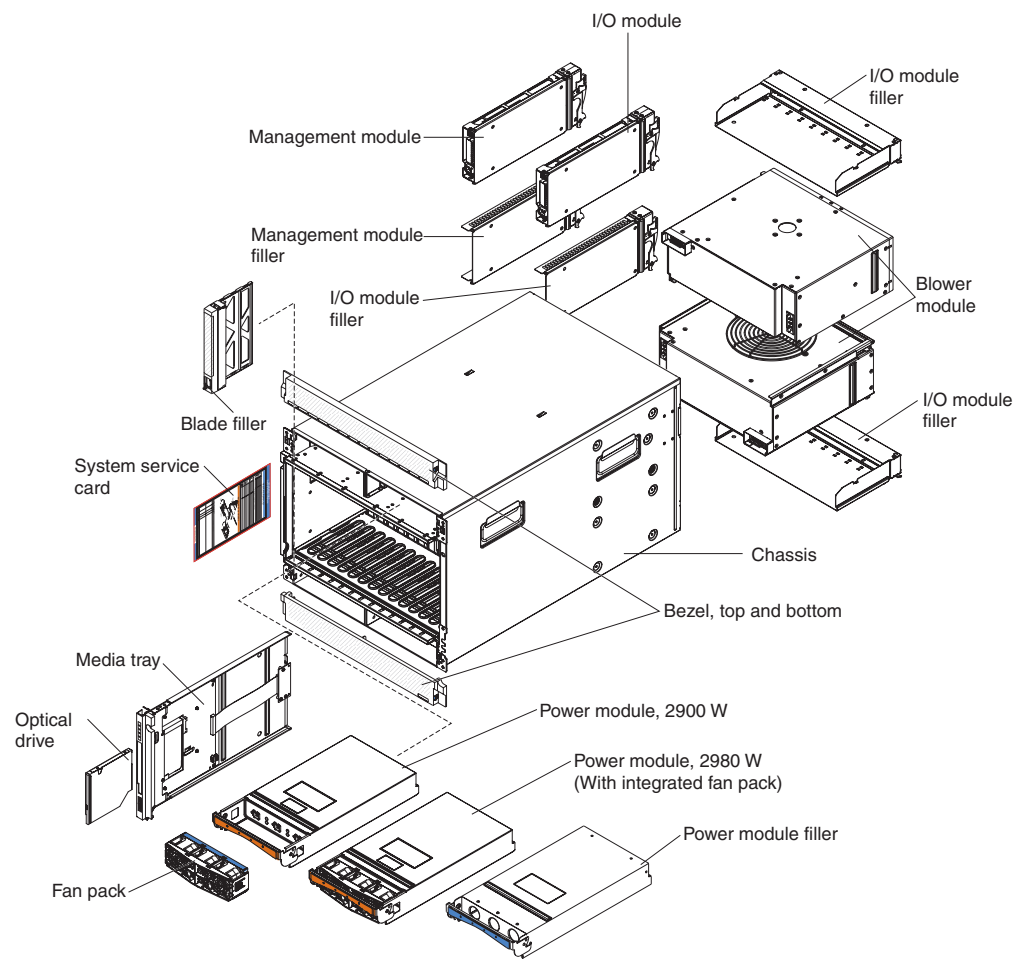
The caution and danger statements that appear in this document are also in the multilingual *Safety Information* document, which is on the IBM *BladeCenter Documentation* CD. Each statement is numbered for reference to the corresponding statement in the *Safety Information* document.

The following notices and statements are used in this document:

- **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.

Major components of the BladeCenter H unit

The following illustrations show the locations of the major components in the BladeCenter unit.



Chapter 2. 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.

Supplying power to the BladeCenter unit

To supply power to the BladeCenter unit, connect one end of each power cord to a power connector on the rear of the BladeCenter unit and the other end of each power cord to a 220-volt power distribution unit or appropriate electrical outlet. The BladeCenter unit does not have a power switch.

The blade servers in the BladeCenter unit are connected to power but are not turned on. After the BladeCenter unit has power, depending on the configuration settings, the blade servers might have to be individually turned on.

Disconnecting power from 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.

To disconnect power from the BladeCenter unit, complete the following steps:

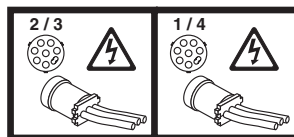
1. Shut down each blade server. See the documentation that comes with your blade servers for the procedure for shutting down the operating system.

Statement 5:



CAUTION:

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



2. Disconnect all power cords on the BladeCenter unit from the power connectors.

Attention: The power cords on the rear of the BladeCenter chassis are not approved to be connected or disconnected under power. You must first disconnect the power cords from the ac power source; then, you can remove the power cords from the chassis connectors.

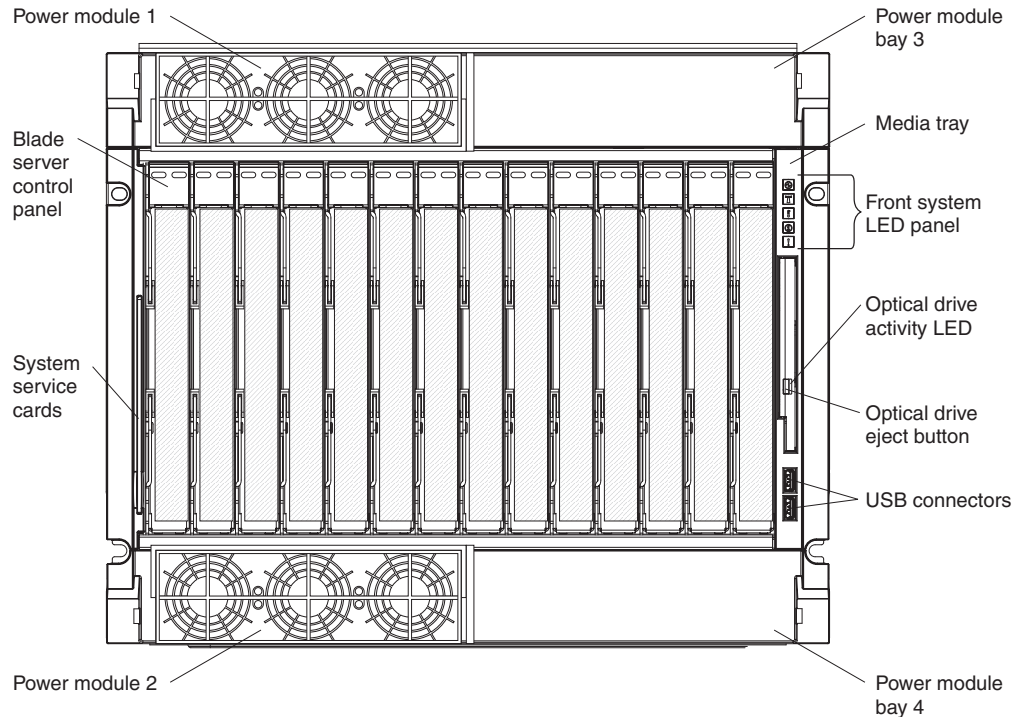
Note: After you disconnect the BladeCenter unit from power, wait at least 5 seconds before you connect the BladeCenter unit to power again.

BladeCenter components, controls, and LEDs

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

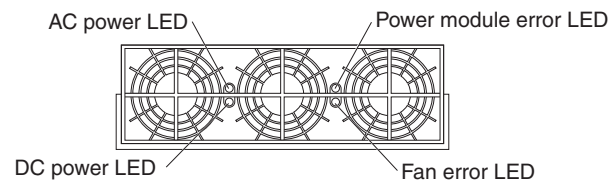
Front view

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



Power modules

The following illustration shows the LEDs on each power module.



The LEDs on each power module indicate the condition of the power module and fan pack.

Note: The orientation of the power module shown in the illustration is for one of the top power-modules. The orientation for modules in the bottom power-module bays is rotated 180°.

- **DC power LED:** When this green 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 power and dc power LEDs are lit.
- **AC power LED:** When this green LED is lit, ac input to the power module is present and within specifications. During typical operation, both the ac power and dc power LEDs are lit.

- **Power module error LED:** When this amber LED is lit, a power module failure has occurred and it is not operating within specifications.
- **Fan error LED:** When this amber LED is lit, a fan pack has failed and is not operating within specifications.

Media tray

The media tray contains the following:

- **Front system LED panel**

The LEDs on this panel provide status information for your BladeCenter unit.



Power-on



Location



Over-temperature



Information



System error

Note: You can turn off the location LED and the information LED through the management module.

- **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, not functioning or the media tray is not fully seated.

Attention: If the power-on LED is off, it does not mean that 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 the BladeCenter unit.

- **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 I/O module inserted in a bay or power demands that exceed the capacity of power modules that are 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. After the situation is corrected, 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.
- **Optical drive activity LED:** When this LED is lit, it indicates that the optical drive is in use.
- **Optical drive eject button:** Press this button to release a disc from the optical drive.
- **USB connectors:** Use these connectors to attach USB devices.

System service cards

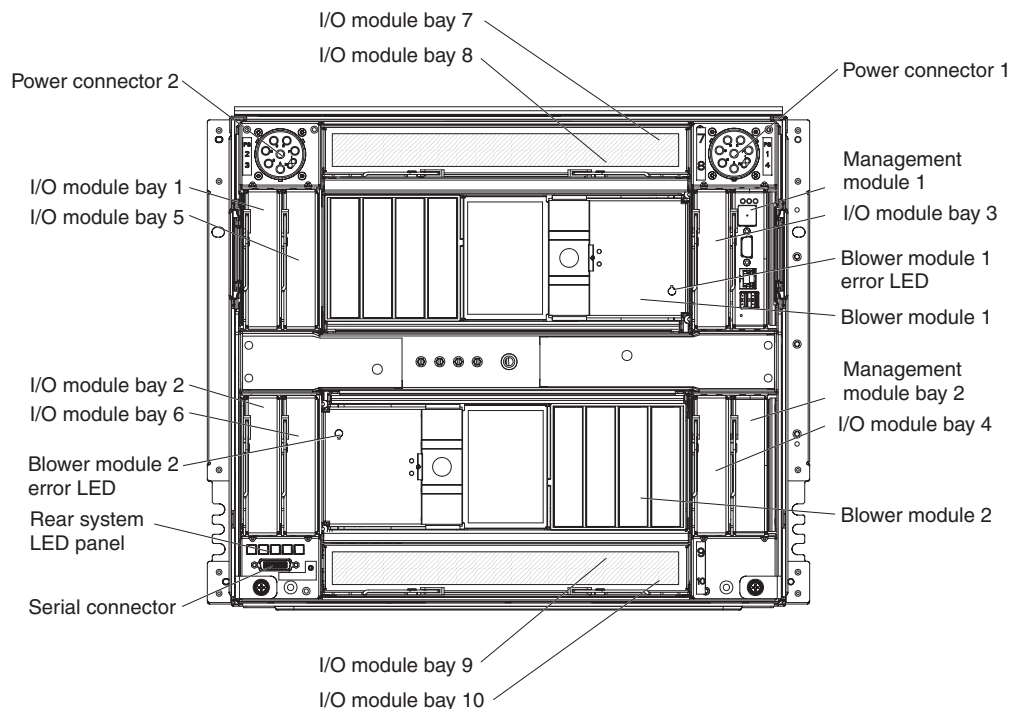
These cards contain system service instructions and a writable area. They slide in and out of the storage location on the left side of the BladeCenter unit.

Blade server 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 server control panel.

Rear view

This section identifies the components, connectors, and LEDs on the rear of the BladeCenter unit.



Power connectors

Connect a power cord from each power connector to a 220-volt power distribution unit or appropriate electrical outlet. See your specific power cable document for more information.

I/O modules

See the documentation that comes with each I/O module for a description of the LEDs and connectors on the I/O module.

Management modules

See the documentation that comes with each management module for a description of the LEDs and connectors on the module.

Blower modules

When the amber LED on a blower module is lit, an error has been detected in the blower or power to the blower is not present. The system-error LEDs on the BladeCenter system LED panels are also lit.

Serial connector

This connector provides direct access to the serial ports on each of the 14 blade server bays. Use this connector to attach the optional serial port breakout cable and connect up to 14 local consoles. See the documentation supplied with your blade server to see if it supports this cable.

Rear system LED panel

The LEDs on this panel provide status information. These LEDs duplicate the LEDs in the front system LED panel (see “Front system LED panel” on page 13 for more information).

Chapter 3. Installing the BladeCenter unit and options

This chapter provides instructions for installing the BladeCenter unit into a rack and adding optional devices to your BladeCenter unit. Some removal instructions are provided in case you have to remove one device to install another.

Installation checklist

Before you can use the BladeCenter unit, you must set up and configure the BladeCenter unit, and install and configure the required components in the BladeCenter unit. If you have not already done so, perform the activities on the following checklist:

- ___ 1. Set up the rack in which you will install the BladeCenter unit. See the documentation that comes with your rack.
- ___ 2. Determine the BladeCenter unit configuration settings, such as the IP address, network address, and Wake on LAN setting. Record the BladeCenter configuration setting information in Appendix A, “BladeCenter management-module configuration worksheet,” on page 47. See the *BladeCenter Management Module User's Guide* that comes with your management module for instructions to configure an IP address.
- ___ 3. Remove any modules that come installed in the BladeCenter unit to reduce the weight of the unit you install into the rack. See “Removing components before rack installation” on page 19 for instructions.
- ___ 4. Install the BladeCenter unit into the rack. See the *BladeCenter H Rack Installation Instructions*.
- ___ 5. Reinstall the removed modules in the BladeCenter unit. Make sure that the BladeCenter unit has adequate power to support all of the installed components. The BladeCenter unit must contain either two or four power modules.
- ___ 6. Install the required BladeCenter unit components.
- ___ 7. Make sure that the latest level of firmware is installed on all of the BladeCenter components. See <http://www.ibm.com/support/> for additional information.
- ___ 8. Configure the management module in the BladeCenter unit. See the *BladeCenter Advanced Management Module Installation Guide* that comes with your management module for information and instructions.
- ___ 9. Configure the I/O modules in the BladeCenter unit. See the documentation for your I/O modules for configuration information.
- ___ 10. Configure the blade servers. See the *Installation and User's Guide* that comes with your blade server for information and instructions.

Installing the BladeCenter unit in a rack

Install the BladeCenter unit in a rack before you install any modules or blade servers in the BladeCenter unit. If your BladeCenter unit is preconfigured with blade servers, power modules, management modules, and blowers already installed, remove them first to reduce the weight. Detailed instructions for installing a BladeCenter unit in a rack are in the *BladeCenter H Rack Installation Instructions* that come with the BladeCenter unit.

Installation guidelines

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

- Read the safety information that begins on page vii and the guidelines in “Handling static-sensitive devices.” This information will help you work safely.
- Orange on a component or an orange label on or near a component indicates that the component can be hot-swapped, which means that you can remove or install the component while the BladeCenter unit is running. (Orange can also indicate touch points on hot-swap components.) See the instructions for removing or installing a specific hot-swap component for any additional procedures that you might have to perform before you remove or install the component.
- You do not have to disconnect the BladeCenter unit from power to install or replace any of the hot-swap modules in the BladeCenter unit. You must shut down the operating system and turn off a hot-swap blade server before you remove the blade server, but you do not have to shut down the BladeCenter unit itself.
- Blue on a component indicates touch points where you can grip the component to remove it from or install it in the BladeCenter unit, open and close a latch, and so on.
- For a list of supported options for the BladeCenter unit, see <http://www.ibm.com/bladecenter/>

System reliability guidelines

To help ensure proper cooling and system reliability, make sure that the following requirements are met:

- Each of the module bays on the rear of the BladeCenter unit has either a module or a module filler installed.
- Each of the blade bays on the front of the BladeCenter unit has either a blade server or a blade filler 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 optional 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 the BladeCenter unit and other electronic devices. 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 BladeCenter unit or rack 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 immediately without setting down. If it is necessary to set down the device, put it back into its static-protective package.
- Take additional care when handling devices during cold weather. Heating reduces indoor humidity and increases static electricity.

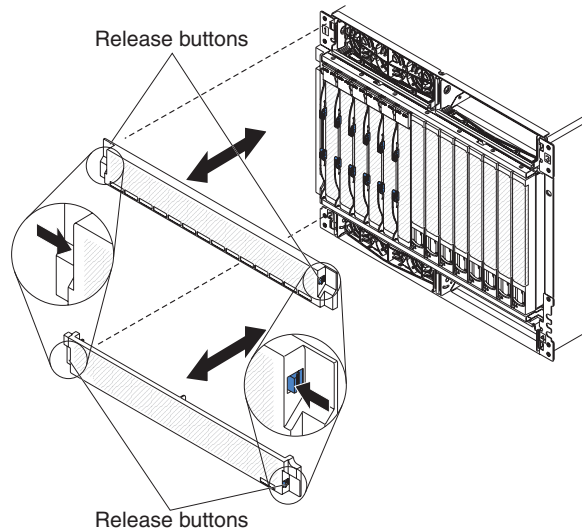
Removing components before rack installation

Attention: See the *BladeCenter H Problem Determination and Service Guide* for removing components from the BladeCenter unit when the unit is connected to power.

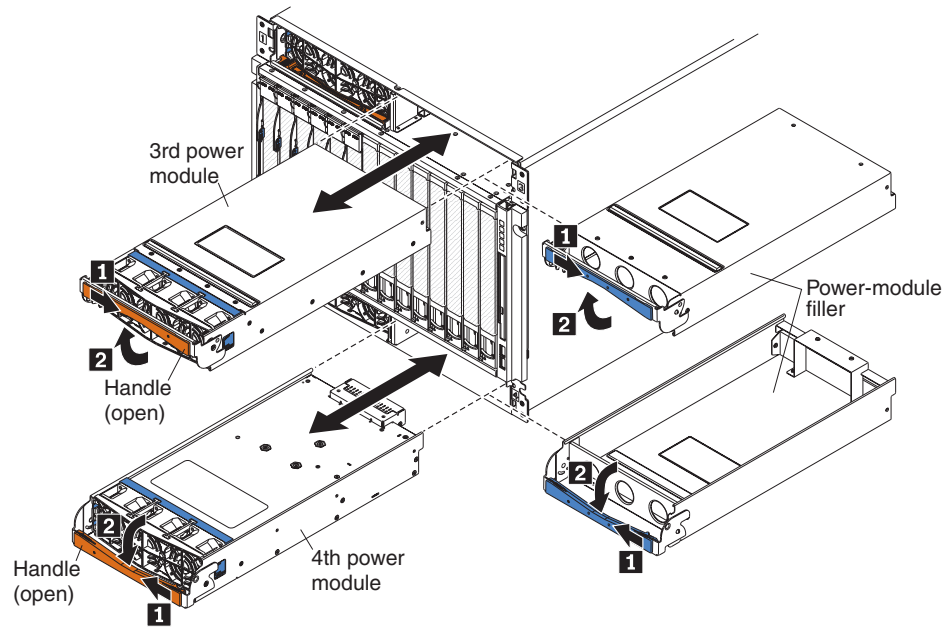
Use the following procedures to remove components from the BladeCenter unit before you install it in a rack and connect to power.

Removing a power module

To remove a power module, complete the following steps.



1. Read the safety information that begins on page v and “Installation guidelines” on page 18.
2. Press the blue release button on each end of the bezel.
3. Pull the bezel away from the BladeCenter unit.

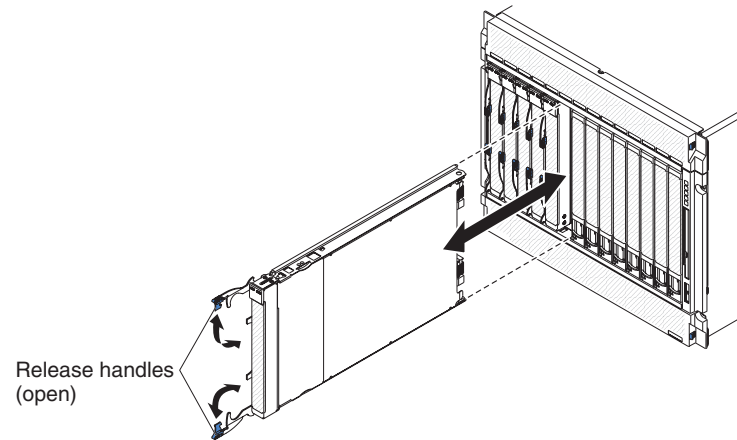


4. Open the power-module handle, using one of the following procedures:
 - For a power module in one of the upper power-module bays, push the inner handle release to the right; then, pull the handle up to the open position.
 - For a power module in one of the lower power-module bays, push the inner handle release to the left; then, pull the handle down to the open position.
5. Use the handle to pull the module out of the bay.

Removing a blade server

Attention: Note the bay number. 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.

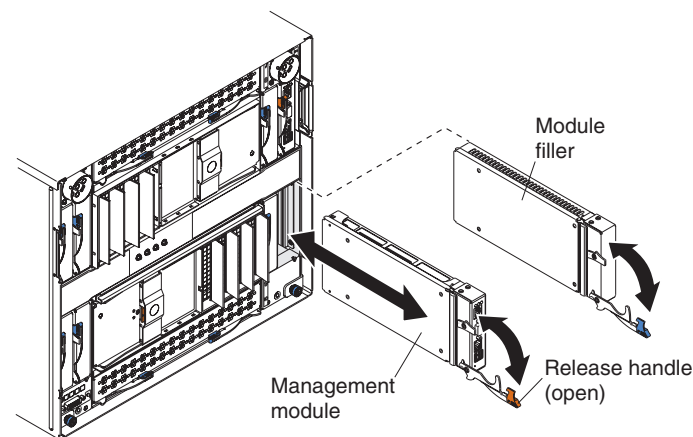
To remove a blade server, complete the following steps.



1. Read the safety information that begins on page v and “Installation guidelines” on page 18.
2. Move the two release handles to the open position. The blade server moves out of the bay approximately 0.6 cm (0.25 inch).
3. Pull the blade server out of the bay.

Removing a management module

To remove a management module or filler, complete the following steps.

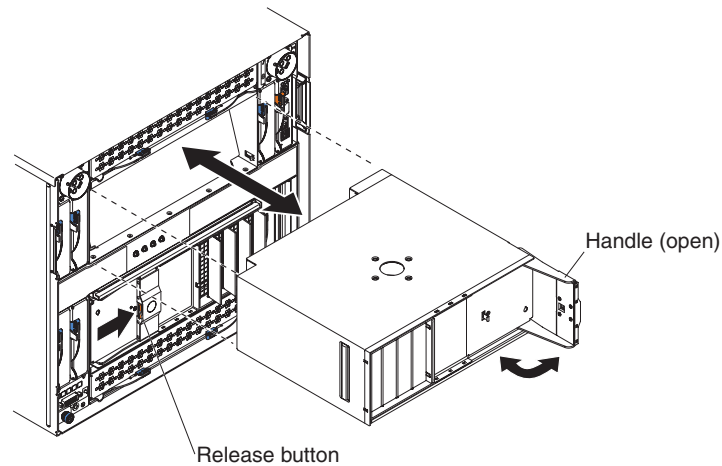


1. Read the safety information that begins on page v and “Installation guidelines” on page 18.
2. Pull the module release handle to the open position. The module moves out of the bay approximately 0.6 cm (0.25 inch).
3. Slide the module out of the bay.

Removing a blower module

Your BladeCenter might be equipped with standard blower modules (part number 44E5083), or it might be equipped with high-efficiency blower modules (part number 68Y8205). The standard and high-efficiency blower modules are not interchangeable and should not be mixed in the same BladeCenter unit.

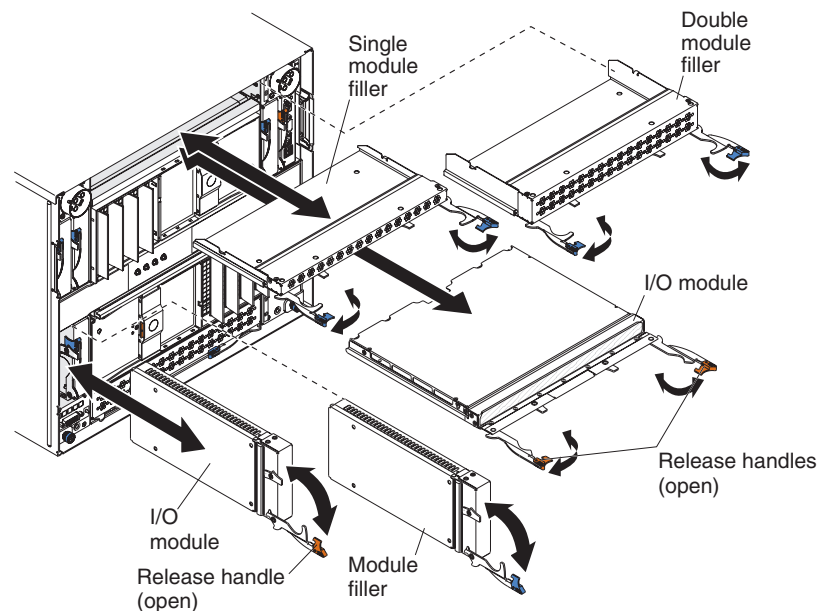
To remove a blower module, complete the following steps.



1. Read the safety information that begins on page v and “Installation guidelines” on page 18.
2. Press the release button on the blower handle and rotate the handle to the open position (rotate to the right for the upper blower module or to the left for the lower blower module).
3. Using the handle, pull the blower module out of the bay.

Removing an I/O module

To remove an I/O module or module filler, complete the following steps.



1. Read the safety information that begins on page v and “Installation guidelines” on page 18.

2. Pull the release handle or handles to the open position. The module moves out of the bay approximately 0.6 cm (0.25 inch).

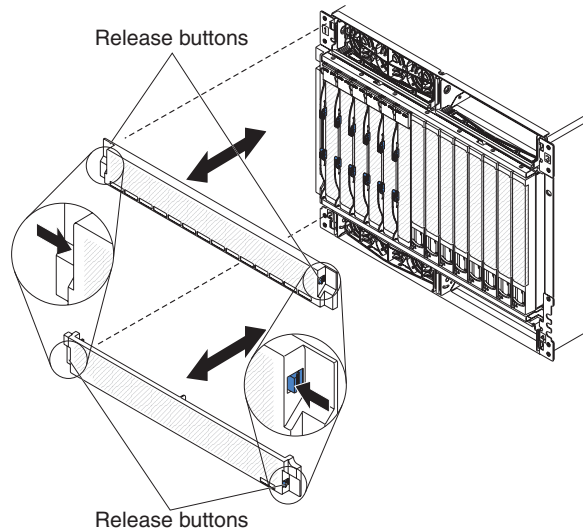
Note: The modules and fillers in I/O bays 1 through 6 each have one release handle; the modules and fillers in I/O bays 7 through 10 each have two release handles.

3. Slide the module out of the bay.

Removing a bezel

When working with some devices, such as the media tray and power modules, you must first remove the top or bottom bezels to access the devices.

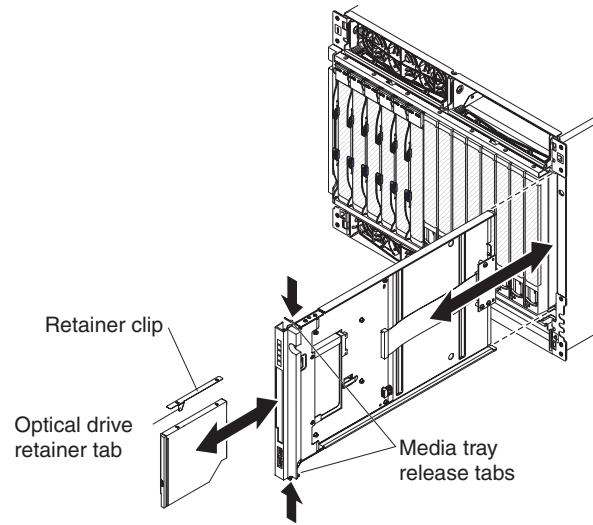
To remove either bezel, complete the following steps.



1. Read the safety information that begins on page v and “Installation guidelines” on page 18.
2. Press the blue release button on each end of the bezel.
3. Pull the bezel away from the BladeCenter unit.

Removing an optical drive filler

To remove an optical drive filler, complete the following steps.



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

1. Read the safety information that begins on page v and “Installation guidelines” on page 18.
2. Remove the top and bottom bezels (see “Removing a bezel” on page 23).
3. Press the release tabs on the top and bottom of the media tray; then, pull the tray out of the BladeCenter unit.
4. Place the media tray on a clean, static-free surface with the circuit board and optical drive filler facing up.

Attention: To prevent damage to the circuit board, do not touch or apply pressure to the circuit board or any of its components.

5. Press the optical drive filler retainer tab and slide the optical drive filler out of the media tray.
6. Remove the retainer clip from the side of the optical drive filler.

Installing components

The following procedures are for reinstalling components or installing optional devices in the BladeCenter unit once the rack installation is complete.

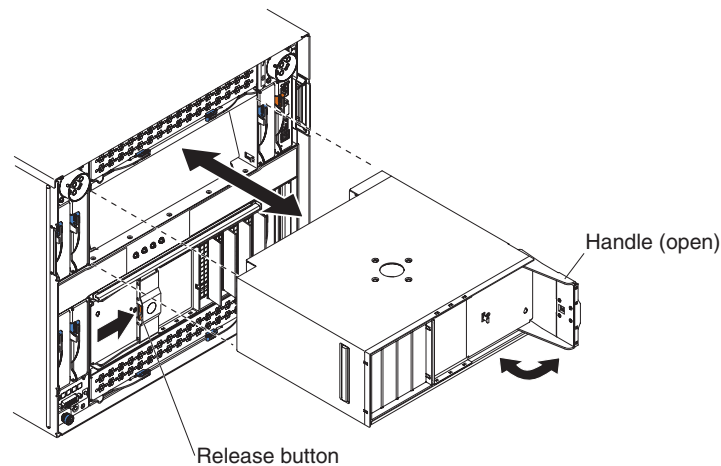
Installing a blower module

Your BladeCenter might be equipped with standard blower modules (part number 44E5083), or it might be equipped with high-efficiency blower modules (part number 68Y8205). The standard and high-efficiency blower modules are not interchangeable and should not be mixed in the same BladeCenter unit.

For a list of supported options for the BladeCenter, see the ServerProven® list at <http://www.ibm.com/servers/eserver/serverproven/compat/us/>.

Note: Government regulations (such as those prescribed by Occupational Safety and Health Administration or European Community Directives) might govern noise level exposure in the workplace and might apply to you and your server installation. The actual sound pressure levels in your installation depend on a variety of factors, including the number of racks in the installation; the size, materials, and configuration of the room where you designate the racks to be installed; the noise levels from other equipment; the room ambient temperature; and employees' location in relation to the equipment. Compliance with such government regulations also depends on a variety of additional factors, including the duration of employees' exposure and whether employees wear hearing protection. It is recommended that you consult qualified experts in this field to determine whether you are in compliance with the applicable regulations.

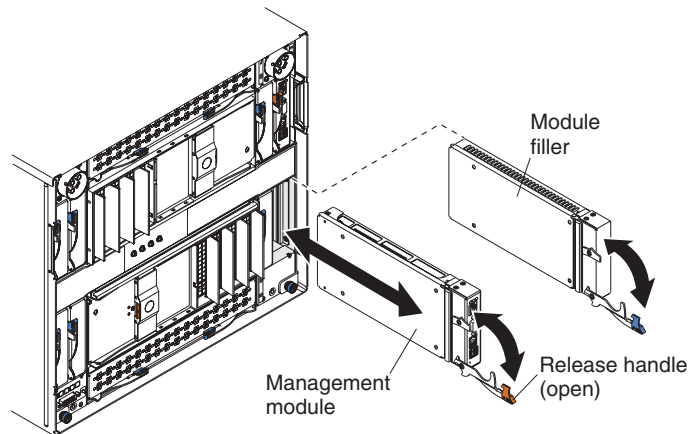
To install a blower module, complete the following steps.



1. Read the safety information that begins on page v and “Installation guidelines” on page 18.
2. Make sure that the handle on the blower module is in the open position.
3. Orient the blower module to the selected blower-module bay:
 - For the upper bay, the handle must be on the right.
 - For the lower bay, the handle must be on the left.
4. Slide the module into the bay until it stops; then, push the handle to the closed position.

Installing a management module

To install a management module, complete the following steps.



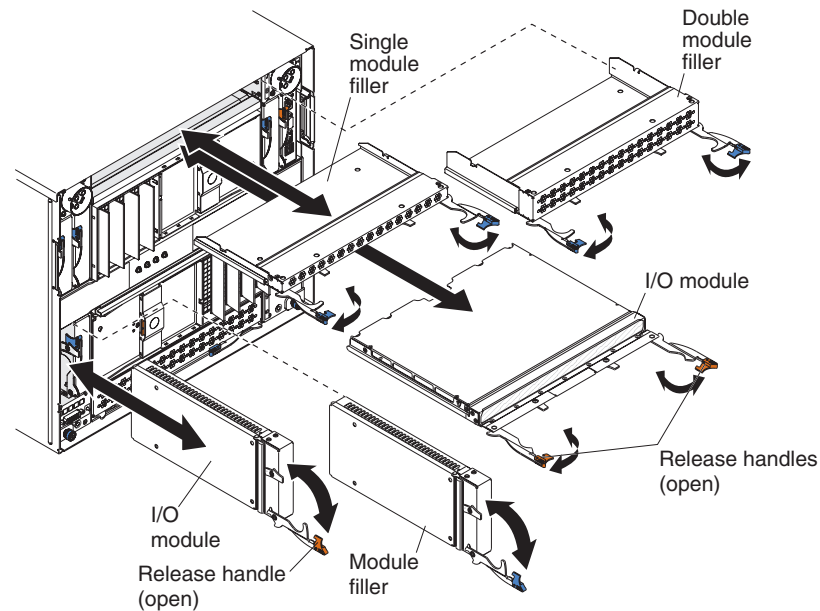
1. Remove the module filler if one is installed.
2. Make sure that the release handle on the module is in the open position.
3. Slide the module into the module bay until it stops.
4. Push the release handle on the module to the closed position.
5. Connect any cables to the module.
6. If the BladeCenter unit is connected to power:
 - Make sure that the OK LED on the module is lit.
 - If this is a redundant management module, wait at least 45 minutes for the modules to copy.

Installing an I/O module

The BladeCenter unit has 10 hot-swap I/O-module bays that are compatible with three types of I/O modules (see “Major components of the BladeCenter H unit” on page 9 for the location of the I/O module bays).

Note: Before you install a new I/O module, read the documentation that comes with the module for detailed instructions.

To install an I/O module, complete the following steps.



1. Remove the module filler if one is installed.
2. Make sure that the release handles are in the open position.

Note: The modules and fillers in I/O bays 1 through 6 each have one release handle; the modules and fillers in I/O bays 7 through 10 each have two release handles.

3. Slide the module into the module bay until it stops.
4. Push the release handle or handles to the closed position.
5. Connect all cables to the module.

Installing a power module

Two types of power modules are supported for your BladeCenter, 2900W power modules with removable fan pack and 2980W high-efficiency power modules with integrated fan pack. The IBM 2980-watt power modules for BladeCenter® H are more efficient than the 2900W power modules, using less power without sacrificing performance. The 2900W and 2980W high-efficiency power modules are not interchangeable within the same power domain of the chassis. A power module configuration is supported only if the two power modules are matched within the same power domain:

- Power modules 1 and 2 provide power for domain A (blade slots 1 to 7)
- Power modules 3 and 4 provide power for domain B (blade slots 8 to 14)

The following is an example of a supported configuration:

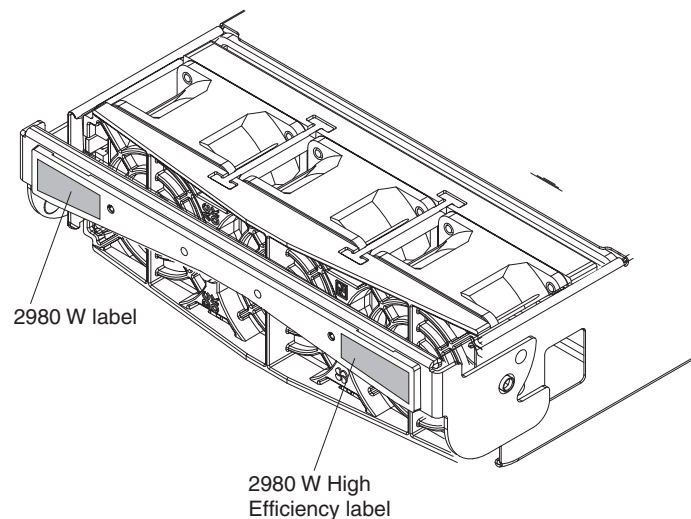
- Domain A: Power Module 1; 2900W, Power Module 2; 2900W
- Domain B: Power Module 3; 2980W, Power Module 4; 2980W

This is an example of a non-supported configuration:

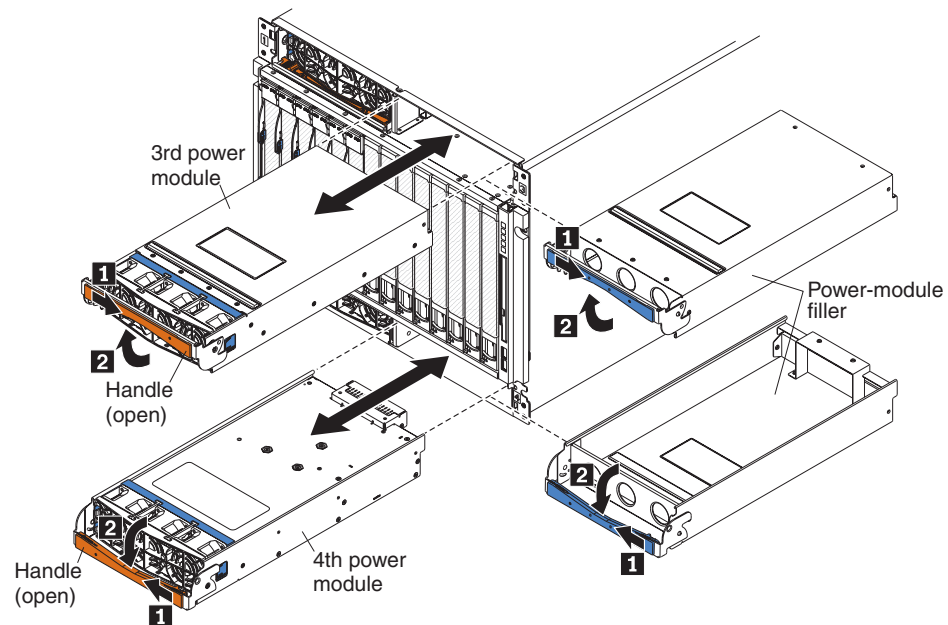
- Domain A: Power Module 1; 2900W, Power Module 2; 2980W
- Domain B: Power Module 3; 2900W, Power Module 4; 2980W

Attention: Failed power modules should only be replaced with the same type of power module.

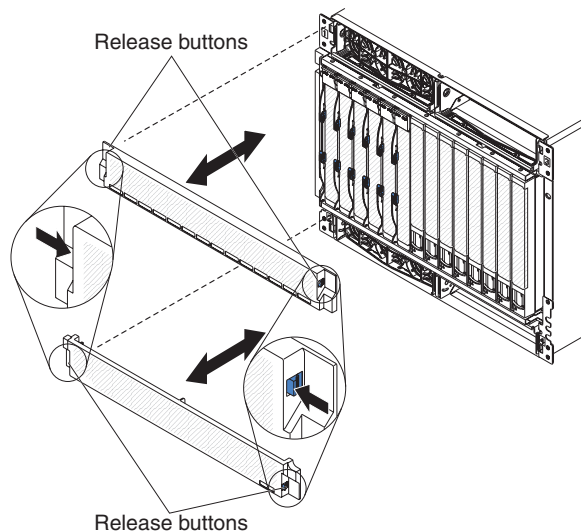
Note: The 2980W high-efficiency power modules are identified by a label on the power module handle. Remove the top or bottom bezel as needed to access the power module handle. 2900W power modules do not have this label.



To install a power module, complete the following steps.



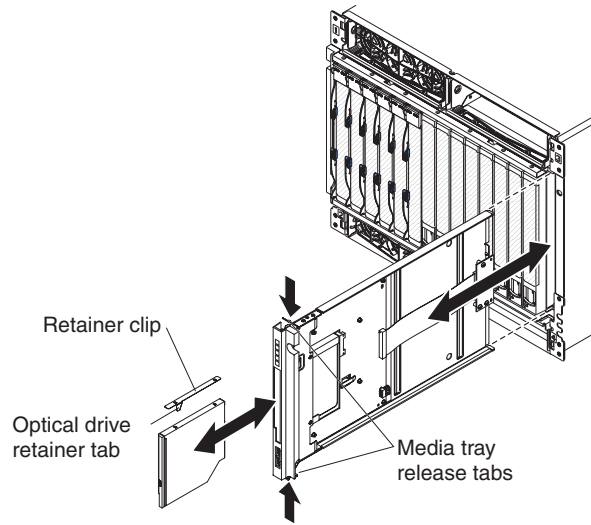
1. Remove the module filler if one is installed.
2. Make sure that the handle on the power module is in the open position.
3. Orient the new power module to the selected power-module bay:
 - For the upper power-module bays, the rear connector on the power module must be facing down.
 - For the lower power-module bays, the rear connector on the power module must be facing up.
4. Slide the module into the bay until it stops; then, push the handle to the closed position.



5. Align the blue tabs on the ends of the bezel with the corresponding holes in the front of the BladeCenter unit.
6. Firmly press the bezel into the BladeCenter unit until the tabs lock it into place.

Installing an optical drive

To install an optical drive, complete the following steps.



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

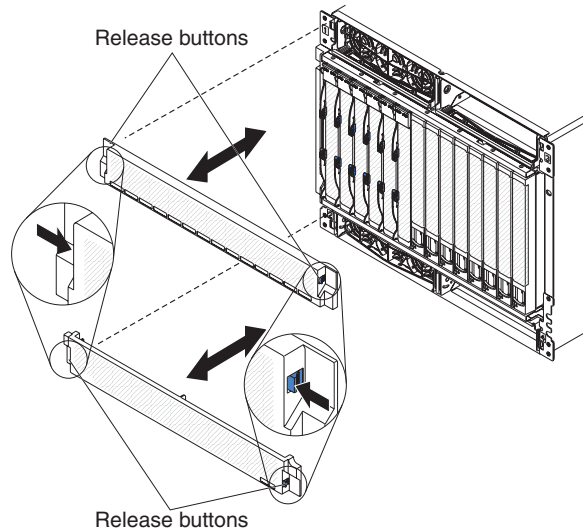
1. Remove the media tray and optical drive filler (see “Removing an optical drive filler” on page 24).
2. Make sure that the media tray is on a clean, static-free surface with the circuit board facing up.

Attention: To prevent damage to the circuit board, do not touch or apply pressure to the circuit board or any of its components.

3. Install the retainer clip on the side of the optical drive.
4. Carefully slide the optical drive into the bay on the media tray until it fully engages the connector and the retainer tab locks into place.
5. Carefully slide the media tray into the BladeCenter unit until the release tabs lock it into place.
6. Install the top and bottom bezels (see “Installing a bezel” on page 31).

Installing a bezel

To install either the top or bottom bezel, complete the following steps.



1. Align the blue tabs on the ends of the bezel with the corresponding holes in the front of the BladeCenter unit.
2. Firmly press the bezel into the BladeCenter unit until the tabs lock it into place.

Installing a blade server

Statement 21:

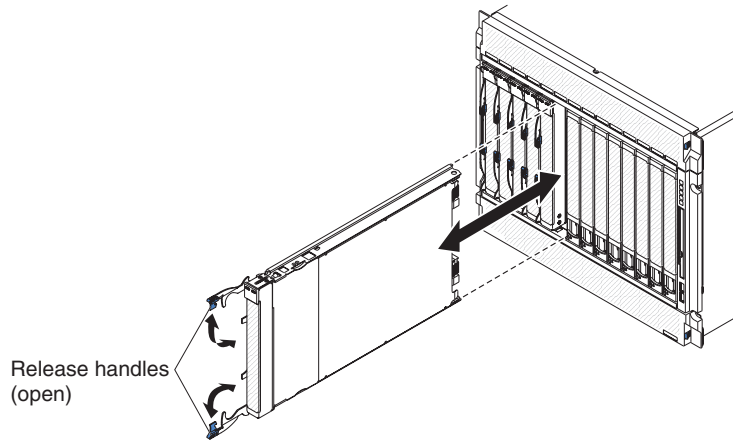


CAUTION:

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

Attention: If this is the initial installation of a blade server in the BladeCenter unit, you must 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.

To install a blade server, complete the following steps.



1. Select the bay for the blade server.

Notes:

- a. Depending on the blade-server type and the optional devices that are installed in it, two or more adjacent bays might be required.
- b. When any blade server or device is in blade bays 8 through 14, power modules must be present in all four power bays.

2. Remove the filler from the bay, if one is installed.

Attention: To help ensure proper cooling, performance and system reliability, do not operate the BladeCenter unit for more than 1 minute without either a blade server or a blade filler installed in each blade bay.

3. Make sure that the two release handles are in the open position.
4. Slide the blade server into the bay until it stops.
5. Push the two release handles to the closed position.
6. Make sure that the blade server is receiving power. See the documentation that comes with the blade server for instructions.
7. If this is a new blade server, write identifying information on one of the user labels that come with the blade server; then, place the label on the BladeCenter unit top bezel just above the blade server.

Important: Do not place the label on the blade server or in any way block the ventilation holes on the BladeCenter unit bezel.

Completing the installation

After you connect the cables to the modules and route the cables (see the cable routing instructions supplied with the rack if necessary), do the following to start the BladeCenter unit and verify that it is working correctly.

1. Supply power to the BladeCenter unit by connecting the power cords to a 220-volt power distribution unit or appropriate electrical outlets.
2. Make sure that the following LEDs are lit and indicate that the device is working properly.
 - dc power and ac power LEDs on each power module.
 - OK LED on each management module.
 - OK LED on each I/O module.
3. Make sure that the power-on LED on each blade server is lit, either steady or flashing.

See Chapter 2, “BladeCenter unit power, controls, and indicators,” on page 11 for information about the location of the LEDs on the modules. See the documentation that comes with the blade servers for the location of the LEDs on the blade servers.

Chapter 4. Configuration and networking guidelines

The BladeCenter components are configured and managed through a management module. Depending on your management module type, you can configure the management module and the BladeCenter unit components through a local or remote connection and management-module user interfaces or other system management tools. See your management-module documentation for instructions for configuring the BladeCenter unit.

Configuring the BladeCenter unit

General configuration of the BladeCenter unit and installed components is performed through the management module. See the *BladeCenter Management Module User's Guide* and the *BladeCenter Management Module Command-Line Interface Reference Guide* for your management module for information and instructions. Some devices in the BladeCenter unit, such as I/O modules and blade servers, might also require additional configuration. See the documentation that comes with each device for information and instructions.

Configuring the management module

All management modules are preconfigured with the same static IP address. You can use the management module to assign a new static IP address. To establish connectivity, the management module attempts to use Dynamic Host Configuration Protocol (DHCP) to acquire its initial IP address for the management-module Ethernet port. If DHCP is not installed or is enabled and fails, the management module uses the static IP address. Use the management module to configure other BladeCenter component settings, such as user accounts, DHCP, or Wake on LAN. See the documentation for your management module for instructions.

Configuring I/O modules

You must install and configure at least one external (in-band) port on an Ethernet switch module in I/O-module bay 1 or 2 to communicate with the Ethernet controllers that are integrated in each blade server. See the documentation for your management module for information about configuring external ports on I/O modules. For I/O-device settings, see the documentation that comes with your I/O device.

Note: If a pass-thru module is installed in I/O-module bay 1 or 2, you must configure the network switch that the pass-thru module is connected to; see the documentation that comes with the network switch.

Configuring blade servers

To achieve blade-server redundancy, you must configure the Ethernet controllers in one or more blade servers for failover. When failover occurs on a blade server, the secondary Ethernet controller takes over network communications, using the I/O module that is associated with that controller. Install a pair of Ethernet switches in I/O-module bays 1 and 2, and then configure them and your network infrastructure so that they can direct traffic to the same destinations. You can also install a pass-thru module that is connected to an external Ethernet switch in either or both of these I/O-module bays. See the documentation that comes with your blade server and operating system for instructions.

BladeCenter networking guidelines

Make sure the network infrastructure is configured before you connect the BladeCenter unit to a LAN switch or similar network device.

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 in I/O module bays 1 and 2. There is no internal data path between the two switches within the BladeCenter unit; 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.

Chapter 5. IBM Director

This chapter provides information about IBM Director, a workgroup-hardware-management tool that you can use to centrally manage IBM servers.

With IBM Director, a network administrator can perform the following tasks:

- View the hardware configuration of remote systems, in detail.
- Monitor the usage and performance of critical components, such as microprocessors, disks, and memory.
- Centrally manage individual or large groups of IBM and non-IBM Intel-processor-based servers, desktop computers, workstations, and mobile computers on a variety of platforms.

IBM Director provides a comprehensive entry-level workgroup hardware manager. It includes the following key features:

- Advanced self-management capabilities for maximum system availability.
- Multiple operating-system platform support, including Microsoft Windows 2000 Server, Windows XP Professional, Red Hat Linux, SUSE Linux, and Novell NetWare. For a complete list of operating systems that support IBM Director, see the IBM Director Compatibility Document. This document is in PDF at http://www.ibm.com/servers/eserver/xseries/systems_management/sys_migration/ibmdiragent.html. It is updated every 6 to 8 weeks.
- Support for IBM and non-IBM servers, desktop computers, workstations, and mobile computers.
- Support for systems-management industry standards.
- Integration into leading workgroup and enterprise systems-management environments.
- Ease of use, training, and setup.

IBM Director also provides an extensible platform that supports advanced BladeCenter tools that are designed to reduce the total cost of managing and supporting networked systems. By deploying IBM Director, you can achieve reductions in ownership costs through the following benefits:

- Reduced downtime
- Increased productivity of IT personnel and users
- Reduced service and support costs


For more information about IBM Director, see the documentation on the *IBM Director* CD that comes with the BladeCenter unit, the IBM Director Information Center at http://publib.boulder.ibm.com/infocenter/eserver/v1r2/topic/dirinfo/fgm0_main.htm, and the IBM System x Management Web page at http://www.ibm.com/servers/eserver/xseries/systems_management/xseries_sm.html, which present an overview of IBM Systems Management and IBM Director.

Chapter 6. Shared BladeCenter resources

The BladeCenter unit provides resources that are available to most blade servers at all times, such as power modules, cooling, system management, and network I/O modules; no user intervention is required. Some resources are selectable for use by a single blade server at a time, such as the media tray or the keyboard-video-mouse (KVM). You can select the resources for a blade server in the following ways:


Attention: Do not switch ownership of the media tray to another blade server while a transaction is taking place on the optical drive or an attached USB device. The data might become corrupted. Make sure that activity lights on the optical drive are not lit.

- Most blade servers have two selection buttons on the front of the blade server

CD and .

- You can use the management-module Web interface to enable or disable the select buttons on the blade servers and change ownership of the media tray or the KVM (**Blade Tasks** → **Remote Control**).

The monitor that is attached to the management module shows the video output from the blade server that is the current owner of the 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 is displayed on the monitor briefly until the management module uses its NVRAM values to reestablish ownership of the KVM and media tray (optical drive, diskette drive, and front panel USB ports). After that, the video from the blade server that is the current KVM owner is displayed on the monitor.

- To switch the KVM to a specific blade server, press the  button on that blade server.
- To switch the media tray to a specific blade server, press the CD button on that blade server.

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

- On a keyboard that is directly attached to the management module, 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 must hold down the Shift key while you enter this key sequence.

It can take up to 20 seconds for the operating system in the switched-to blade server to recognize the media tray or the KVM. If you install Microsoft Windows 2000 on a blade server while it is not the current owner of the media tray or the KVM, 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 occurrence).

Note: The operating system in the blade server must provide USB support for the blade server to recognize and use the media tray. The BladeCenter unit uses USB for internal communication with these devices.

Chapter 7. Solving problems

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

If you cannot locate and correct the problem using the information in this section, see the *Problem Determination and Service Guide* for more information.

Diagnostic tools overview

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

- **Troubleshooting tables**

These tables list problem symptoms and steps to correct the problems. See “Troubleshooting tables” 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.

- **Light path diagnostic LEDs**

Use the light path diagnostic LEDs on the BladeCenter unit and the BladeCenter components to identify system errors quickly. See “Light path diagnostic LEDs” on page 44.

Troubleshooting tables

Use the troubleshooting tables to find solutions to problems that have identifiable symptoms.

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

See the *Problem Determination and Service Guide* 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 cause of problem, call for service.

Attention: If diagnostic error messages appear that are not listed in the *Problem Determination and Service Guide*, make sure that the latest level of firmware code is installed in your BladeCenter unit.

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

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

Monitor or video problems

Note: These symptoms apply only to the monitor that is connected to the management module; they do not apply to the remote console.

Some IBM monitors have their own self-tests. If you suspect a problem with your monitor, see the documentation that comes with the monitor for instructions for testing and adjusting the monitor.

<ul style="list-style-type: none">• Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.• If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician.	
Symptom	Action
The monitor is not working	<ol style="list-style-type: none">1. Make sure that:<ul style="list-style-type: none">• The monitor is turned on and the brightness and contrast controls are adjusted correctly.• The monitor is connected to the active management module.• The blade server that owns the KVM is turned on.• The KVM is owned by a blade server that supports KVM.2. Reseat the monitor cable.3. Replace the monitor.

Power problems

<ul style="list-style-type: none">• Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.• If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician.	
Symptom	Action
The BladeCenter unit does not power on.	<ol style="list-style-type: none">1. Make sure that:<ol style="list-style-type: none">a. All power cords are plugged into 220-Volt power sources and that the power sources are working.b. The ac power and dc power LEDs on the power modules are lit.2. If you just installed an option, remove it, and restart the BladeCenter unit. If the BladeCenter unit now powers on, you might have installed more options than the power modules support. You might have to install power modules in power-module bays 3 and 4.3. If the problem remains, see the <i>BladeCenter H Problem Determination and Service Guide</i> for more information.

Management module problems

<ul style="list-style-type: none"> Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved. If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician. 	
Symptom	Action
Cannot connect to the BladeCenter unit using the Web interface or telnet.	<ol style="list-style-type: none"> Make sure that: <ul style="list-style-type: none"> The network cable is connected to the Ethernet port on the active management module. The network cable is not connected to the serial port on the management module. The IP address or host name is correct. Reseat the management module. Reset and reconfigure the management module (see the <i>BladeCenter Advanced Management Module Installation Guide</i> for more information). Replace the management module.
Cannot connect to the BladeCenter unit after a switchover to the redundant management module	<ol style="list-style-type: none"> Make sure that: <ul style="list-style-type: none"> The redundant management module has been installed for at least 45 minutes to receive the transfer of data from the primary management module. The network cable is connected to the Ethernet port on the active (redundant) management module. The network cable is not connected to the serial port on the active (redundant) management module. The IP address or host name is correct. Reseat the management module. Reset and reconfigure the management module (see the <i>BladeCenter Advanced Management Module Installation Guide</i> for more information). Replace the management module.

Blower module problems

<ul style="list-style-type: none"> Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved. If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician. 	
Symptom	Action
A blower module is running at full speed.	<ol style="list-style-type: none"> Make sure that: <ul style="list-style-type: none"> The other blower is installed and working. At least one management module is installed, and it is active and working. Reseat the following components: <ol style="list-style-type: none"> Media tray Blower module Replace the blower module.

<ul style="list-style-type: none"> • Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved. • If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician. 	
Symptom	Action
A blower module is not working.	<ol style="list-style-type: none"> 1. Make sure all power cords are plugged into 220-Volt power sources and that the power sources are working. 2. Reseat the blower module. 3. Replace the blower module.

Media tray problems

<ul style="list-style-type: none"> • Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved. • If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician. 	
Symptom	Action
The optical drive is not recognized by any blade server.	<ol style="list-style-type: none"> 1. Reseat the following components: <ol style="list-style-type: none"> a. Media tray b. Optical drive 2. Replace the optical drive.

Light path diagnostic LEDs

Light path diagnostic LEDs are a system of LEDs on the BladeCenter unit and the BladeCenter components that can be used to identify system errors. If the front or rear system-error LED of the BladeCenter unit is lit, one or more error LEDs on the BladeCenter components also might be lit. These LEDs help identify the cause of the problem.

Diagnosing problems using diagnostic LEDs

To identify the component that is causing the error, locate the lit error LED on that component.

The following example shows how to use the LEDs 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 error LED (see “BladeCenter components, controls, and LEDs” on page 12 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).
 - If the component is a module, replace the module.
 - 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.

Diagnostic LEDs

Use the following table to find solutions to problems that are identified by LEDs on the front and rear BladeCenter system LED panels.

Table 1. Diagnostic LEDs

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 see the <i>BladeCenter H Problem Determination and Service Guide</i> for more information.
Over-temperature	The system temperature has exceeded a threshold level.	<ol style="list-style-type: none"> 1. Determine whether a blower module has failed. If it has, replace the blower module as soon as possible, to regain redundancy. 2. Make sure that the room temperature is not too high. (See “Features and specifications” on page 3 for temperature information.) 3. Determine whether a blade server has a lit error LED. If it does, see the documentation that comes with the blade server. 4. Make sure that there is a blade server, module, or filler installed in each bay.
Information	A noncritical event has occurred that should be looked at, such as the wrong I/O module inserted in a bay, or power requirements that exceed the capacity of power modules currently installed.	<ol style="list-style-type: none"> 1. Check the management-module event log for the messages. 2. 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.	<ol style="list-style-type: none"> 1. Check the management-module event log for the messages. 2. Check the LEDs on the BladeCenter unit and the blade servers to isolate the component. <ul style="list-style-type: none"> • If the error LED is on a module, see the <i>BladeCenter H Problem Determination and Service Guide</i> for more information. • If the error LED is on a blade server, see the documentation that comes with the blade server.

Appendix A. BladeCenter management-module configuration worksheet

Use the worksheets in this appendix to record the information for configuring the BladeCenter unit using the management module. Information about using the worksheet is provided in the *Management Module User's Guide* for your management module.

General settings

Management-module name	
Contact name	
Physical location	
Clock settings	

Login profiles

Login ID	Password	Authority level	
		R/O	R/W

External network interface (eth0)

Interface	<input type="checkbox"/> Enabled <input type="checkbox"/> Disabled
DHCP	<input type="checkbox"/> DHCP with rollover to static <input type="checkbox"/> DHCP only <input type="checkbox"/> Static IP only
Host name	
Static IP configuration (configure only if DHCP is disabled)	
IP address	____.____.____.____
Subnet mask	____.____.____.____
Gateway IP address	____.____.____.____

Internal network interface (eth1)

Interface IP address	____.____.____.____
Subnet mask	____.____.____.____
Locally administered MAC address	____.____.____.____

Alerts

Remote alert recipients		
Receives critical alerts only		
	Status	
	Notification method	<input type="checkbox"/> SNMP over LAN <input type="checkbox"/> E-mail over LAN <input type="checkbox"/> IBM Director
	Host name (or IP address)	
	E-mail address	
Global remote alert settings		
Remote alerts retry limit		
Delay between retries		
Include event log with e-mail alerts		<input type="checkbox"/> Yes <input type="checkbox"/> No
Alerts to be monitored		
Critical alerts		Select all critical alerts
		Hard disk drive
		Multiple blower failures
		Power failure
		Temperature
		VRM failure
		Multiple switch module failures
		Invalid configuration
Warning alerts		Select all critical alerts
		Single blower failure
		Temperature
		Voltage
		KVM/media tray switching failure
		Redundant module failure
System alerts		Power off
		Inventory
		Log 75% full

Network protocols

SNMP	
SNMP agent	<input type="checkbox"/> Enable <input type="checkbox"/> Disable
SNMP traps	<input type="checkbox"/> Enable <input type="checkbox"/> Disable
Community name	
Host name (or IP address)	
SMTP	
Host name (or IP address)	
DNS	
DNS	<input type="checkbox"/> Enable <input type="checkbox"/> Disable
DNS server IP address 1	____.____.____.____
DNS server IP address 2	____.____.____.____
DNS server IP address 3	____.____.____.____

Security

Secure Socket Layer (SSL)	<input type="checkbox"/> Enabled <input type="checkbox"/> Disabled
Certificates	<input type="checkbox"/> Self-signed <input type="checkbox"/> Provided by a certificate authority

Appendix B. Getting help and technical assistance

If you need help, service, or technical assistance or just want more information about IBM products, you will find a wide variety of sources available from IBM to assist you. This section contains information about where to go for additional information about IBM and IBM products, what to do if you experience a problem with your 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 and any optional devices are turned on.
- Use the troubleshooting information in your system documentation, and use the diagnostic tools that come with your system. Information about diagnostic tools is in the *Problem Determination and Service Guide* on the IBM Documentation CD that comes with your system.
- Go to the IBM support Web site at <http://www.ibm.com/systems/support/> to check for technical information, hints, tips, and new device drivers or to submit a request for information.

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

Using the documentation

Information about your IBM system and preinstalled software, if any, or optional device is available in the documentation that comes with the product. That documentation can include printed documents, online documents, 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/systems/support/> and follow the instructions. Also, some documents are available through the IBM Publications Center at <http://www.ibm.com/shop/publications/order/>.

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 systems, optional devices, services, and support. The address for IBM System x[®] and xSeries[®] information is <http://www.ibm.com/systems/x/>. The address for IBM BladeCenter information is <http://www.ibm.com/systems/bladecenter/>. The address for IBM IntelliStation[®] information is <http://www.ibm.com/intellistation/>.

You can find service information for IBM systems and optional devices at <http://www.ibm.com/systems/support/>.

Software service and support

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

For more information about Support Line and other IBM services, see <http://www.ibm.com/services/>, or see <http://www.ibm.com/planetwide/> for support telephone numbers. In the U.S. and Canada, call 1-800-IBM-SERV (1-800-426-7378).

Hardware service and support

You can receive hardware service through your IBM reseller or IBM Services. To locate a reseller authorized by IBM to provide warranty service, go to <http://www.ibm.com/partnerworld/> and click **Find a Business Partner** on the right side of the page. For IBM support telephone numbers, see <http://www.ibm.com/planetwide/>. In the U.S. and Canada, call 1-800-IBM-SERV (1-800-426-7378).

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.

IBM Taiwan product service

台灣 IBM 產品服務聯絡方式：
台灣國際商業機器股份有限公司
台北市松仁路 7 號 3 樓
電話：0800-016-888

IBM Taiwan product service contact information:

IBM Taiwan Corporation
3F, No 7, Song Ren Rd.
Taipei, Taiwan
Telephone: 0800-016-888

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Important notes

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

CD or DVD drive speed is the variable read rate. Actual speeds vary and are often less than the possible maximum.

When referring to processor storage, real and virtual storage, or channel volume, KB stands for 1024 bytes, MB stands for 1 048 576 bytes, and GB stands for 1 073 741 824 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 can 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 that are available from IBM.

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

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

Particulate contamination

Attention: Airborne particulates (including metal flakes or particles) and reactive gases acting alone or in combination with other environmental factors such as humidity or temperature might pose a risk to the server that is described in this document. Risks that are posed by the presence of excessive particulate levels or concentrations of harmful gases include damage that might cause the server to malfunction or cease functioning altogether. This specification sets forth limits for particulates and gases that are intended to avoid such damage. The limits must not be viewed or used as definitive limits, because numerous other factors, such as temperature or moisture content of the air, can influence the impact of particulates or environmental corrosives and gaseous contaminant transfer. In the absence of specific limits that are set forth in this document, you must implement practices that maintain particulate and gas levels that are consistent with the protection of human health and safety. If IBM determines that the levels of particulates or gases in your environment have caused damage to the server IBM may condition provision of repair or replacement of servers or parts on implementation of appropriate remedial measures to mitigate such environmental contamination. Implementation of such remedial measures is a customer responsibility.

Table 2. Limits for particulates and gases

Contaminant	Limits
Particulate	<ul style="list-style-type: none">• The room air must be continuously filtered with 40% atmospheric dust spot efficiency (MERV 9) according to ASHRAE Standard 52.2¹.• Air that enters a data center must be filtered to 99.97% efficiency or greater, using high-efficiency particulate air (HEPA) filters that meet MIL-STD-282.• The deliquescent relative humidity of the particulate contamination must be more than 60%².• The room must be free of conductive contamination such as zinc whiskers.
Gaseous	<ul style="list-style-type: none">• Copper: Class G1 as per ANSI/ISA 71.04-1985³• Silver: Corrosion rate of less than 300 Å in 30 days

¹ ASHRAE 52.2-2008 - *Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size*. Atlanta: American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc.

² The deliquescent relative humidity of particulate contamination is the relative humidity at which the dust absorbs enough water to become wet and promote ionic conduction.

³ ANSI/ISA-71.04-1985. *Environmental conditions for process measurement and control systems: Airborne contaminants*. Instrument Society of America, Research Triangle Park, North Carolina, U.S.A.

Documentation format

The publications for this product are in Adobe Portable Document Format (PDF) and should be compliant with accessibility standards. If you experience difficulties when you use the PDF files and want to request a Web-based format or accessible PDF document for a publication, direct your mail to the following address:

*Information Development
IBM Corporation
205/A015*

3039 E. Cornwallis Road
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Electronic emission notices

Federal Communications Commission (FCC) statement

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

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

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

Industry Canada Class A emission compliance statement

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

Avis de conformité à la réglementation d'Industrie Canada

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

Australia and New Zealand Class A statement

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

European Union EMC Directive conformance statement

This product is in conformity with the protection requirements of EU Council Directive 2004/108/EC 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.

Attention: This is an EN 55022 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.

Responsible manufacturer:

International Business Machines Corp.
New Orchard Road
Armonk, New York 10504
914-499-1900

European Community contact:

IBM Technical Regulations, Department M456
IBM-Allee 1, 71137 Ehningen, Germany
Telephone: +49 7032 15-2937
E-mail: tjahn@de.ibm.com

Germany Class A statement

Deutschsprachiger EU Hinweis:

Hinweis für Geräte der Klasse A EU-Richtlinie zur Elektromagnetischen Verträglichkeit

Dieses Produkt entspricht den Schutzanforderungen der EU-Richtlinie 2004/108/EG zur Angleichung der Rechtsvorschriften über die elektromagnetische Verträglichkeit in den EU-Mitgliedsstaaten und hält die Grenzwerte der EN 55022 Klasse A ein.

Um dieses sicherzustellen, sind die Geräte wie in den Handbüchern beschrieben zu installieren und zu betreiben. Des Weiteren dürfen auch nur von der IBM empfohlene Kabel angeschlossen werden. IBM übernimmt keine Verantwortung für die Einhaltung der Schutzanforderungen, wenn das Produkt ohne Zustimmung der IBM verändert bzw. wenn Erweiterungskomponenten von Fremdherstellern ohne Empfehlung der IBM gesteckt/eingebaut werden.

EN 55022 Klasse A Geräte müssen mit folgendem Warnhinweis versehen werden: "Warnung: Dieses ist eine Einrichtung der Klasse A. Diese Einrichtung kann im Wohnbereich Funk-Störungen verursachen; in diesem Fall kann vom Betreiber verlangt werden, angemessene Maßnahmen zu ergreifen und dafür aufzukommen."

Deutschland: Einhaltung des Gesetzes über die elektromagnetische Verträglichkeit von Geräten

Dieses Produkt entspricht dem "Gesetz über die elektromagnetische Verträglichkeit von Geräten (EMVG)". Dies ist die Umsetzung der EU-Richtlinie 2004/108/EG in der Bundesrepublik Deutschland.

Zulassungsbescheinigung laut dem Deutschen Gesetz über die elektromagnetische Verträglichkeit von Geräten (EMVG) (bzw. der EMC EG Richtlinie 2004/108/EG) für Geräte der Klasse A

Dieses Gerät ist berechtigt, in Übereinstimmung mit dem Deutschen EMVG das EG-Konformitätszeichen - CE - zu führen.

Verantwortlich für die Einhaltung der EMV Vorschriften ist der Hersteller:

International Business Machines Corp.
New Orchard Road
Armonk, New York 10504
914-499-1900

Der verantwortliche Ansprechpartner des Herstellers in der EU ist:

IBM Deutschland
Technical Regulations, Department M456
IBM-Allee 1, 71137 Ehningen, Germany
Telephone: +49 7032 15-2937
E-mail: tjahn@de.ibm.com

Generelle Informationen:

**Das Gerät erfüllt die Schutzanforderungen nach EN 55024 und EN 55022
Klasse A.**

Japan VCCI Class A statement

この装置は、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。 VCCI-A

This is a Class A product based on the standard of the Voluntary Control Council for Interference (VCCI). If this equipment is used in a domestic environment, radio interference may occur, in which case the user may be required to take corrective actions.

Japan Electronics and Information Technology Industries Association (JEITA) statement

高調波ガイドライン適合品

Japanese Electronics and Information Technology Industries Association (JEITA)
Confirmed Harmonics Guideline (products less than or equal to 20 A per phase)

Korea Communications Commission (KCC) statement

이 기기는 업무용으로 전자파 적합등록을 받은 기기
이오니, 판매자 또는 사용자는 이점을 주의하시기
바라며, 만약 잘못 구입하셨을 때에는 구입한 곳에
서 비업무용으로 교환하시기 바랍니다.

Please note that this equipment has obtained EMC registration for commercial use. In the event that it has been mistakenly sold or purchased, please exchange it for equipment certified for home use.

Russia Electromagnetic Interference (EMI) Class A statement

ВНИМАНИЕ! Настоящее изделие относится к классу А.
В жилых помещениях оно может создавать радиопомехи, для
снижения которых необходимы дополнительные меры

People's Republic of China Class A electronic emission statement

中华人民共和国“A类”警告声明

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。

Taiwan Class A compliance 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。

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