IBM

BladeCenter HS12
Type 8014 or 8028

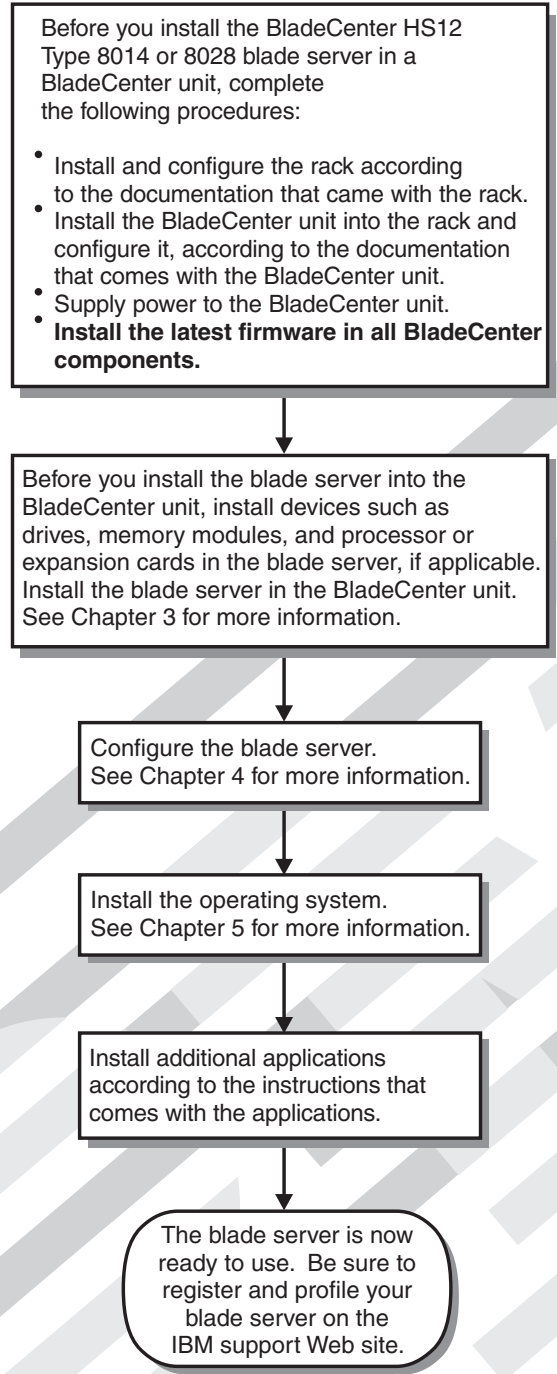## Installation and User's Guide

Welcome.

Thank you for buying an IBM blade server. Your blade server features superior performance, availability, and scalability.

This *Installation and User's Guide* contains information for setting up, configuring, and using your blade server.
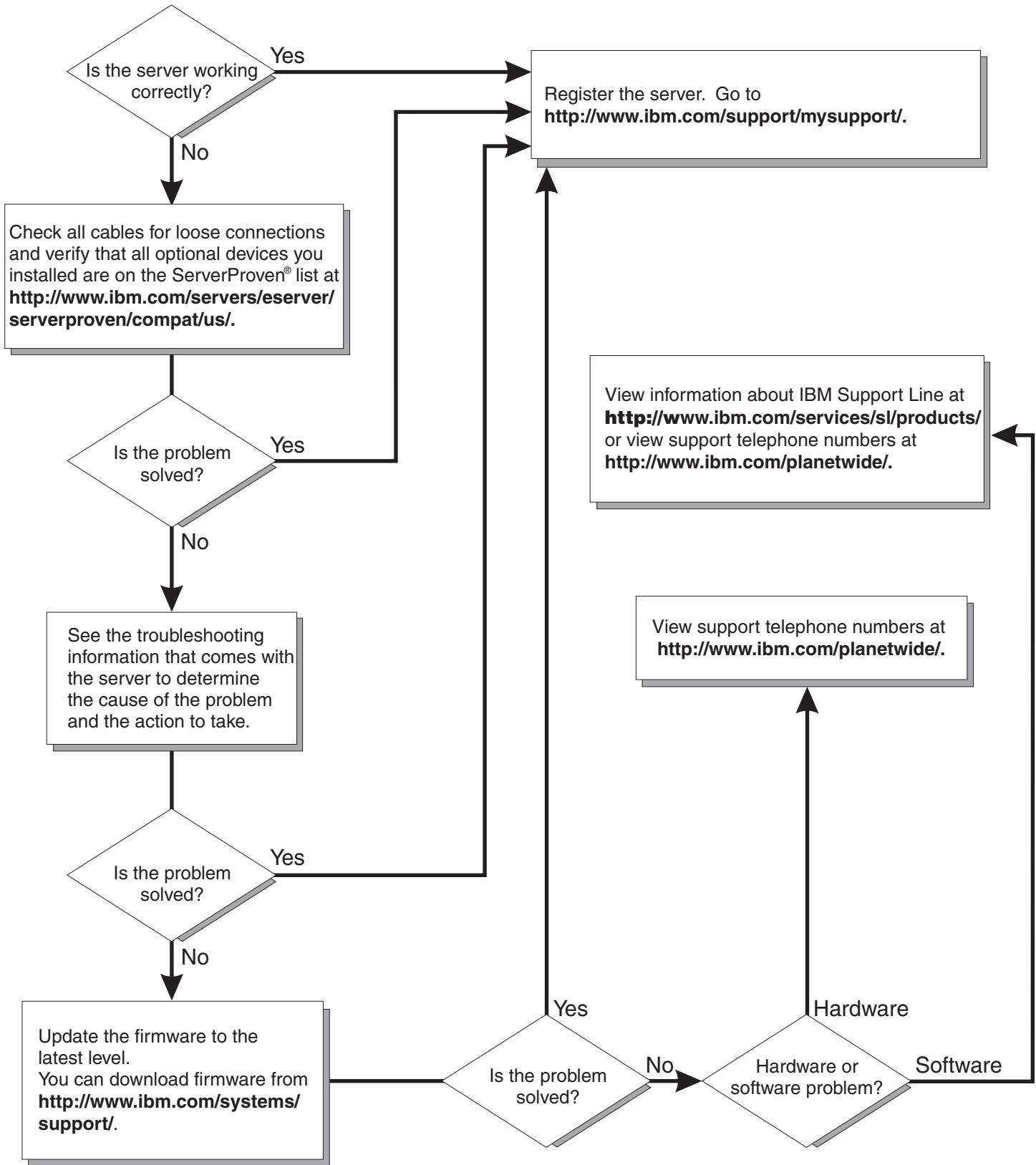
Additionally, a service information label is attached to each BladeCenter unit and blade server. This label provides a graphical summary of many of the installation and service activities that are associated with each device.

For more information about your BladeCenter components and features, you can view the publications on the *Documentation* CD or download them from the IBM support Web site.

Go to http://www.ibm.com/systems/support/.

Before you install the BladeCenter HS12 Type 8014 or 8028 blade server in a BladeCenter unit, complete the following procedures:

- Install and configure the rack according to the documentation that came with the rack.
- Install the BladeCenter unit into the rack and configure it, according to the documentation that comes with the BladeCenter unit.
- Supply power to the BladeCenter unit.
- **Install the latest firmware in all BladeCenter components.**

↓

Before you install the blade server into the BladeCenter unit, install devices such as drives, memory modules, and processor or expansion cards in the blade server, if applicable. Install the blade server in the BladeCenter unit. See Chapter 3 for more information.

↓

Configure the blade server. See Chapter 4 for more information.

↓

Install the operating system. See Chapter 5 for more information.

↓

Install additional applications according to the instructions that comes with the applications.

↓

The blade server is now ready to use. Be sure to register and profile your blade server on the IBM support Web site.

Server Support

Is the server working correctly? — **Yes** → Register the server. Go to **http://www.ibm.com/support/mysupport/.**

No ↓

Check all cables for loose connections and verify that all optional devices you installed are on the ServerProven® list at **http://www.ibm.com/servers/eserver/serverproven/compat/us/.**

↓

Is the problem solved? — **Yes** → Register the server. Go to **http://www.ibm.com/support/mysupport/.**

No ↓

See the troubleshooting information that comes with the server to determine the cause of the problem and the action to take.

↓

Is the problem solved? — **Yes** → Register the server. Go to **http://www.ibm.com/support/mysupport/.**

No ↓

Update the firmware to the latest level.
You can download firmware from **http://www.ibm.com/systems/support/.**

→ Is the problem solved? — **Yes** ↑ Register the server. Go to **http://www.ibm.com/support/mysupport/.**

No → Hardware or software problem?

Hardware ↑ View support telephone numbers at **http://www.ibm.com/planetwide/.**

Software → View information about IBM Support Line at **http://www.ibm.com/services/sl/products/** or view support telephone numbers at **http://www.ibm.com/planetwide/.**

BladeCenter HS12
Type 8014 or 8028

Installation and User's Guide

Note: Before using this information and the product it supports, read the general information in "Notices" on page 55 and the *Warranty and Support Information* document for your blade server type on the IBM *Documentation* CD.

Contents

Safety

Before installing this product, read the Safety Information.

قبل تركيب هذا المنتج، يجب قراءة الملاحظات الآمنية

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

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

安裝本產品之前，請先閱讀「安全資訊」。

Prije instalacije ovog produkta obavezno pročitajte Sigurnosne Upute.

Před instalací tohoto produktu si přečtěte příručku bezpečnostních instrukcí.

Læs sikkerhedsforskrifterne, før du installerer dette produkt.

Lees voordat u dit product installeert eerst de veiligheidsvoorschriften.

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

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

Vor der Installation dieses Produkts die Sicherheitshinweise lesen.

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

לפני שתתקינו מוצר זה, קראו את הוראות הבטיחות.

A termék telepítése előtt olvassa el a Biztonsági előírásokat!

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

製品の設置の前に、安全情報をお読みください。

본 제품을 설치하기 전에 안전 정보를 읽으십시오.

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

ᡳᠨᡩᠠᡥᠠ ᠰᡳᠮᠨᡝᡴ ... (Manchu/Mongolian vertical script)

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

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

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

Перед установкой продукта прочтите инструкции по
технике безопасности.

Pred inštaláciou tohto zariadenia si pečítaje Bezpečnostné predpisy.

Pred namestitvijo tega proizvoda preberite Varnostne informacije.

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

Läs säkerhetsinformationen innan du installerar den här produkten.

ཐོན་རྫས་འདི་བདེ་སྐྱོང་མ་བྱས་གོང་། སྐོར་གྱི་ཡིད་གཟབ་
བྱ་འདུ་མིན་ཡོད་པའི་འོད་སྟེར་བལྟ་དགོས།

Bu ürünü kurmadan önce güvenlik bilgilerini okuyun.

مەزكۇر مەھسۇلاتنى ئورنىتىشتىن بۇرۇن بىخەتەرلىك ئۇچۇرلىرىنى ئوقۇپ چىقىڭ.

Youq mwngz yungh canjbinj neix gaxgonq, itdingh aeu doeg aen
canjbinj soengq cungj vahgangj ancien siusik.

Safety statements

These statements provide the caution and danger information that is used in this
documentation.

Important:

Each caution and danger statement in this documentation 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 statement are in the *Safety Information* document under Statement 1.

Be sure to read all caution and danger statements in this documentation before you perform the procedures. Read any additional safety information that comes with your system 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:	To Disconnect:
1. Turn everything OFF.	1. Turn everything OFF.
2. First, attach all cables to devices.	2. First, remove power cords from outlet.
3. Attach signal cables to connectors.	3. Remove signal cables from connectors.
4. Attach power cords to outlet.	4. Remove all cables from devices.
5. Turn device ON.	

Statement 2

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

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

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

Statement 12

CAUTION:
The following label indicates a hot surface nearby.

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.

UL regulatory information

This device is for use only with Listed .

Chapter 1. Introduction

The IBM BladeCenter HS12 Type 8014 or 8028 blade server is compatible with IBM BladeCenter units. This single-wide blade server is ideally suited for Small and Medium Enterprise (SME) applications, branch office, and departmental workgroup locations. The IBM BladeCenter HS12 blade server supports one Intel LGA-771 high-performance microprocessor and has six memory-module slots, two storage-device bays, one Peripheral Component Interconnect eXtended (PCI-X) slot, a PCI-Express (PCI-E) connector, and a concurrent keyboard/video/mouse (cKVM) slot.

This blade server supports two model types:
- Type 8014 supports a fixed-storage device system and has a 1-year warranty
- Type 8028 supports a hot-swap storage device system and has a 3-year warranty

Note: Unless otherwise stated, references to the BladeCenter unit apply to all BladeCenter unit types.

This *Installation and User's Guide* provides information about:
- Setting up the blade server
- Starting and configuring the blade server
- Installing hardware options
- Installing the operating system
- Performing basic troubleshooting of the blade server

Packaged with this document are software CDs that help you to configure hardware, install device drivers, and install the operating system.

To download the latest device drivers, complete the following steps.

Note: Changes are made periodically to the IBM Web site. The actual procedure might vary slightly from what is described in this document.

1. Go to http://www.ibm.com/systems/support/.
2. Under **Product support**, click **BladeCenter**.
3. Under **Popular links**, click **Software and device drivers**.
4. Click **BladeCenter HS12** to display the matrix of downloadable files for the blade server.

The blade server comes with a limited warranty. For information about the terms of the warranty and getting service and assistance, see the *Warranty and Support Information* document for your blade server on the IBM *Documentation* CD. You can obtain up-to-date information about the blade server at http://www.ibm.com/systems/bladecenter/.

If firmware and documentation updates are available, you can download them from the IBM Web site. The blade server might have features that are not described in the documentation that comes with the blade server, and the documentation might be updated occasionally to include information about those features, or technical updates might be available to provide additional information that is not included in the blade server documentation.

To check for updates, complete the following steps.

Note: Changes are made periodically to the IBM Web site. Procedures for locating firmware and documentation might change from what is described in this document.

1. Go to http://www.ibm.com/systems/support/.
2. Under **Product support**, click **BladeCenter**.
3. Under **Popular links**, click **Software and device drivers** for firmware updates, or click **Publications lookup** for documentation updates.

Record information about the blade server in the following table. You will need these numbers when you register the blade server with IBM. You can register the blade server at http://www.ibm.com/support/mysupport/.

Product name	BladeCenter HS12
Machine type	_____
Model number	_____
Serial number	_____

The model number and serial number are on the ID label that is behind the control panel door on the front of the blade server, and on a label on the side of the blade server that is visible when the blade server is not in the BladeCenter unit.

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

Release handles
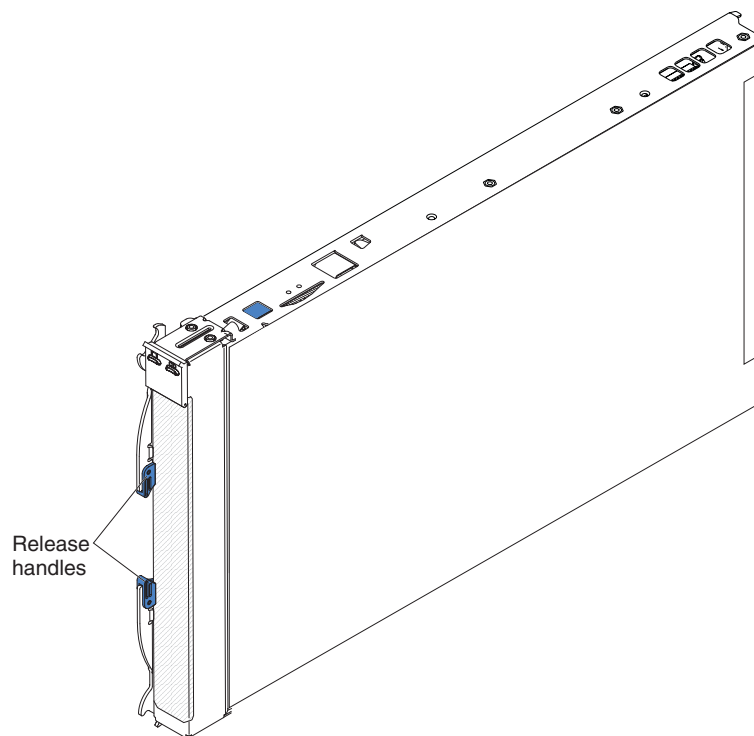
A set of blank labels for your blade server comes with the BladeCenter unit. When you install the blade server in the BladeCenter unit, write identifying information on a label and place the label on the BladeCenter unit bezel. See the documentation for your BladeCenter unit for recommended label placement. Important: Do not place the label on the blade server itself or in any way block the ventilation holes on the blade server.

Related documentation

Use this information to identify and locate related blade server documentation.

This *Installation and User's Guide* contains general information about the blade server, including how to install supported optional devices and how to configure the blade server. The following documentation also comes with the blade server:

* *Problem Determination and Service Guide*

  This document is in Portable Document Format (PDF) on the IBM *Documentation* CD. It contains information to help you solve problems yourself, and it contains information for service technicians.

* *Safety Information*

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

* *Warranty and Support Information*

  This document is in PDF on the IBM *Documentation* CD. It contains information about the terms of the warranty and getting service and assistance.

Depending on your BladeCenter product, additional documents might be included on the IBM *Documentation* CD. In addition to the documentation in this library, be sure to review the *Planning and Installation Guide* for your BladeCenter unit for information to help you prepare for system installation and configuration. To check for updated documentation and technical updates, complete the following steps.

Note: Changes are made periodically to the IBM Web site. The actual procedure might vary slightly from what is described in this document.

1. Go to http://www.ibm.com/systems/support/.
2. Under **Product support**, click **BladeCenter**.
3. Under **Popular links**, click **Publications lookup**.
4. From the **Product family** menu, select **BladeCenter HS12** and click **Continue**.

The IBM Documentation CD

Use the IBM Documentation CD to access the blade server documentation in PDF format.

You can run the IBM *Documentation* CD on any personal computer that meets the hardware and software requirements.

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

Hardware and software requirements

Use this information to determine the minimum hardware and software requirements for the blade server.

The IBM *Documentation* CD requires the following minimum hardware and software:
- Microsoft Windows XP, Windows 2000, or Red Hat Enterprise Linux 5 Server
- 100 MHz microprocessor
- 32 MB of RAM
- Adobe Acrobat Reader 3.0 (or later) or xpdf, which comes with Linux operating systems

Using the Documentation Browser

Use these instructions to start 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 displays the documents in the language for that region (if available). If a document is not available in the language for that region, the English-language version is displayed.

Use one of the following procedures to start the Documentation Browser:
- If Autostart is enabled, insert the CD into the CD drive. The Documentation Browser starts automatically.
- If Autostart is disabled or is not enabled for all users, use one of the following procedures:
  - If you are using a Windows operating system, insert the CD into the CD or DVD drive and click **Start → Run**. In the **Open** field, type

    `e:\win32.bat`

    where *e* is the drive letter of the CD or DVD drive, and click **OK**.
  - If you are using Red Hat Linux, insert the CD into the CD or DVD drive; then, run the following command from the /mnt/cdrom directory:

    `sh runlinux.sh`

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

When you select a document, a description of the document is displayed 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 Crtl+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.

Notices and statements in this document

Use this information to understand the most common documentation notices and statements and how they are used.

The caution and danger statements in this document are also in the multilingual *Safety Information* document, which is on the IBM *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 might occur.
- **Caution:** These statements indicate situations that can be potentially hazardous to you. A caution statement is placed just before the description of a potentially hazardous procedure step or situation.
- **Danger:** These statements indicate situations that can be potentially lethal or extremely hazardous to you. A danger statement is placed just before the description of a potentially lethal or extremely hazardous procedure step or situation.

Features and specifications

Use this table to view specific information about the blade server, such as, blade server hardware features and the dimensions of the blade server.

Notes:

1. Power, cooling, removable-media drives, external ports, and advanced system management are provided by the BladeCenter unit.
2. The operating system in the blade server must provide USB support for the blade server to recognize and use the removable-media drives. The BladeCenter unit uses USB for internal communications with these devices.

The following table is a summary of the features and specifications of the blade server.

Table 1. Features and specifications

Microprocessor: Supports one Intel LGA-771 microprocessor	**Predictive Failure Analysis (PFA) alerts:**	**Environment:**

Microprocessor: Supports one Intel LGA-771 microprocessor

Note: Use the Configuration/Setup Utility program to determine the type and speed of the microprocessors in the blade server.

Memory:
- Dual-channel, dual inline memory modules (DIMMs): 6 DIMM connectors
- Type: ECC double-data rate (DDR2 667) DRAM. Supports 512 MB, 1 GB, 2 GB, and 4 GB DIMMs with up to 24 GB of total memory on the system board

Drives: Support for a pair of one of the following storage drives:
- Hot-swap, small form factor (SFF) Serial Attached SCSI (SAS) hard disk drives, and hot-swap solid state storage drives.
- Fixed SFF Serial Advanced Technology Attachment (SATA) hard disk drives
- Fixed SFF SATA solid state storage drives

Predictive Failure Analysis (PFA) alerts:
- Microprocessor
- Memory
- Hard disk drives

Electrical input: 12 V dc

Integrated functions:
- Expansion card interface
- Local service processor: Baseboard management controller (BMC) with Intelligent Platform Management Interface (IPMI) firmware
- ATI ES1000 video controller
- LSI 1064E SAS controller (type 8028 and 1916)
- SATA controller (type 8014)
- Concurrent keyboard/video/ mouse (cKVM) support when optional cKVM feature card is installed
- Light path diagnostics
- RS-485 interface for communication with the management module
- Automatic server restart (ASR)
- USB 2.0 for communication with the cKVM and removable media drives
- Serial over LAN (SOL)
- Redundant buses for communication with keyboard, mouse, and removable media drives

Environment:
- Air temperature:
  - Blade server on: 10°C to 35°C (50°F to 95°F). Altitude: 0 m to 914.4 m (0 ft to 3000 ft)
  - Blade server on: 10°C to 32°C (50°F to 89.6°F). Altitude: 914.4 m to 2133.6 m (3000 ft to 7000 ft)
  - Blade server off: 10°C to 43°C (50°F to 89.6°F). Altitude: 914.4 m to 2133.6 m (3000 ft to 7000 ft)
  - Blade server shipping: -40°C to 60°C (-40°F to 140°F)
- Humidity:
  - Blade server on: 8% to 80%
  - Blade server off: 8% to 80%

Size:
- Height: 24.5 cm (9.7 inches)
- Depth: 44.6 cm (17.6 inches)
- Width: 2.9 cm (1.14 inches)
- Maximum weight: 4.8 kg (10 lb)

What your blade server offers

Your blade server offers features, such as, the Baseboard management controller, storage disk drive support, IBM® Director, IBM Enterprise X-Architecture, microprocessor technology, integrated network support, I/O expansion, large system-memory capacity, Light path diagnostics, PCI Express, and power throttling.

- **Baseboard management controller (BMC)**

  The baseboard management controller (BMC) is on the system board of the blade server. The BMC operates as the service processor for the blade server and performs several tasks, including the following:

  - Provides RS-485 interfaces to the management module
  - Provides the following support:
    - Intelligent Platform Management Interface (IPMI)
    - Power control and advanced power management
    - Reliability, availability, and serviceability (RAS) features
    - Serial over LAN (SOL)

- **Hard disk drive support**

  The blade server supports up to two of any one of the following types of storage devices:
  - 2.5-inch fixed SATA SFF solid state storage drives or SATA SFF hard disk drives, up to 80 GB (8014 model)
  - 2.5-inch hot-swap SAS SFF hard disk drives, RAID 0 and RAID 1 support, up to 146 GB (8028 model)
  - 2.5-inch hot-swap SAS SFF solid state storage drives, up to 146 GB (8028 model)

- **IBM® Director**

  IBM Director is a workgroup-hardware-management tool that you can use to centrally manage servers. For more information, see the IBM® Director documentation on the *IBM® Director* CD.

- **IBM Enterprise X-Architecture**

  IBM Enterprise X-Architecture technology combines proven, innovative IBM designs to make your x86-processor-based blade server powerful, scalable, and reliable. For more information, see http://www.ibm.com/servers/eserver/xseries/xarchitecture/enterprise/index.html.

- **IBM *ServerGuide Setup and Installation* CD**

  The *ServerGuide Setup and Installation* CD that comes with the blade server provides programs to help you set up the blade server and install a Windows operating system. The ServerGuide program detects installed optional hardware devices and provides the correct configuration programs and device drivers. For more information about the *ServerGuide Setup and Installation* CD, see "Using the ServerGuide Setup and Installation CD" on page 39.

- **Microprocessor technology**

  The blade server supports an Intel LGA-771 microprocessor. Depending on the model, the blade server comes with one of six specialty of Intel microprocessors. For more information about supported microprocessors and their part numbers, see the *Problem Determination and Service Guide*.

- **Integrated network support**

  The blade server comes with one integrated Broadcom 5714S dual Gigabit Ethernet controller, which support connection to a 10 Mbps network through an Ethernet-compatible switch module in the BladeCenter unit. The controller supports Wake on LAN technology.

- **I/O expansion**

  The blade server has connectors on the system board for optional expansion cards for adding more network communication capabilities to the blade server.

- **Large system-memory capacity**

  The blade server system board supports up to 24 GB of system memory. The memory controller provides support for up to six industry-standard registered ECC DDR2 667 on Very Low Profile (VLP) form factor DIMMs installed on the system board. For the most current list of supported DIMMs, see the ServerProven list at http://www.ibm.com/servers/eserver/serverproven/compat/us/.

- **Light path diagnostics**

  Light path diagnostics provides light-emitting diodes (LEDs) to help you diagnose problems. For more information, see the *Problem Determination and Service Guide*.

- **PCI Express**

PCI Express is a serial interface that is used for chip-to-chip interconnect and expansion adapter interconnect. With the blade expansion connector you can add optional I/O and storage devices.

- **Power throttling**

  Each blade server is powered by two BladeCenter redundant power-supply modules. By enforcing a power policy known as power-domain oversubscription, the BladeCenter unit can share the power load between two power modules to ensure sufficient power for each device in the BladeCenter unit. This policy is enforced when the initial power is applied to the BladeCenter unit or when a blade server is inserted into the BladeCenter unit.

  The following settings for this policy are available:

  - Redundant without performance impact
  - Redundant with performance impact
  - Nonredundant

  You can configure and monitor the power environment by using the management module. For more information about configuring and using power throttling, see the management-module documentation or http:// www.ibm.com/systems/support/.

Reliability, availability, and serviceability features

Reliability, availability, and serviceability features help to ensure the integrity of the data that is stored in the blade server, the availability of the blade server when you need it, and the ease with which you can diagnose and correct problems.

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

The blade server has the following RAS features:
- Advanced Configuration and Power Interface (ACPI)
- Automatic BIOS recovery (ABR)
- Automatic server restart (ASR)
- Built-in monitoring for temperature, voltage, hard disk drives.
- Customer support center 24 hours per day, 7 days a week.[1]
- Customer-upgradeable basic input/output system (BIOS) code and diagnostics
- Diagnostic support of Ethernet controllers
- ECC protection on the L2 cache
- Error codes and messages
- Hot-swap SAS or solid state storage drives, fixed SATA or solid state storage drives
- Light path diagnostics feature
- Memory parity testing
- Microprocessor built-in self-test (BIST) during power-on self-test (POST)
- Microprocessor serial number access
- PCI PMI 2.2
- PCI-X 1.0a
- PCI Express 1.0a
- POST
- ROM resident diagnostics
- Registered ECC DDR2 667 memory

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

- Service processor that communicates with the management module to enable remote blade server management
- System error logging
- Wake on LAN capability
- Wake on PCI (PME) capability
- Wake on USB 2.0 capability

IBM® Director

Use this information to understand how IBM® Director works with the blade server.

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 x86-processor-based servers, desktop computers, workstations, and notebook 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 Small Business Server, Microsoft Windows 2000 Server, Windows Server 2003, AIX®, i5/OS™, Red Hat Linux, SUSE Linux, and VMware. For a complete list of operating systems that support IBM Director, see the IBM Director Compatibility Document. This document is in Portable Document Format (PDF) at http://www.ibm.com/systems/management/director/resources/. It is updated every 6 to 8 weeks.
- Support for IBM and non-IBM servers, desktop computers, workstations, and notebook 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 server 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:
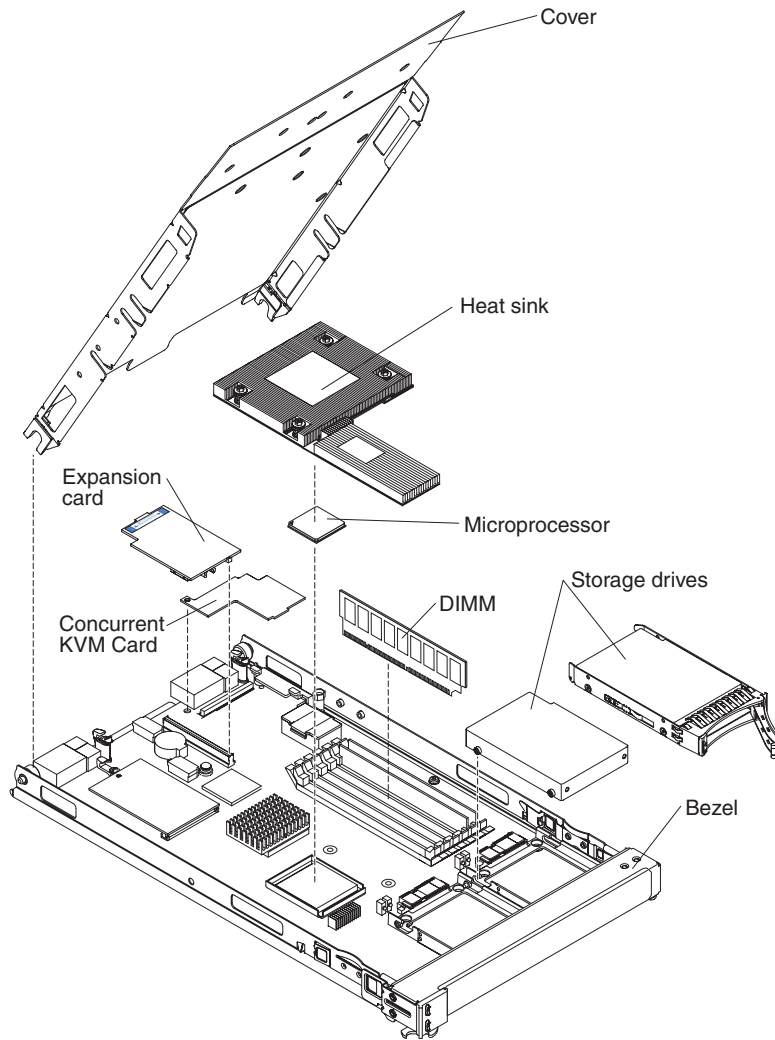
- Reduced downtime
- Increased productivity of IT personnel and users
- Reduced service and support costs

For more information about IBM® Director, see the documentation on the *IBM® Director* CD that comes with the server, the IBM® Director Information Center at http://publib.boulder.ibm.com/infocenter/eserver/v1r2/topic/diricinfo_all/diricinfoparent.html and the IBM xSeries Systems Management Web page at http://www.ibm.com/servers/eserver/xseries/systems_management/, which presents an overview of IBM Systems Management and IBM® Director.

Major components of the blade server

Use this information to locate the major components on the blade server. The major components of the blade server include Field Replaceable Units (FRUs), Customer Replaceable Units (CRUs), and optional devices.

The following illustration shows the major components of the blade server.

Cover

Heat sink

Expansion card

Microprocessor

Concurrent KVM Card

DIMM

Storage drives

Bezel

Chapter 2. Power, controls, and indicators

Use this information to view power features, turn on and turn off the blade server, and view the functions of the controls and indicators.

Blade server controls and LEDs

Use this information for details about the controls and LEDs on the blade server.

Note: The control panel door is shown in the closed position in the following illustration. To access the power-control button, you must open the control panel door.
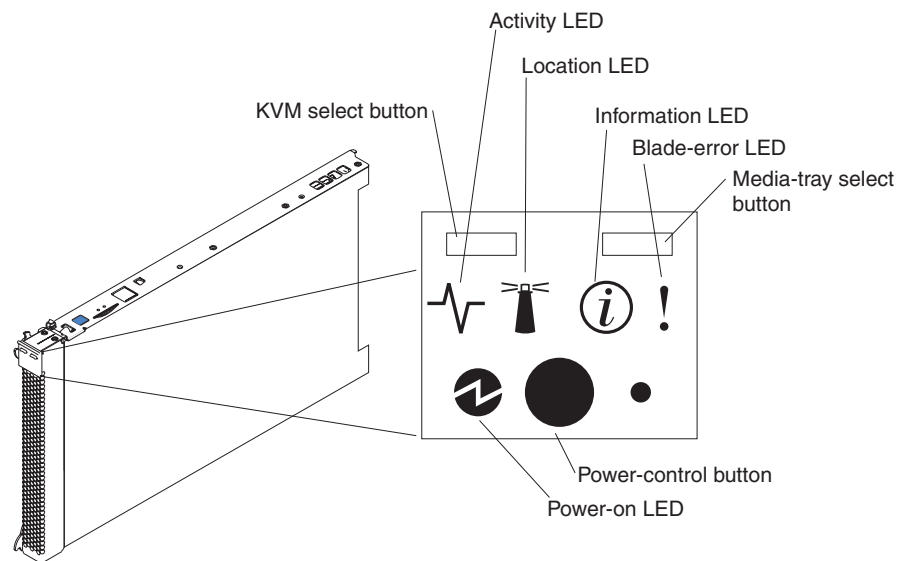
Keyboard/video/mouse (KVM) select button: Press this button to associate the shared BladeCenter unit keyboard port, video port, and mouse port with the blade server. The LED on this button flashes while the request is being processed and then is lit when the ownership of the keyboard, video, and mouse has been transferred to the blade server. It can take approximately 20 seconds to switch the keyboard, video, and mouse control to the blade server.

Using 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 instead of using the KVM select button:

NumLock NumLock *blade_server_number* Enter

blade_server_number is the two-digit number of the blade-server bay in which the blade server is installed. A blade server that occupies more than one blade-server bay is identified by the lowest bay number that it occupies.

If there is no response when you press the KVM select button, you can use the management-module Web interface to determine whether local control has been disabled on the blade server. See http://www-03.ibm.com/systems/management/ for more information.

Notes:

1. The operating system in the blade server must provide USB support for the blade server to recognize and use the keyboard and mouse, even if the keyboard and mouse have PS/2-style connectors.

2. If you install a supported Microsoft Windows operating system on the blade server while it is not the current owner of the keyboard, video, and mouse, a delay of up to 1 minute occurs the first time that you switch the keyboard, video, and mouse to the blade server. All subsequent switching takes place in the normal KVM switching time frame (up to 20 seconds).

Activity LED: When this green LED is lit, it indicates that there is activity on the hard disk drive or network.

Location LED: The system administrator can remotely turn on this blue LED to aid in visually locating the blade server. When this LED is lit, the location LED on the BladeCenter unit is also lit. The location LED can be turned off through the management-module Web interface at or through IBM® Director Console. For more information about the management-module Web interface, see http://www-03.ibm.com/systems/management/. For more information about IBM® Director, see the documentation on the IBM® Director CD that comes with the server, or visit the IBM® Director Information Center at http://publib.boulder.ibm.com/infocenter/eserver/v1r2/topic/diricinfo_all/diricinfoparent.html .

Information LED: When this amber LED is lit, it indicates that information about a system error in the blade server has been placed in the management-module event log. The information LED can be turned off through the management-module Web interface at or through IBM® Director Console. For more information about the management-module Web interface, see http://www-03.ibm.com/systems/management/. For more information about IBM® Director, see the documentation on the IBM® Director CD that comes with the server, or visit the IBM® Director Information Center at http://publib.boulder.ibm.com/infocenter/eserver/v1r2/topic/diricinfo_all/diricinfoparent.html .

Blade-error LED: When this amber LED is lit, it indicates that a system error has occurred in the blade server. The blade-error LED turns off only after the error is corrected.

Media-tray select button: Press this button to associate the shared BladeCenter unit media tray (removable-media drives) with the blade server. The LED on the button flashes while the request is being processed and then is lit when the ownership of the media tray has been transferred to the blade server. It can take approximately 20 seconds for the operating system in the blade server to recognize the media tray.

If there is no response when you press the media-tray select button, you can use the management-module Web interface to determine whether local control has been disabled on the blade server.

Note: The operating system in the blade server must provide USB support for the blade server to recognize and use the removable-media drives.

Power-control button: This button is behind the control panel door. Press this button to turn on or turn off the blade server.

Note: The power-control button has effect only if local power control is enabled for the blade server. Local power control is enabled and disabled through the management-module Web interface.

Power-on LED: This green LED indicates the power status of the blade server in the following manner:
- Flashing rapidly: The service processor (BMC) on the blade server is communicating with the management module.
- Flashing slowly: The blade server has power but is not turned on.
- Lit continuously: The blade server has power and is turned on.

Turning on the blade server

Use this information to turn on the blade server.

After you connect the blade server to power through the BladeCenter unit, the blade server can start in any of the following ways:
- You can press the power-control button on the front of the blade server (behind the control panel door, see "Blade server controls and LEDs" on page 11) to start the blade server.

   Notes:
   1. Wait until the power-on LED on the blade server flashes slowly before you press the power-control button. While the service processor in the management module is initializing, the power-on LED does not flash, and the power-control button on the blade server does not respond.
   2. While the blade server is starting, the power-on LED on the front of the blade server is lit. See "Blade server controls and LEDs" on page 11 for the power-on LED states.
- If a power failure occurs, the BladeCenter unit and then the blade server can start automatically when power is restored, if the blade server is configured through the management module to do so.
- You can turn on the blade server remotely by using the management module.
- If the blade server is connected to power (the power-on LED is flashing slowly), the operating system supports the Wake on LAN feature, and the Wake on LAN feature has not been disabled through the management module, the Wake on LAN feature can turn on the blade server.

Turning off the blade server

Use this information to turn off the blade server.

When you turn off the blade server, it is still connected to power through the BladeCenter unit. The blade server can respond to requests from the service processor, such as a remote request to turn on the blade server. To remove all power from the blade server, you must remove it from the BladeCenter unit. Shut down the operating system before you turn off the blade server. See the operating-system documentation for information about shutting down the operating system.

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

- You can press the power-control button on the blade server (behind the control panel door; see "Blade server controls and LEDs" on page 11). This starts an orderly shutdown of the operating system, if this feature is supported by the operating system.
- If the operating system stops functioning, you can press and hold the power-control button for more than 4 seconds to turn off the blade server.
- The management module can turn off the blade server through the management-module Web interface. For additional information, see the *IBM BladeCenter Management Module User's Guide* or go to http://www-03.ibm.com/ systems/management/ for more information.

Blade server connectors

Use this information to locate blade server system-board components and connectors for optional devices.

The following illustration shows the system-board components, including connectors for user-installable optional devices, in the blade server.
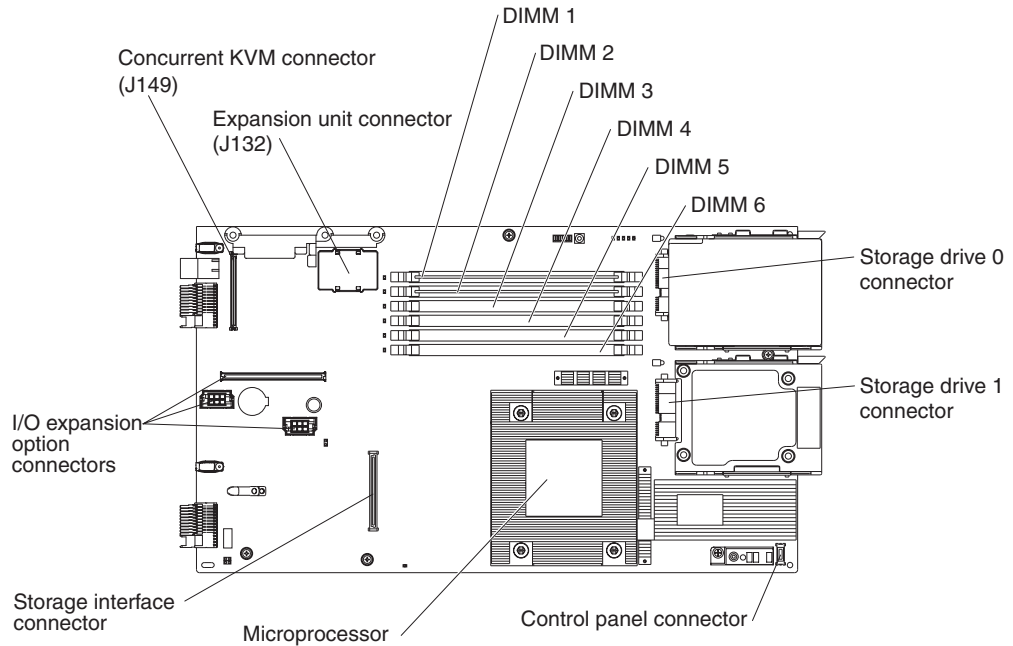
Chapter 3. Installing options

Use this information for instructions about installing optional hardware devices in the blade server. Some option-removal instructions are provided in case you have to remove one option to install another.

Installation guidelines

Use these guidelines before you install the blade server or optional devices.

Before you install optional devices, read the following information:

- Before you begin, read "Safety" on page v and "Installation guidelines." This information will help you work safely.
- When you install your new blade server, take the opportunity to download and apply the most recent firmware updates. This step will help to ensure that any known issues are addressed and that your blade server is ready to function at maximum levels of performance.

  To download firmware updates for your blade server, complete the following steps.

  Note: Changes are made periodically to the IBM Web site. The actual procedure might vary slightly from what is described in this document.

  1. Go to http://www.ibm.com/systems/support/.
  2. Under **Product support**, click **BladeCenter**.
  3. Under **Popular links**, click **Software and device drivers**.
  4. Click **BladeCenter HS12** to display the matrix of downloadable files for the blade server.
- Observe good housekeeping in the area where you are working. Place removed covers and other parts in a safe place.
- Back up all important data before you make changes to disk drives.
- Before you remove a blade server from the BladeCenter unit, you must shut down the operating system and turn off the blade server. 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 blade server, open or close a latch, and so on.
- Orange on a component or an orange label on or near a component indicates that the component can be hot-swapped, which means that if the server and operating system support hot-swap capability, you can remove or install the component while the server 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.
- For a list of supported optional devices for the blade server, see http://www.ibm.com/servers/eserver/serverproven/compat/us/.

System reliability guidelines

Use this information to make sure that the blade server meets the proper cooling and reliability guidelines.

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

- To ensure proper cooling, do not operate the BladeCenter unit without a blade server, expansion unit, or blade filler installed in each blade-server bay. See the documentation for your BladeCenter unit for additional information
- The blade server battery must be operational. If the battery becomes defective, replace it immediately. For instructions, see the *Problem Determination and Service Guide*.

Handling static-sensitive devices

Use this information to observe the static-sensitive device requirements.

Attention: Static electricity can damage the blade server 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 damage from electrostatic discharge, observe the following precautions:

- When you work on a BladeCenter unit that has an electrostatic discharge (ESD) connector, use a wrist strap, especially when you handle modules, optional devices, or blade servers. To work correctly, the wrist strap must have a good contact at both ends (touching your skin at one end and firmly connected to the ESD connector on the front or back of the BladeCenter unit).
- 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 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 any *unpainted* metal surface on any other grounded rack component in the rack in which you are installing the device for at least 2 seconds. This drains static electricity from the package and from your body.
- Remove the device from its package and install it directly into the blade server without setting down the device. If it is necessary to set down the device, put it back into its static-protective package. Do not place the device on the blade server cover or on a metal surface.
- Take additional care when you handle devices during cold weather. Heating reduces indoor humidity and increases static electricity.

Removing the blade server from the BladeCenter unit

Use these instructions to remove the blade server from the BladeCenter unit.

If you need an unpopulated I/O-module bay in your BladeCenter unit to install your new blade server, remove an existing blade server or filler module from the BladeCenter unit. The following illustration shows how to remove a blade server or filler module from a BladeCenter unit. The appearance of your BladeCenter unit might be different; see the documentation for your BladeCenter unit for additional information.

Release handles
(open)
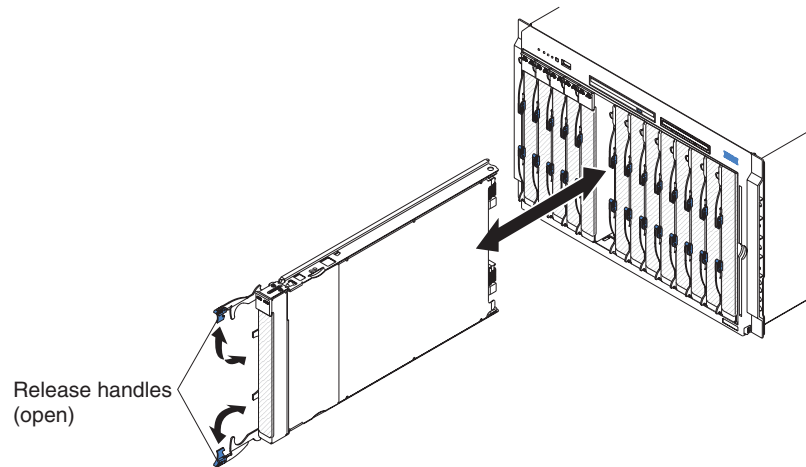
Attention:

- To maintain proper system cooling, do not operate the BladeCenter unit without a blade server, expansion unit, or filler module installed in each blade server bay.
- When you remove the blade server, note the blade-server bay number. Reinstalling a blade server into a different blade server bay from the one it was removed from can have unintended consequences. Some configuration information and update options are established according to blade-server bay number; if you reinstall the blade server into a different bay, you might have to reconfigure the blade server.

To remove the blade server, complete the following steps:

1. If the blade server is operating, shut down the operating system; then, press the power-control button (behind the blade server control panel door) to turn off the blade server (see "Turning off the blade server" on page 13 for more information).

   Attention: Wait at least 30 seconds, until the storage devices stop spinning, before you proceed to the next step.

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

3. Pull the blade server out of the bay.

4. Place either a blade filler or another blade server in the blade server bay within 1 minute.

Opening the blade server cover

Use these instructions to open the blade server cover.

To open the blade server cover, complete the following steps.

Note:

1. The following illustration shows how to open the cover on the blade server.

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

Blade server cover

Cover pins

Blade server cover release
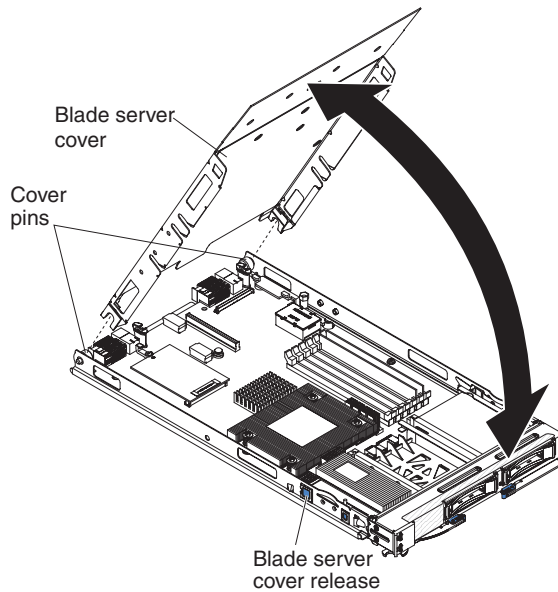
1. Before you begin, read "Safety" on page v and "Installation guidelines" on page 15.
2. If the blade server is installed in a BladeCenter unit, remove it (see "Removing the blade server from the BladeCenter unit" on page 16 for instructions).
3. If the blade server has an expansion unit in place of the cover, remove it (see "Removing an optional expansion unit").
4. Carefully lay the blade server on a flat, static-protective surface, with the cover side up.
5. Press the blade server cover release on each side of the blade server or expansion unit and lift the cover open, as shown in the illustration.
6. Lay the cover flat, or lift it from the blade server and store for future use.

Statement 21

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

Removing an optional expansion unit

Use these instructions to remove the optional expansion unit from the blade server.

To remove the optional expansion unit, complete the following steps.

Note:
1. The following illustration shows how to remove an optional expansion unit from a blade server.
2. The illustrations in this document might differ slightly from your hardware.

Expansion unit

Blade server
cover release

Blade server
cover release
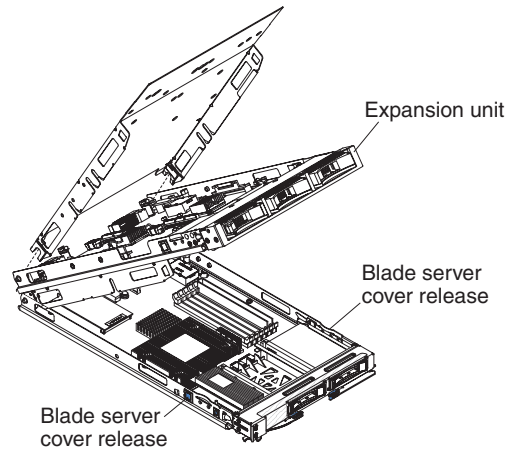
1. Before you begin, read "Safety" on page v and "Installation guidelines" on page 15.
2. If the blade server is installed in a BladeCenter unit, remove it (see "Removing the blade server from the BladeCenter unit" on page 16 for instructions).
3. Carefully lay the blade server on a flat, static-protective surface, with the cover side up.
4. Open the blade server cover, if one is installed (see "Opening the blade server cover" on page 17 for instructions).
5. Remove the expansion unit:
   a. Press the blade server cover release on each side of the blade server.
   b. Use the extraction device on the expansion unit, if one is present, to disengage the expansion unit from the system board. These extraction devices can be of several types, including thumbscrews or levers.
   c. Rotate the expansion unit open; then, lift the expansion unit from the blade server.
6. If you are instructed to return the cover or an optional expansion unit, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing a fixed-storage drive

Use these instructions to install a fixed-storage drive, such as solid state storage drive or SATA storage drive, in the blade server.

Notes:
1. The following illustration shows how to install a fixed-storage drive in a blade server.
2. The illustrations in this document might differ slightly from your hardware.
3. You must have a SATA interface card installed to control the storage drives. This interface card comes preinstalled in the blade server.

The blade server (machine type 8014) has two storage bays for installing fixed-storage drives, such as solid state storage drives or SATA storage drives. To install a fixed-storage drive, complete the following steps.
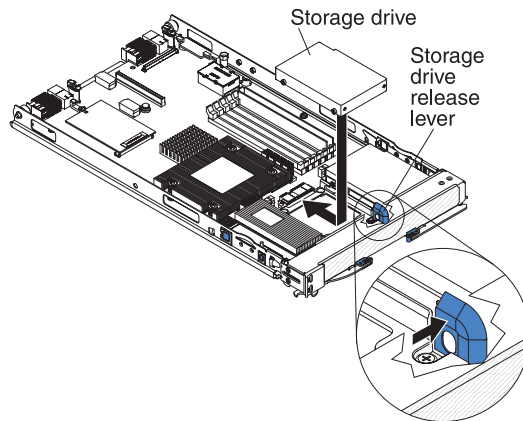
Storage drive

Storage drive release lever

1. Before you begin, read "Safety" on page v and "Installation guidelines" on page 15.
2. If the blade server is installed in a BladeCenter unit, remove it (see "Removing the blade server from the BladeCenter unit" on page 16 for instructions).
3. Carefully lay the blade server on a flat, static-protective surface.
4. Open the blade server cover (see "Opening the blade server cover" on page 17 for instructions).
5. If an optional expansion unit is installed, remove it (see "Removing an optional expansion unit" on page 18).
6. Touch the static-protective package that contains the storage drive to any *unpainted* metal surface on the BladeCenter unit or any *unpainted* metal surface on any other grounded rack component; then, remove the storage drive from the package.
7. Open the storage drive release lever on the system board; then, put the drive into the storage bay and push it, from the rear edge of the drive, into the connector until the drive moves past the storage drive release lever and is firmly seated in the connector.

   Attention: Do not press on the top of the drive. Pressing on the top might damage the drive.
8. Lock the storage drive into place by making sure that the storage drive release lever is secure.

If you have other devices to install or remove, do so now; otherwise, go to "Completing the installation" on page 30.

Installing a hot-swap storage drive

Use these instructions to install hot-swap storage devices, such as SAS storage drives, in the blade server.

Notes:

1. The following illustration shows how to install a hot-swap storage drive in a blade server.
2. The illustrations in this document might differ slightly from your hardware.
3. You must have a SAS interface card installed to control the storage drives. This interface card comes preinstalled in the blade server.

The blade server (machine type 8028) has two storage bays for installing hot-swap storage devices, such as SAS storage drives. One storage drive might already be

installed in the blade server in storage bay 0. If the blade server is equipped with one storage drive, you can install an additional drive in storage bay 1. These two SAS hard disk drives support RAID 0 and RAID 1 (use to implement and manage a redundant array of independent disks (RAID) level-1 array). See "Configuring a SAS RAID array" on page 42 for information about SAS RAID configuration.

To install a hot-swap hard disk drive, complete the following steps.
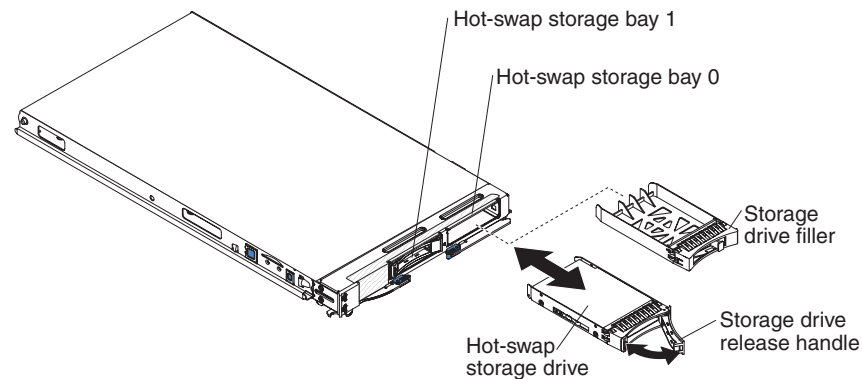
1. Before you begin, read "Safety" on page v and "Installation guidelines" on page 15.
2. Identify the blade server storage bay (hot-swap storage bay 0 or hot-swap storage bay 1) in which the hard disk drive will be installed.
3. If a storage-bay filler is installed, remove it from the blade server by lifting the release levers and pulling it away from the blade server.
4. Touch the static-protective package that contains the hard disk drive to any *unpainted* metal surface on the BladeCenter unit or any *unpainted* metal surface on any other grounded rack component; then, remove the hard disk drive from the package.
5. Open the release lever on the hot-swap hard disk drive and slide the drive into the storage bay until it is firmly seated in the connector.
6. Lock the hard disk drive into place by closing the release lever.

If you have other devices to install or remove, do so now; otherwise, go to "Completing the installation" on page 30.

Installing a memory module

Use these instructions to install memory modules in the blade server.

The following notes describe the types of direct inline memory modules (DIMMs) that the blade server supports and other information that you must consider when you install DIMMs:

Note:
1. The following illustration shows the location of the DIMM connectors on the system board.
2. The illustrations in this document might differ slightly from your hardware.
- The system board has DIMM connectors.
- The server supports two-way memory interleaving.

- The optional DIMMs that are available for the blade server are 512 MB, 1 GB, 2 GB, and 4 GB. Depending on the memory configuration that is set in the Configuration/Setup Utility program, the blade server can support a minimum of 1 GB and a maximum of 24 GB of system memory on the system board.
- When you install memory, you must install a pair of matched DIMMs. Some blade server models come with one DIMM installed in DIMM slot 1. In this case, you must order and install a second matched DIMM in DIMM slot 2. Install the DIMMs in the order shown in the following table.

Table 2. DIMM configuration

Pair	DIMM pairs and location
First	DIMM 1 and DIMM 2
Second	DIMM 3 and DIMM 4
Third	DIMM 5 and DIMM 6

Table 3. DIMM Population Rule

Configuration	DIMM 5 and DIMM 6	DIMM 3 and DIMM 4	DIMM 1 and DIMM 2
1	X	X	Single rank
2	X	Single rank	Single rank
3	Single rank	Single rank	Single rank
4	X	X	Dual rank
5	X	Dual rank	Dual rank
6	Dual rank	Dual rank	Dual rank
7	X	Dual rank	Single rank
8	X	Single rank	Dual rank
9	Dual rank	Single rank	Single rank
10	Dual rank	Dual rank	Single rank

- All DIMMs in a pair or group must be the same size, speed, type, technology, and physical design. You can use compatible DIMMs from different manufacturers.
- Install only ECC DDR2 667 DRAM with ECC DIMMs. For a current list of supported DIMMs for the blade server, see http://www.ibm.com/servers/eserver/serverproven/compat/us/.
- Installing or removing DIMMs changes the configuration information of the blade server. After you install or remove a DIMM, you must change and save the new configuration information by using the Configuration/Setup Utility program. When you restart the blade server, a message indicates that the memory configuration has changed. Start the Configuration/Setup Utility program and select **Save Settings** (see "Configuration/Setup Utility menu" on page 36 for more information) to save changes.

To install a DIMM, complete the following steps:

1. Before you begin, read "Safety" on page v and "Installation guidelines" on page 15.
2. Read the documentation that comes with the DIMMs.
3. If the blade server is installed in a BladeCenter unit, remove it (see "Removing the blade server from the BladeCenter unit" on page 16 for instructions).

4. Carefully lay the blade server on a flat, static-protective surface.
5. Open the blade server cover (see "Opening the blade server cover" on page 17 for instructions).
6. If an expansion unit is installed and you are installing DIMMs on the system board, remove the expansion unit (see "Removing an optional expansion unit" on page 18).
7. Locate the DIMM connectors. Determine the connector into which you will install the DIMM.
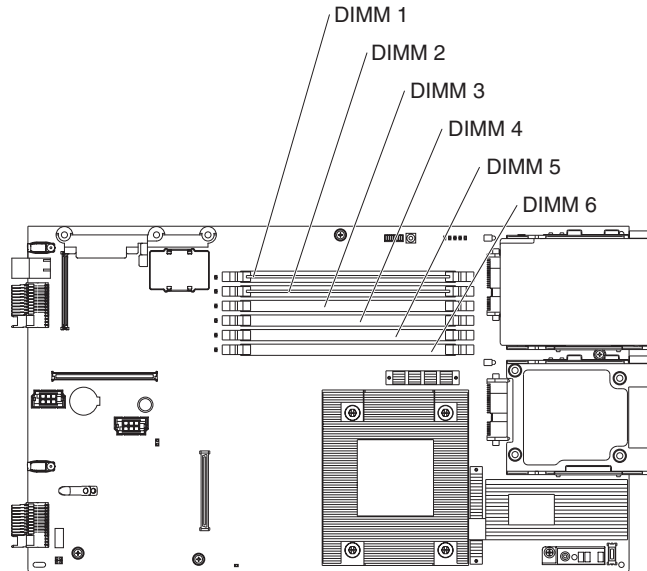
8. Touch the static-protective package that contains the DIMM to any *unpainted* metal surface on the BladeCenter unit or any *unpainted* metal surface on any other grounded rack component in the rack in which you are installing the DIMM for at least 2 seconds; then, remove the DIMM from its package.
9. To install the DIMMs, repeat the following steps for each DIMM that you install:
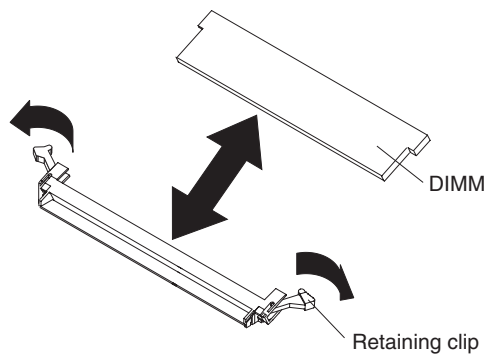
a. Turn the DIMM so that the DIMM keys align correctly with the connector on the system board.

   Attention: To avoid breaking the retaining clips or damaging the DIMM connectors, handle the clips gently.

b. Make sure that the small tabs on the retaining clips are in the notches on the DIMM. If there is a gap between the DIMM and the retaining clips, the DIMM has not been correctly installed. Press the DIMM firmly into the connector, and then press the retaining clips toward the DIMM until the

tabs are fully seated. When the DIMM is correctly installed, the retaining clips are parallel to the sides of the DIMM.

Important: If there is a gap between the DIMM and the retaining clips, the DIMM has not been correctly installed. In this case, open the retaining clips and remove the DIMM; then, reinsert the DIMM.

If you have other devices to install or remove, do so now; otherwise, go to "Completing the installation" on page 30.
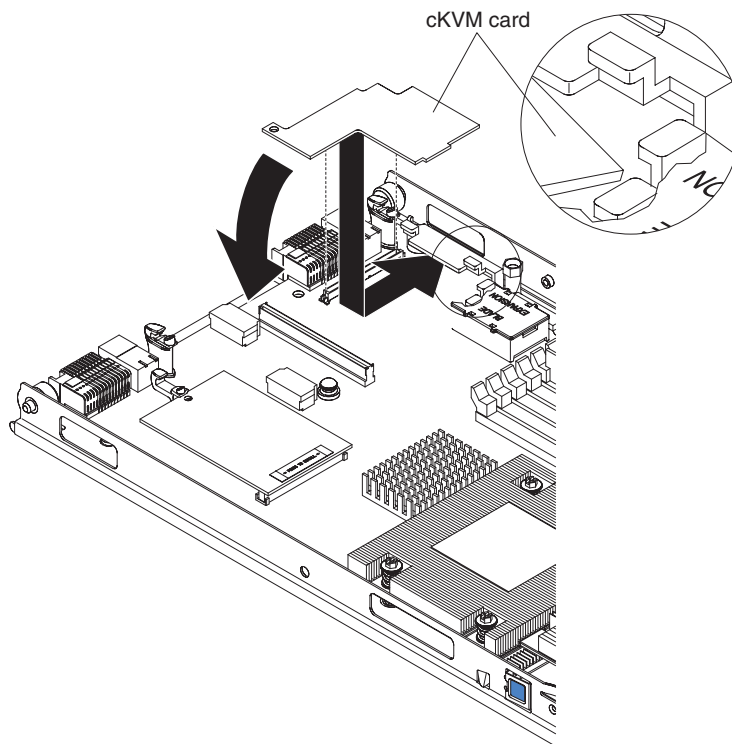
Installing a concurrent KVM card

Use these instructions to install a concurrent KVM (CKVM) card in the blade server.

To install a cKVM card, complete the following steps.

Notes:

1. The following illustration shows the location and how to install a cKVM card in the system board.
2. The illustrations in this document might differ slightly from your hardware.

1. Before you begin, read "Safety" on page v and "Installation guidelines" on page 15.
2. If the blade server is installed in a BladeCenter unit, remove it (see "Removing the blade server from the BladeCenter unit" on page 16 for instructions).
3. Carefully lay the blade server on a flat, static-protective surface.
4. Open the blade server cover (see "Opening the blade server cover" on page 17 for instructions).

5. If an optional expansion unit is installed, remove it (see "Removing an optional expansion unit" on page 18).

6. If an I/O expansion card or a high-speed expansion card is installed, remove it.

7. Touch the static-protective package that contains the cKVM card to any *unpainted* metal surface on the BladeCenter unit or any *unpainted* metal surface on any other grounded rack component; then, remove the card from the package.

8. Locate the cKVM connector and orient the cKVM card.

9. Slide the right side of the card (the side of the card that is away from the cKVM connector) between the two tabs at the right side of the expansion card bracket; then, gently pivot the card into the connector.

   Note: For device-driver and configuration information to complete the installation of the cKVM card, see the documentation that comes with the card.

10. If you removed a small-form-factor expansion card or a high-speed expansion card in step "Installing a concurrent KVM card" on page 24, reinstall it (see "I/O expansion cards").

If you have other devices to install or remove, do so now; otherwise, go to "Completing the installation" on page 30.

I/O expansion cards

Use this information to install an I/O expansion card, such as a SAS connectivity card, in the blade server.

The illustrations show installation of the SAS connectivity card in the system board; installing the card in an expansion unit is similar.

The blade server supports various types of I/O expansion cards. See http://www.ibm.com/servers/eserver/serverproven/compat/us/ for a list of available I/O expansion cards and their form-factor types. The following notes describe information that you must consider when you install an I/O expansion card:

- The system board supports two I/O expansion cards. The supported cards are the SAS connectivity card and the high-speed expansion card.
- If an expansion unit is installed, you cannot install a high-speed expansion card in the blade server; however, some expansion units do support installation of additional I/O expansion cards. See the documentation for your expansion unit for information.

Make sure that the BladeCenter unit and the I/O modules to which the I/O expansion card is mapped support the network-interface type of the I/O expansion card. For example, if you add an Ethernet expansion card to a blade server in a Type 8677 BladeCenter unit, the I/O modules in I/O-module bays 3 and 4 on the BladeCenter unit must both be compatible with the expansion card. All other expansion cards that are installed in other blade servers in the BladeCenter unit must also be compatible with these I/O modules. In this example, you can then install two Ethernet switch modules, two pass-thru modules, or one Ethernet switch module and one pass-thru module. Because pass-thru modules are compatible with a variety of I/O expansion cards, installing two pass-thru

modules enables the use of several types of compatible I/O expansion cards in blade servers within the same BladeCenter unit.

Installing an I/O expansion card

Use these instructions to install an I/O expansion card, such as a SAS connectivity card, a high-speed expansion card, or an InfiniBand high-speed I/O expansion card, in the blade server.

The illustrations show installing a SAS connectivity card and a high-speed expansion card on the system board; installing the cards in an expansion unit is similar.

The blade server supports various types of I/O expansion cards. See http://www.ibm.com/servers/eserver/serverproven/compat/us/ for a list of available I/O expansion cards and their form-factor types.

Before you install the I/O expansion card in a blade server, consider the following BladeCenter expansion card, blade server, and other related device information:

- The appearance of your blade server or system boards might be different from the illustrations in this document.
- Depending on the model of blade server in which the I/O expansion card is being installed, the specific location of connectors and other components might be different from the illustrations in this document or your BladeCenter documentation.

Make sure that the BladeCenter unit and the I/O modules to which the I/O expansion card is mapped support the network-interface type of the I/O expansion card. For example, if you add an Ethernet expansion card to a blade server in a Type 8677 BladeCenter unit, the I/O modules in I/O-module bays 3 and 4 on the BladeCenter unit must both be compatible with the expansion card. All other expansion cards that are installed in other blade servers in the BladeCenter unit must also be compatible with these I/O modules. In this example, you can then install two Ethernet switch modules, two pass-thru modules, or one Ethernet switch module and one pass-thru module. Because pass-thru modules are compatible with a variety of I/O expansion cards, installing two pass-thru modules enables the use of several types of compatible I/O expansion cards in blade servers within the same BladeCenter unit.

The following illustration shows how to install an I/O expansion card.

To install the I/O expansion card in a blade server, complete the following steps.

Expansion card

Expansion card
connectors
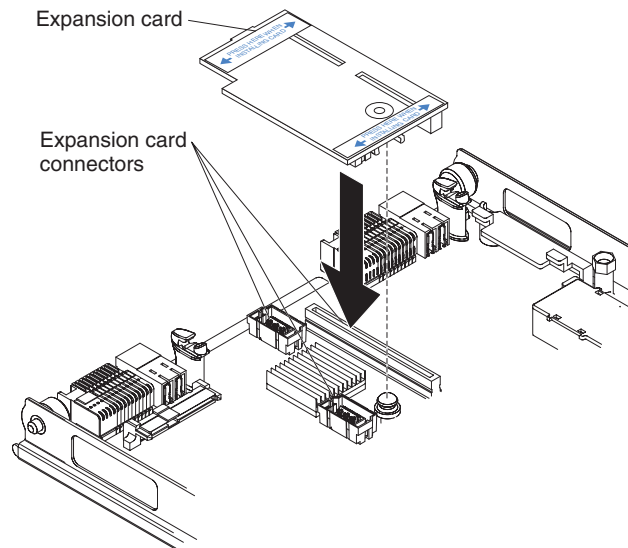
1. Before you begin, read "Safety" on page v and "Installation guidelines" on page 15.
2. Turn off the blade server.
3. If the blade server is installed in a BladeCenter unit, remove it (see"Removing the blade server from the BladeCenter unit" on page 16 for instructions).
4. Open the blade server cover. (see "Opening the blade server cover" on page 17 for instructions).
5. If an optional expansion unit is installed, remove it (see "Removing an optional expansion unit" on page 18).
6. If the system board in the blade server contains an I/O expansion card, such as a high-speed expansion card, remove the expansion card that is blocking access to these connectors.
7. If you have not already done so, touch the static-protective package that contains the I/O expansion card to any *unpainted* metal surface of the BladeCenter unit or any *unpainted* metal surface on any other grounded rack-component for at least 2 seconds.
8. Remove the I/O expansion card from its static-protective package.
9. Locate the three I/O expansion-card connectors on the system board in the blade server. Note that two of these card connectors are identical.
10. Align the I/O expansion card over the system board in the blade server, so that the three connectors on the reverse side of the card are correctly aligned above the three matching expansion card connectors on the system board in the blade server.

    ATTENTION: When you apply pressure to both sides of the expansion card to seat it in the blade server in step, press the card gently, so that you do not damage it.
11. To correctly seat the I/O expansion card in the blade server, press down firmly on all four corners of the card. The two labels on the top ends of the card are blue touch points on the I/O expansion card. One of these labels contains the following statement: **PRESS TO INSTALL**. The I/O expansion card is automatically secured to the system board through the retention clip that is located on the reverse side of the card.

Note: The retention clip is permanently attached to the reverse side of the I/O expansion card. Do *not* attempt to remove the retention clip.

12. If you removed an expansion card that was blocking access to the three I/O expansion-card connectors on the blade-server system board, reinstall the expansion card.

13. Reinstall the cover on the blade server. For instructions, see the *Installation and User's Guide* that comes with your blade server. Turn on the blade server, and continue with your BladeCenter system activities.

Note: For device-driver and configuration information to complete the installation of the I/O expansion card, see the documentation that comes with the expansion card.

If you have other devices to install or remove, do so now; otherwise, go to "Completing the installation" on page 30.
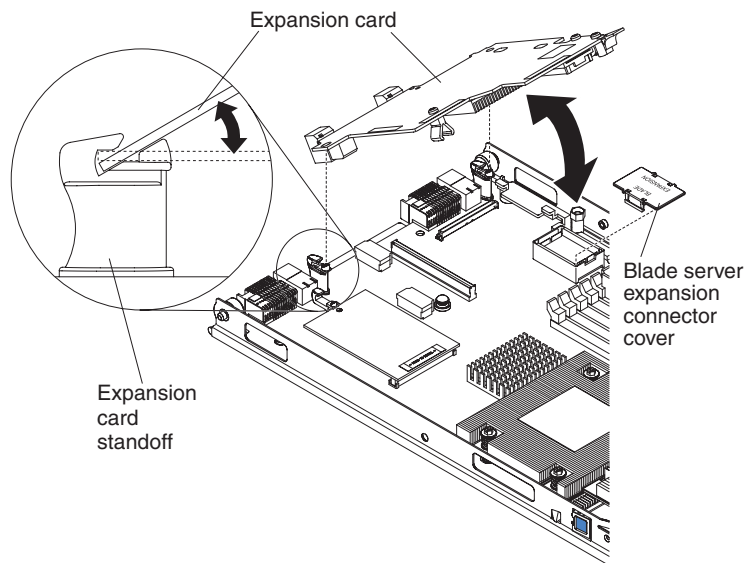
Installing a high-speed expansion card

Use these instructions to install a high-speed expansion card in the blade server.

To install a high-speed expansion card, complete the following steps.

Note:

1. The following illustration shows the location and installation of a high-speed expansion card, such as an InfiniBand high-speed expansion card, in the system board.

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

1. Before you begin, read "Safety" on page v and "Installation guidelines" on page 15.

2. If the blade server is installed in a BladeCenter unit, remove it (see "Removing the blade server from the BladeCenter unit" on page 16 for instructions).

3. Carefully lay the blade server on a flat, static-protective surface.

4. Open the blade server cover (see "Opening the blade server cover" on page 17 for instructions).

5. Locate the blade server expansion connector and remove the blade server expansion connector cover and set it aside.
6. Touch the static-protective package that contains the expansion card to any *unpainted* metal surface on the BladeCenter unit or any *unpainted* metal surface on any other grounded rack component; then, remove the expansion card from the package.
7. Orient the expansion card and slide the slots at the back end of the card onto the pins on the expansion-card standoff; then, gently pivot the card into the blade server expansion connector.
8. Firmly press on the indicated locations to seat the expansion card.

   Note: For device-driver and configuration information to complete the installation of the expansion card, see the documentation that comes with the expansion card.

If you have other devices to install or remove, do so now; otherwise, go to "Completing the installation" on page 30.

Installing an optional expansion unit

Use these instructions to install an optional expansion unit.

The optional expansion units supported for this blade server are the PCI I/O expansion unit and the Storage and I/O expansion unit.

Attention: If a high-speed expansion card is installed on the blade server system board, you cannot install an optional expansion unit.

Notes:
1. The following illustration shows an optional expansion unit in a blade server.
2. The illustrations in this document might differ slightly from your hardware.

To install an optional expansion unit, complete the following steps.
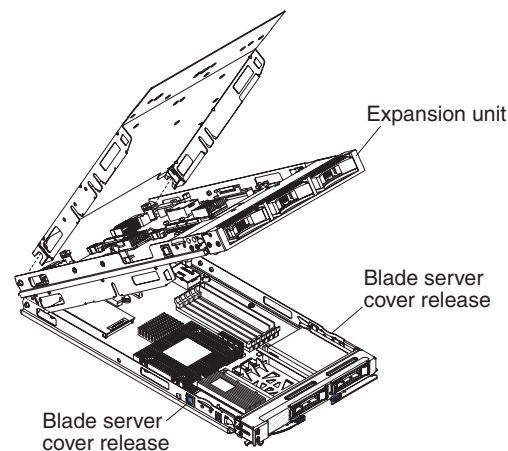
Expansion unit

Blade server cover release

Blade server cover release

1. Before you begin, read "Safety" on page v and "Installation guidelines" on page 15.
2. If the blade server is installed in a BladeCenter unit, remove it (see "Removing the blade server from the BladeCenter unit" on page 16 for instructions).

3. Remove the protective covers from the blade server expansion connectors, if any are present.

4. Touch the static-protective package that contains the optional expansion unit to any *unpainted* metal surface on the BladeCenter unit or any *unpainted* metal surface on any other grounded rack component; then, remove the optional expansion unit from the package.

5. Orient the optional expansion unit as shown in the illustration.

6. Lower the optional expansion unit so that the slots at the rear slide down onto the cover pins at the rear of the blade server.

7. Close the optional expansion unit (see the expansion unit documentation for information and instructions):

   - If the optional expansion unit has an extraction device, pivot the expansion unit closed; then, use the extraction device to fully seat the expansion unit on the system board. These extraction devices can be of several types, including thumbscrews or levers.

   - If the optional expansion unit has no extraction device, pivot the expansion unit closed; then, press the expansion unit firmly into place until the blade server cover releases click.

The connectors on the expansion unit automatically align with and connect to the connectors in the system board.

If you have other expansion units to install, do so now; otherwise, go to "Completing the installation."

Completing the installation

To complete the installation, complete the following tasks.

1. Reinstall the optional expansion unit, if you removed one to install other devices (see "Installing an optional expansion unit" on page 29 for information on installing the expansion unit).

2. Close the blade server cover, unless you installed an optional expansion unit that has its own cover (see "Closing the blade server cover" on page 31).

   Statement 21

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

3. Reinstall the blade server into the BladeCenter unit (see "Installing the blade server in a BladeCenter unit" on page 31).

4. Turn on the blade server (see "Turning on the blade server" on page 13).

5. For certain devices, run the blade server Configuration/Setup Utility program (see Chapter 4, "Configuring the blade server," on page 35).

   Note: If you have just connected the power cords of the BladeCenter unit to electrical outlets, you must wait until the power-on LED on the blade server flashes slowly before you press the power-control button.

Closing the blade server cover

Use these instructions for information about how to close the blade server cover.

Attention: You cannot insert the blade server into the BladeCenter unit until the cover is installed and closed or an expansion unit is installed. Do not attempt to override this protection.

To close the blade server cover, complete the following steps:
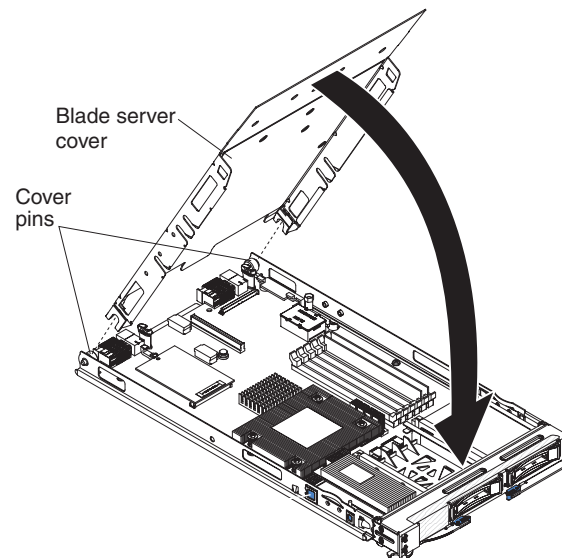
1. Read the safety information that begins on page "Safety" on page v and "Installation guidelines" on page 15.
2. Lower the cover so that the slots at the rear slide down onto the pins at the rear of the blade server, as shown in the illustration. Before you close the cover, make sure that all components are installed and seated correctly and that you have not left loose tools or parts inside the blade server.
3. Pivot the cover to the closed position, as shown in the illustration, until it clicks into place.

Installing the blade server in a BladeCenter unit

Use these instructions to install the blade server in a BladeCenter unit.

The following illustration shows how to install a blade server into a BladeCenter unit. The appearance of your BladeCenter unit might be different; see the documentation for your BladeCenter unit for additional information. To install a blade server in a BladeCenter unit, complete the following steps.
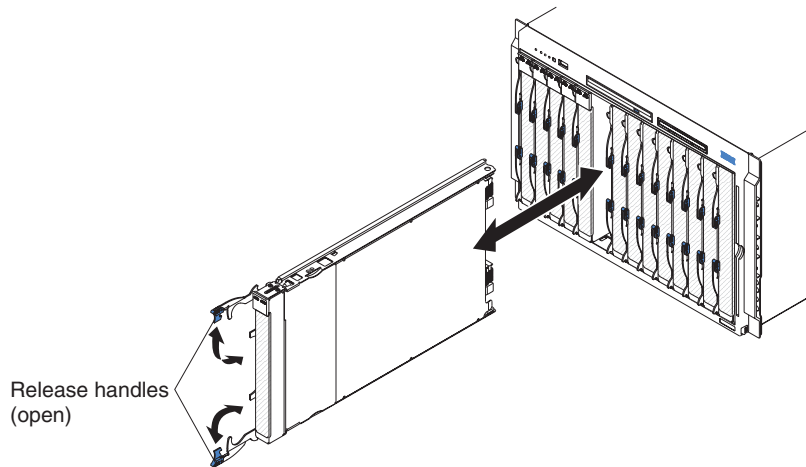
Release handles
(open)

Statement 21

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

1. Before you begin, read "Safety" on page v and "Installation guidelines" on page 15.
2. If you have not done so already, install any optional devices that you want, such as hard disk drives, memory, or an InfiniBand high-speed expansion card, in the blade server.
3. Select the I/O-module bay for the blade server; at least one I/O-module bay is required.

   Notes:
   a. When any blade server or device is in any I/O-module bay 7 through 14, power modules must be installed in all four power-module bays. For additional information, see the *Installation and User's Guide* that comes with the BladeCenter unit.
   b. To help ensure proper cooling, performance, and system reliability, make sure that each I/O-module bay on the front of the BladeCenter unit contains a blade server, expansion unit, or blade filler. Do not operate a BladeCenter unit for more than 1 minute without a blade server, expansion unit, or blade filler in each I/O-module bay.
4. Make sure that the release handles on the blade server are in the open position (perpendicular to the blade server).
5. Slide the blade server into the I/O-module bay until it stops.
6. Push the release handles on the front of the blade server to the closed position.
7. Turn on the blade server (see "Turning on the blade server" on page 13 for instructions).
8. Make sure that the power-on LED on the blade server control panel is lit continuously, indicating that the blade server is receiving power and is turned on.
9. If you have other blade servers to install, do so now.

If you reinstall a blade server that you removed, you must install it in the same blade server bay from which you removed it. Some blade server configuration information and update options are established according to blade server bay number. Reinstalling a blade server into a different blade server bay number from the one from which it was removed can have unintended consequences, and you might have to reconfigure the blade server.

If this is the initial installation of the blade server in the BladeCenter unit, you must configure the blade server through the Configuration/Setup Utility program and install the blade server operating system. See "Updating the blade server configuration" and Chapter 5, "Installing the operating system," on page 45 for details. If you have changed the configuration of the blade server or if you are installing a different blade server from the one that you removed, you must configure the blade server through the Configuration/Setup Utility, and you might have to install the blade server operating system. For more information, see "Using the Configuration/Setup Utility program" on page 35.

Updating the blade server configuration

Use this information to update the blade server configuration.

When the blade server starts for the first time after you add or remove an internal device, you might receive a message that the configuration has changed. The Configuration/Setup Utility program automatically starts so that you can save the new configuration settings. See "Using the Configuration/Setup Utility program" on page 35 for more information about the Configuration/Setup Utility program.

Some options have device drivers that you must install. See the documentation that comes with each device for information about installing device drivers.

The blade server operates as a symmetric multiprocessing (SMP) server, regardless of how many microprocessors are installed. For optimum performance, you must upgrade the operating system to support SMP. See Chapter 5, "Installing the operating system," on page 45 and your operating-system documentation for additional information.

Input/output connectors and devices

Use this information to locate the input/output connectors and devices.

See the documentation that comes with the BladeCenter unit for information about the input/output connectors.

The input/output connectors that are available to the blade server are supplied by the BladeCenter unit. The blade server has two selection buttons on the control panel: the media tray select button and the keyboard/video/mouse select button. See "Blade server controls and LEDs" on page 11 for information about these buttons and their functions.

The Ethernet controllers on the blade server communicate with the network through the Ethernet-compatible I/O modules in the BladeCenter unit. Network signals to and from the blade server or any expansion cards are automatically routed to a same-network-interface I/O module through circuitry in the BladeCenter unit.

Chapter 4. Configuring the blade server

Use this information for details about the configuration requirements of the blade server.

Before you continue, make sure that the blade server has the latest version of firmware code. For additional information, see "Firmware updates" on page 41.

The following configuration programs come with the blade server:

- **Configuration/Setup Utility program**

  The Configuration/Setup Utility program is part of the basic input/output system (BIOS). Use it to change system settings, such as interrupt requests (IRQ), date and time, and password. See "Using the Configuration/Setup Utility program" for more information.

- **LSI Logic Configuration Utility program**

  The LSI Logic Configuration Utility program is part of the BIOS. Use it to set the device scan order and to set the storage drive controller IDs. See "Using the LSI Logic Configuration Utility program" on page 43 for more information.

- **IBM** *ServerGuide Setup and Installation* **CD**

  The ServerGuide program provides software-setup tools and installation tools that are designed for the blade server. Use this CD during the installation of the blade server to configure basic hardware features and to simplify the installation of the operating system. For information about using this CD, see "Using the ServerGuide Setup and Installation CD" on page 39.

- **Preboot Execution Environment (PXE) boot agent utility program**

  The PXE boot agent utility program is part of the BIOS. Use it to select the boot protocol and other boot options and to select a power-management option. For information about using this utility program, see "Using the PXE boot agent utility program" on page 41.

The IBM Remote Deployment Manager (RDM) Version 4.20 program is available for purchase. You can use IBM RDM Version 4.20 (or later) to install a BIOS code update onto a blade server by following the instructions in the documentation that comes with the RDM program. To determine whether an operating system supports the RDM program or for updated information about RDM and information about purchasing the software, go to http://www.ibm.com/systems/management/.

Using the Configuration/Setup Utility program

Use these instructions to start the Configuration/Setup Utility program.

To start the Configuration/Setup Utility program, complete the following steps:

1. Turn on the blade server (see "Turning on the blade server" on page 13).
2. Immediately give the blade server control of the BladeCenter unit shared keyboard, video, and mouse ports.
   - If you are managing the blade server by using the BladeCenter system console, press the KVM select button on the blade server (see "Blade server controls and LEDs" on page 11 for information).

- If you are managing the blade server from a remote location, see the *IBM BladeCenter Management Module User's Guide*, *IBM BladeCenter Management Module Command-Line Interface Reference Guide*, or *IBM BladeCenter Serial over LAN Setup Guide* for information and instructions.

3. When the Configuration/Setup utility message is displayed, press F1.

4. Follow the instructions on the screen.

Configuration/Setup Utility menu

Use the Configuration/Setup Utility main menu to view and configure blade server configuration data and settings.

The following menu items are on the Configuration/Setup Utility main menu. Depending on the version of the BIOS, some menu items might differ slightly from these descriptions.

- **System Summary**

  Select this menu item to view configuration information, including the type, speed, and cache sizes of the microprocessors and the amount of installed memory. When you make configuration changes through other choices in the Configuration/Setup Utility program, the changes are reflected in the system summary; you cannot change settings directly in the system summary.

  – **Processor Summary**

    Select this menu item to view information about the microprocessor in the blade server.

  – **USB Device Summary**

    Select this menu item to view information about the USB devices in the blade server.

- **System Information**

  Select this menu item to view information about the blade server. When you make configuration changes through other options in the Configuration/Setup Utility program, some of those choices are reflected in the system information; you cannot change settings directly in the system information.

  – **Product Data**

    Select this menu item to view the machine type and model of the blade server, the serial number, and the revision level or issue date of the BIOS and diagnostics code that are stored in electrically erasable programmable ROM (EEPROM).

- **Devices and I/O Ports**

  Select this menu item to view or change assignments for devices and input/output (I/O) ports.

  You can also enable or disable the integrated SAS and Ethernet controllers, all standard ports (such as serial), and the I/O-expansion card. **Enable** is the default setting for all controllers. If you disable a device, it cannot be configured, and the operating system will not be able to detect it (this is equivalent to disconnecting the device). If you disable the Ethernet controller, the blade server will have no Ethernet capability.

  – **Remote Console Redirection**

    Select this menu item to enable Serial over LAN (SOL) and to set remote console communication parameters.

  – **Video**

    Select this menu item to view information about the integrated video controller.

– **System MAC Addresses**

  Select this menu item to set and view the MAC addresses for the Ethernet controllers on the blade server.

  Note: MAC addresses are displayed only for those devices with PXE enabled

- **Date and Time**

  Select this menu item to set the system date and time, in 24-hour format (*hour*:*minute*:*second*).

- **System Security**

  Select this menu item to set a power-on password. See "Using passwords" on page 38 for more information about passwords.

- **Start Options**

  Select this menu item to view or change the start options. Changes in the start options take effect when you start the blade server.

  – **Startup Sequence Options**

  Select this menu item to view the startup device sequence that is set for the blade server.

  You can set keyboard operating characteristics, such as whether the blade server starts with the keyboard number lock on or off. You can enable the blade server to run without a diskette drive or keyboard.

  You can enable or disable the PXE option for all of the Ethernet controllers in the blade server. The default settings enable the PXE option for the two Ethernet controllers on the system board.

  If you enable the boot fail count, the BIOS default settings will be restored after three consecutive failures to find a boot record.

  You can enable a virus-detection test that checks for changes in the boot record when the blade server starts.

- **Advanced Setup**

  Select this menu item to change settings for advanced hardware features.

  Important: The blade server might malfunction if these settings are incorrectly configured. Follow the instructions on the screen carefully.

  – **Memory Settings**

  Select this menu item to manually enable a pair of memory connectors.

  If a memory error is detected during POST or memory configuration, the blade server automatically disables the failing pair of memory connectors and continues operating with reduced memory. After the problem is corrected, you must enable the memory connectors. Use the arrow keys to highlight the pair of memory connectors that you want to enable, and use the arrow keys to select **Enable**.

  To maintain optimum system operation in the event of a memory failure, you can set memory configuration to mirroring or sparing. Memory mirroring stores duplicate data on two DIMMs to prevent data loss if a DIMM fails. Memory sparing removes the failed memory from the system configuration and activates a hot spare pair of DIMMs to replace the failed pair of DIMMs. Before you can enable memory mirroring or sparing, at least two pairs of DIMMs must be installed in the blade server that adhere to the special requirements that are described in "Installing a memory module" on page 21. Set **Memory Configuration** to **Flat** to disable memory mirroring and sparing.

  – **Microprocessor Options**

Select this menu item to disable the microprocessor cache or to set the microprocessor cache to use the write-back or write-through method. Write-back caching generally provides better system performance.

You can also select this menu item to enable or disable hyper-threading and adjust microprocessor performance settings. If hyper-threading is enabled, it is active only if it is supported by your operating system.

– **PCI Bus Control**

Select this menu item to view and set interrupts for PCI devices and to configure the master-latency-timer value for the blade server.

– **Baseboard Management Controller (BMC) Settings**

You can select this menu item to enable or disable and set the timeouts for the POST and OS loader watchdog timers and view BMC version information.

- **BMC Network Configuration**

Select this menu item to set the network addresses of the BMC.

- **BMC System Event Log**

Select this menu item to view and clear BMC event log entries.

• **Save Settings**

Select this menu item to save the changes that you have made in the settings.

• **Restore Settings**

Select this menu item to cancel the changes that you have made in the settings and restore the previous settings.

• **Load Default Settings**

Select this menu item to cancel the changes that you have made in the settings and restore the factory settings.

• **Exit Setup**

Select this menu item to exit from the Configuration/Setup Utility program. If you have not saved the changes that you have made in the settings, you are asked whether you want to save the changes or exit without saving them.

Using passwords

Use this information to set, change, or delete a power-on password.

From the **System Security** choice, you can set, change, and delete a power-on password.

If you set a power-on password, you must type the power-on password to complete the system startup and to have access to the Configuration/Setup Utility menu.

You can use any combination of up to seven characters (A - Z, a - z, and 0 - 9) for the password. Keep a record of your password in a secure place.

If you forget the power-on password, you can regain access to the blade server either by removing the blade server battery and then reinstalling it or by using the power-on password override switch (see the *Problem Determination and Service Guide* on the *Documentation* CD for instructions).

Using the ServerGuide Setup and Installation CD

Use this information as an overview for using the ServerGuide Setup and Installation CD.

The *ServerGuide Setup and Installation* CD contains a setup and installation program that is designed for your blade server. The ServerGuide program detects the blade server model and optional hardware devices that are installed and uses that information during setup to configure the hardware. The ServerGuide program simplifies operating-system installations by providing updated device drivers and, in some cases, installing them automatically.

If a later version of the ServerGuide program is available, you can download a free image of the *ServerGuide Setup and Installation* CD, or purchase the CD from the fulfillment Web site at http://www.ibm.com/systems/management/serverguide/sub.html. To download the free image, click **IBM Service and Support Site**.

Note: Changes are made periodically to the IBM Web site. The actual procedure might vary slightly from what is in this document.

The ServerGuide program performs the following tasks:
* An easy-to-use interface
* Diskette-free setup and configuration programs that are based on detected hardware
* Device drivers that are provided for the blade server model and detected hardware
* Operating-system partition size and file-system type that are selectable during setup

ServerGuide features

Use this information to determine the ServerGuide features.

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

The ServerGuide program requires a supported IBM blade server that is associated with an enabled startable (bootable) CD drive. In addition to the *ServerGuide Setup and Installation* CD, you must have the operating-system CD to install the operating system.

The ServerGuide program has the following features:
* Sets system date and time
* Detects installed optional hardware devices and provides updated device drivers for most adapters and devices
* Provides diskette-free installation for supported Windows operating systems
* Includes an online readme file with links to tips for the hardware and operating-system installation

Setup and configuration overview

Use this information to setup and configure the blade server.

When you use the *ServerGuide Setup and Installation* CD, you do not need setup diskettes. You can use the CD to configure any supported IBM blade server model. The setup program provides a list of tasks that are required to set up the blade server.

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

When you start the *ServerGuide Setup and Installation* CD, the program prompts you to complete the following tasks:

- Select your language.
- Select your keyboard layout and country.
- View the overview to learn about ServerGuide features.
- View the readme file to review installation tips for your operating system and adapter.
- Start the operating-system installation. You will need your operating-system CD.

Typical operating-system installation

Use this information for a typical ServerGuide operating-system installation.

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

The ServerGuide program can reduce the time it takes to install an operating system. It provides the device drivers that are required for the hardware and for the operating system that you are installing. This section describes a typical ServerGuide operating-system installation.

1. After you have completed the setup process, the operating-system installation program starts. (You will need the operating-system CD to complete the installation.)
2. The ServerGuide program stores information about the blade server model, service processor, hard disk drive controllers, and network adapters. Then, the program checks the CD for newer device drivers. This information is stored and then passed to the operating-system installation program.
3. The ServerGuide program presents operating-system partition options that are based on the operating-system selection and the installed hard disk drives.
4. The ServerGuide program prompts you to insert the operating-system CD and restart the server. At this point, the installation program for the operating system takes control to complete the installation. The BladeCenter CD drive must be associated with the blade server before you perform this step.

Installing the operating system without using ServerGuide

Use these instructions to install the operating system on the blade server without using a ServerGuide.

If you have already configured the blade server hardware and you are not using the ServerGuide program to install the operating system, complete the following steps to download the latest operating-system installation instructions from the IBM Web site.

Note: Changes are made periodically to the IBM Web site. The actual procedure might vary slightly from what is described in this document.

1. Go to http://www.ibm.com/systems/support/.
2. Under **Product support**, click **BladeCenter**.
3. From the menu on the left side of the page, click **BladeCenter support search**.
4. From the **Task** menu, select **Install**.
5. From the **Product family** list, select **BladeCenter HS12**.
6. From the **Operating system** list, select your operating system and click **Search** to display the available installation documents.

Using the PXE boot agent utility program

Use these instruction to start the PXE boot agent utility program.

Use the Preboot Execution Environment (PXE) boot agent utility program to select the boot protocol and other boot options and to select a power-management option.

Notes:
1. The blade server does not support Remote Program Load (RPL) selection for the boot protocol option.
2. Enabling PXE might reduce the number of optional expansion modules that your blade server can manage.

To start the PXE boot agent utility program, complete the following steps:
1. Turn on the server.
2. When the `Broadcom NetXtreme Boot Agent vX.X.X` prompt is displayed, press Ctrl+S. You have 2 seconds (by default) to press Ctrl+S after the prompt is displayed.

   If the PXE setup prompt is not displayed, use the Configuration/Setup Utility program to set the **Enable Ethernet PXE/DHCP** option.
3. Use the arrow keys or press Enter to select a choice from the menu.
4. Follow the instructions on the screen to change the settings of the selected items; then, press Enter.

Firmware updates

Use this information to update the blade server to the latest levels of BIOS code and firmware updates.

IBM periodically makes BIOS code, service processor (BMC) firmware, and diagnostic firmware updates available for the blade server. Before you install the blade server in a BladeCenter unit, go to http://www.ibm.com/systems/support/ to download the latest firmware for the blade server. Install the updates, using the instructions that are included with the downloaded files.

Important: To avoid problems and to maintain system performance, always make sure that the BIOS code, service processor (BMC) firmware, and diagnostic firmware levels are consistent for all blade servers within the BladeCenter unit.

Configuring the Gigabit Ethernet controller

Use this information to locate the device drivers for the Gigabit Ethernet controller.

One Ethernet controller is integrated on the blade server system board. A controller provides a 1000 Mbps full-duplex interface for connecting to one of the Ethernet-compatible I/O modules in I/O-module bays 1 and 2, which enables simultaneous transmission and reception of data on the Ethernet local area network (LAN). The Ethernet controller on the system board is routed to a different I/O module in I/O-module bay 1 or bay 2. The routing from an Ethernet controller to an I/O-module bay varies according to the blade server type and the operating system that is installed.

You do not have to set any jumpers or configure the controller for the blade server operating system. However, you must install a device driver to enable the blade server operating system to address the Ethernet controller. For device drivers and information about configuring the Ethernet controller, see the *Broadcom NetXtreme Gigabit Ethernet Software* CD that comes with the blade server.

To find updated information about configuring the controller, complete the following steps.

Note: Changes are made periodically to the IBM Web site. The actual procedure might vary slightly from what is described in this document.

1. Go to http://www.ibm.com/systems/support/.
2. Under **Product support**, click **BladeCenter**.
3. Under **Popular links**, click **Publications lookup**.
4. From the **Product family** menu, select **BladeCenter HS12**, and click **Continue**.

Configuring a SAS RAID array

Use this information to configure a SAS RAID array.

Configuring a SAS RAID array applies only to a blade server (machine type 8028) in which two SAS storage drives are installed.

You can use two SAS storage drives in the blade server to implement and manage RAID level-0 (striping) or RAID level-1 (mirror) arrays in operating systems that are listed on the ServerProven list at http://www.ibm.com/servers/eserver/serverproven/compat/us/. For the blade server, you must configure the SAS RAID by using the LSI Configuration Utility program.

If an optional expansion unit is installed, you can use it to control all of the SAS storage drives that are installed in the blade server. Enable this feature by using the **Device and I/O Ports** choice in Configuration/Setup Utility program (see "Configuration/Setup Utility menu" on page 36 for information and instructions).

Important: You must create the RAID array *before* you install the operating system on the blade server.

You can use the LSI Logic Configuration Utility program to configure the SAS storage drives and the SAS controller. To start the LSI Logic Configuration Utility, complete the following steps:

1. Turn on the blade server (make sure that the blade server is the owner of the keyboard, video, and mouse). See "Turning on the blade server" on page 13.

2. When the message `Press Ctrl-C to start LSI Logic Configuration Utility` is displayed, press F1. If an administrator password has been set, you must type the administrator password to access the full LSI Logic Configuration Utility menu.
3. Follow the instructions on the screen to modify the SAS storage drive and SAS controller settings.

Using the LSI Logic Configuration Utility program

Use these instructions to start the LSI Logic Configuration Utility program.

You can use the LSI Logic Configuration Utility program to perform the following tasks:
- Set the SAS device scan order
- Set the SAS ID for the controller
- Manage the SAS RAID configuration

To start the LSI Logic Configuration Utility program, complete the following steps:
1. Turn on the blade server, and make sure that the blade server is the owner of the keyboard, video, and mouse.
2. When the `<<<Press Ctrl-C to start LSI Logic Configuration Utility>>>` prompt is displayed, press Ctrl+C.
3. Use the arrow keys to select the controller from the list of adapters; then, press Enter.
4. Follow the instructions on the screen to change the settings of the selected items; then, press Enter. If you select **SAS Topology** or **Advanced Adapter Properties**, additional screens are displayed.

Chapter 5. Installing the operating system

Use these instructions to install the operating system on the blade server.

To install the operating system on a blade server, you can use any of the following methods:

- Use the *ServerGuide Setup and Installation* CD to install a supported Microsoft Windows operating system.
- Use Remote Deployment Manager (RDM) Version 4.20 (or later) to install a supported operating system. To determine whether RDM supports an operating system, see http://www.ibm.com/systems/management/.
- Download the latest operating-system installation instructions and install the operating system.

Important: The operating system in the blade server must provide USB support for the blade server to recognize and use the keyboard, mouse, and removable-media drives. The BladeCenter unit uses USB for internal communication with these devices.

Using the ServerGuide Setup and Installation CD to install the operating system

Use these instructions for using the ServerGuide Setup and Installation CD to install the blade server operating system.

To use the *ServerGuide Setup and Installation* CD, complete the following steps:

1. While the blade server is on, press the KVM select button on the front of the blade server to associate the BladeCenter unit CD drive with the blade server.
2. Insert the CD, and restart the blade server. If the CD does not start, see "ServerGuide problems" on page 49.
3. Follow the instructions on the screen to complete the following tasks:
   a. Select your language.
   b. Select your keyboard layout and country.
   c. View the overview to learn about ServerGuide features.
   d. View the readme file to review installation tips about your operating system and adapter.
   e. Start the setup and hardware configuration programs.
   f. Start the operating-system installation. You will need your operating-system CD.

Using RDM to install the operating system

Use this information if you are using RDM to install the blade server operating system.

You can use RDM to install a supported operating system on a blade server.

Follow the instructions in the documentation that comes with RDM to install a supported operating system.

Note: To determine whether an RDM supports an operating system, see http://www.ibm.com/systems/management/.

Downloading installation instructions

Use these instructions to download the operating-system installation instructions.

To download operating-system installation instructions, complete the following steps.

Note: Changes are made periodically to the IBM Web site. The actual procedure might vary slightly from what is described in this document.

1. Go to http://www.ibm.com/systems/support/.
2. Under **Product support**, click **BladeCenter**.
3. From the menu on the left side of the page, click **BladeCenter support search**.
4. From the **Task** menu, select **Install**.
5. From the **Product family** list, select **BladeCenter HS12**.
6. From the **Operating system** list, select your operating system and click **Search** to display the available installation documents.

Chapter 6. Solving problems

Use these instructions to resolve any problems you may encounter while installing the blade server.

If you install the blade server in the BladeCenter unit and the blade server does not start, perform the following actions:

- Make sure that the BladeCenter unit is correctly connected to a power source.
- Reseat the blade server in the BladeCenter unit (see "Installing the blade server in a BladeCenter unit" on page 31).
- If the power-on LED is flashing slowly, turn on the blade server (see "Turning on the blade server" on page 13).
- If you have just added a new optional device or component, make sure that it is correctly installed and compatible with the blade server and its components. If the device or component is not compatible, remove it from the blade server, reinstall the blade server in the BladeCenter unit, and then restart the blade server.

If the blade server does not start after you have performed the preceding actions, see the *Problem Determination and Service Guide* for your blade server on the IBM *Documentation* CD.

Diagnostic tools overview

Use this overview to locate specific diagnostic tools to diagnose and solve hardware-related problems.

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

- **POST beep codes**

  The power-on self-test beep codes can indicate the detection of a problem.

  - One beep indicates successful completion of POST
  - Repeating long beeps indicate a memory error. Make sure that all DIMMs are correctly installed. For more information, see "Installing a memory module" on page 21.
  - See the *Problem Determination and Service Guide* for more information about beep codes.

- **POST error codes**

  See the *Problem Determination and Service Guide* for more information.

-

  The POST error codes table in "ServerGuide problems" on page 49 lists problem symptoms and steps to correct the problems.

  For more information about POST error problem symptoms and steps to correct the problems, see the *Problem Determination and Service Guide* for your blade server.

- **Troubleshooting tables**

  Use the troubleshooting tables to find solutions to problems that have identifiable symptoms. For more information about troubleshooting tables, see the *Problem Determination and Service Guide* for your blade server.

- **Diagnostic programs and error messages**

  Real Time Diagnostics tests the major components of the BladeCenter unit, including the management modules, I/O modules, removable-media drives, and the blade servers, while the operating system is running. Real Time Diagnostics can be plugged into an existing IBM Director environment or installed without IBM Director present. For documentation and download information for Real Time Diagnostics, see http://www.ibm.com/systems/management/. For more information about diagnostic programs and error messages, see the *Problem Determination and Service Guide* for your blade server.

  The IBM Dynamic System Analysis (DSA) diagnostic programs are the primary method of testing the major components of the blade server. The diagnostic programs are available in the preboot environment by pressing F2 during the boot process. The Preboot DSA diagnostic programs are stored in integrated USB memory and collect and analyze system information to aid in diagnosing blade server problems. The diagnostic programs collect the following information about the blade server:
  - System configuration
  - Network interfaces and settings
  - Installed hardware
  - Light path diagnostics status
  - Vital product data, firmware, and BIOS configuration
  - Storage drive health
  - Baseboard Management Controller logs

  The diagnostic programs create a merged log that includes events from all collected logs. The information is collected into a file that you can send to the IBM Support Center. Additionally, you can view the blade server information locally through a generated text report file. You can also copy the log to removable media and view the log from a Web browser.

  Note: If you are unable to find the system-error logs in the blade server firmware code, view the system-event log in the BladeCenter management module.

- **Light path diagnostics**

  Use light path diagnostics LEDs on the system board to diagnose system errors. If the system-error LED on the system LED panel on the front or rear of the BladeCenter unit is lit, one or more error LEDs on the BladeCenter unit components also might be lit. These LEDs help identify the cause of the problem. Blade server error LEDs are described in the *Problem Determination and Service Guide* for your blade server.

ServerGuide problems

Use this information to locate ServerGuide problems and suggested actions.

The following table lists problem symptoms and suggested solutions.

Symptom	Suggested action
The *ServerGuide Setup and Installation* CD will not start.	• Make sure that the CD drive is associated with the blade server that you are configuring. • Make sure that the blade server supports the ServerGuide program and has a bootable CD (or DVD) drive. • If the startup (boot) sequence settings have been changed, make sure that the CD drive is first in the startup sequence.
The RAID configuration program cannot view all installed drives, or the operating system cannot be installed.	• Make sure that there are no duplicate SCSI/SAS IDs or interrupt request (IRQ) assignments. See "Configuring a SAS RAID array" on page 42. • Make sure that the storage drive is connected correctly. See "Blade server connectors" on page 14 to locate the storage drive connector.
The operating-system installation program continuously loops.	Make more space available on the hard disk.
The ServerGuide program will not start the operating-system CD.	Make sure that the operating-system CD is supported by the ServerGuide program. See the *ServerGuide Setup and Installation* CD label for a list of supported operating-system versions.
The operating system cannot be installed; the option is not available.	Make sure that the operating system is supported on the blade server. If the operating system is supported, either no logical drive is defined (SCSI/SAS RAID systems) or the ServerGuide System Partition is not present. Run the ServerGuide program and make sure that setup is complete.

Appendix. 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.

Use this information to obtain additional information about IBM and IBM products, determine what to do if you experience a problem with your IBM system or optional device, and determine 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.

If you believe that you require IBM to perform warranty service on your IBM product, the IBM service technicians will be able to assist you more efficiently if you prepare before you call.

- 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.
- Check for updated software, firmware, and operating-system device drivers for your IBM product. The IBM Warranty terms and conditions state that you, the owner of the IBM product, are responsible for maintaining and updating all software and firmware for the product (unless it is covered by an additional maintenance contract). Your IBM service technician will request that you upgrade your software and firmware if the problem has a documented solution within a software upgrade.
- If you have installed new hardware or software in your environment, check to make sure that the hardware and software is supported by your IBM product.
- Go to to check for information to help you solve the problem.
- Gather the following information to provide to IBM Support. This data will help IBM Support quickly provide a solution to your problem and ensure that you receive the level of service for which you might have contracted.
  - Hardware and Software Maintenance agreement contract numbers, if applicable
  - Machine type number (IBM 4-digit machine identifier)
  - Model number
  - Serial number
  - Current system UEFI and firmware levels
  - Other pertinent information such as error messages and logs
- Go to to submit an Electronic Service Request. Submitting an Electronic Service Request will start the process of determining a solution to your problem by making the pertinent information available to IBM Support quickly and efficiently. IBM service technicians can start working on your solution as soon as you have completed and submitted an Electronic Service Request.

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 .

Getting help and information from the World Wide Web

Up-to-date information about IBM products and support is available on the World Wide Web.

On the World Wide Web, up-to-date information about IBM systems, optional devices, services, and support is available at . IBM System x information is at . IBM BladeCenter information is at . IBM IntelliStation information is at .

How to send DSA data to IBM

Use the IBM Enhanced Customer Data Repository to send diagnostic data to IBM.

Before you send diagnostic data to IBM, read the terms of use at .

You can use any of the following methods to send diagnostic data to IBM:
- **Standard upload:**
- **Standard upload with the system serial number:**
- **Secure upload:**
- **Secure upload with the system serial number:**

Creating a personalized support web page

You can create a personalized support web page by identifying IBM products that are of interest to you.

To create a personalized support web page, go to . From this personalized page, you can subscribe to weekly email notifications about new technical documents, search for information and downloads, and access various administrative services.

Software service and support

Through IBM Support Line, you can get telephone assistance, for a fee, with usage, configuration, and software problems with your IBM products.

For information about which products are supported by Support Line in your country or region, see .

For more information about Support Line and other IBM services, see or see 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 and click **Business Partner Locator**. For IBM support telephone numbers, see . 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

Use this information to contact 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.

Each solid-state memory cell has an intrinsic, finite number of write cycles that the cell can incur. Therefore, a solid-state device has a maximum number of write cycles that it can be subjected to, expressed as `total bytes written` (TBW). A device that has exceeded this limit might fail to respond to system-generated commands or might be incapable of being written to. IBM is not responsible for replacement of a device that has exceeded its maximum guaranteed number of program/erase cycles, as documented in the Official Published Specifications for the device.

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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 device 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 device 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 device, IBM may condition provision of repair or replacement of devices or parts on implementation of appropriate remedial measures to mitigate such environmental contamination. Implementation of such remedial measures is a customer responsibility.

Table 4. Limits for particulates and gases

Contaminant	Limits
Particulate	• The room air must be continuously filtered with 40% atmospheric dust spot efficiency (MERV 9) according to ASHRAE Standard 52.2[1]. • 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	• Copper: Class G1 as per ANSI/ISA 71.04-1985[3] • Silver: Corrosion rate of less than 300 Å in 30 days

Table 4. Limits for particulates and gases (continued)

Contaminant	Limits
[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
P.O. Box 12195
Research Triangle Park, North Carolina 27709-2195
U.S.A.

In the request, be sure to include the publication part number and title.

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When you attach a monitor to the equipment, you must use the designated monitor cable and any interference suppression devices that are supplied with the monitor.

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 might 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

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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 Deutschland GmbH
Technical Regulations, Department M372
IBM-Allee 1, 71139 Ehningen, Germany
Telephone: +49 7032 15 2941
Email: lugi@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.

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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.
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Armonk, New York 10504
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Der verantwortliche Ansprechpartner des Herstellers in der EU ist:

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Technical Regulations, Abteilung M372
IBM-Allee 1, 71139 Ehningen, Germany
Telephone: +49 7032 15 2941
Email: lugi@de.ibm.com

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Japan Electronics and Information Technology Industries Association (JEITA) statement

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

Korea Communications Commission (KCC) statement

이 기기는 업무용(A급)으로 전자파적합기기로서 판매자 또는 사용자는 이 점을 주의하시기 바라며, 가정외의 지역에서 사용하는 것을 목적으로 합니다.

This is electromagnetic wave compatibility equipment for business (Type A). Sellers and users need to pay attention to it. This is for any areas other than home.

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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