IBM

BladeCenter
LS22 Type 7901
LS42 Type 7902

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 documentation on the IBM *Documentation* CD or download them from the IBM Support Web site.

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

Before you install the BladeCenter LS22 Type 7901 or LS42 Type 7902 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 200 - 240 V ac to the BladeCenter unit.
- Install the latest firmware in all BladeCenter components.

↓

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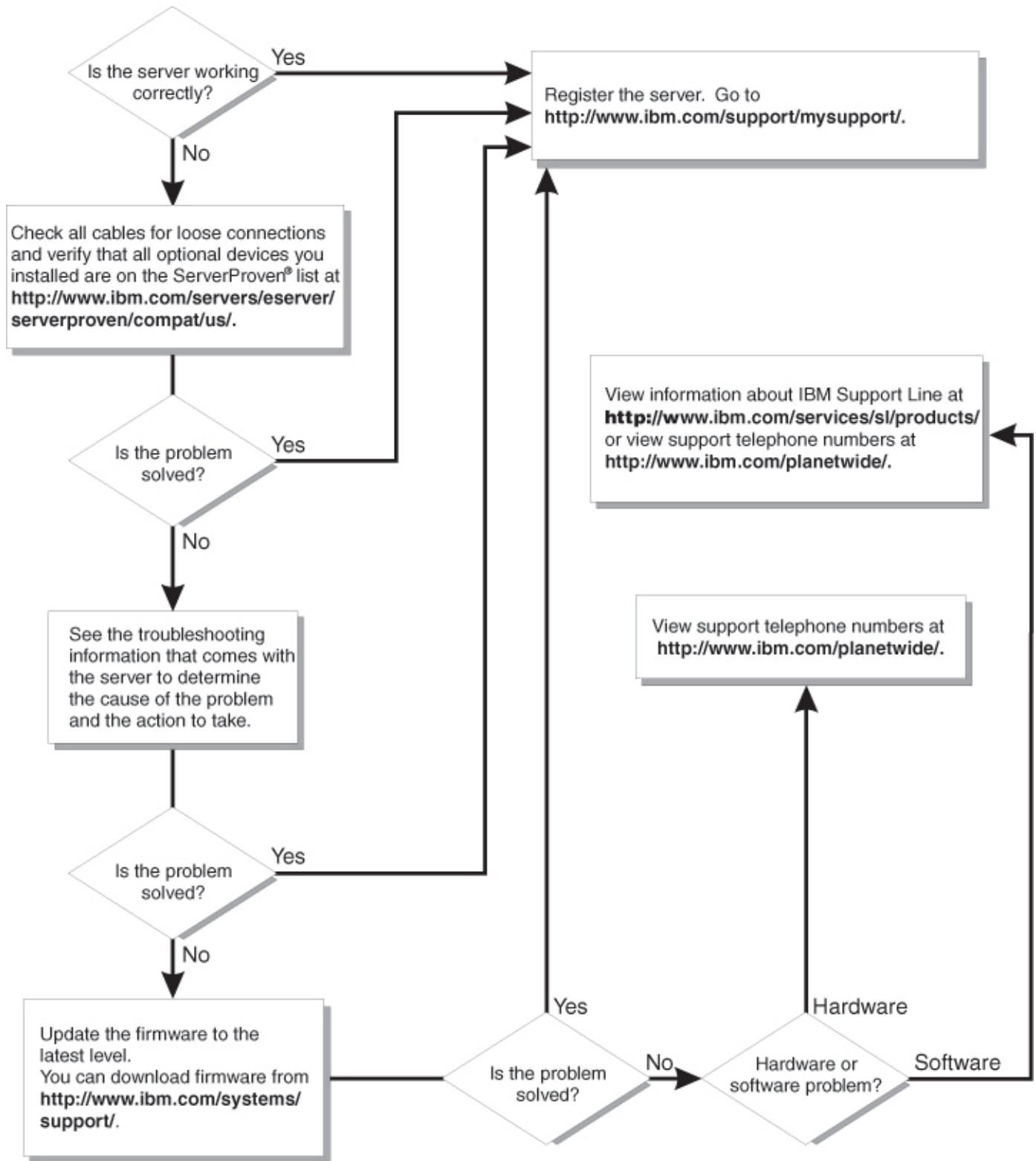
↓

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 come 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 LS22 and LS42
Type 7901 and 7902

Installation and User's Guide

Note: Before using this information and the product it supports, read the general information in "Notices" on page 67 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 الأمنية

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

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

安裝本產品之前，請先閱讀「安全資訊」。

Prije instalacije ovog produkta obavezno pročitajte Sigurnosne Upute.

Před instalací tohoto produktu si přečtete příručku bezpečnostních instrukcí.

Læs sikkerhedsforskrifterne, før du installerer dette produkt.

Lees voordat u dit product installeert eerst de veiligheidsvoorschriften.

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

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

Vor der Installation dieses Produkts die Sicherheitshinweise lesen.

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

לפני שתתקינו מוצר זה, קראו את הוראות הבטיחות.

A termék telepítése előtt olvassa el a Biztonsági előírásokat!

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

製品の設置の前に、安全情報をお読みください。

본 제품을 설치하기 전에 안전 정보를 읽으십시오.

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

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

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

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

Перед установкой продукта прочтите инструкции по
технике безопасности.

Pred inštaláciou tohto zariadenia si pečítaje Bezpečnostné predpisy.

Pred namestitvijo tega proizvoda preberite Varnostne informacije.

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

Läs säkerhetsinformationen innan du installerar den här produkten.

Important:

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

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

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

Statement 1

DANGER

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

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

To Connect:	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**
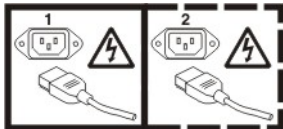- **Heat to more than 100°C (212°F)**
- **Repair or disassemble**

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

Statement 10

CAUTION:
Do not place any object on top of rack-mounted devices.

Statement 21

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

Chapter 1. Introduction

The IBM® BladeCenter® LS22 Type 7901 and LS42 Type 7902 blade servers are compatible with IBM BladeCenter units. These high-density, high-performance blade servers are ideally suited for networking environments that require superior microprocessor performance, efficient memory management, flexibility, and reliable data storage.

Note: Unless otherwise stated, references to the BladeCenter unit apply to any IBM BladeCenter units.

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, go to http://www.ibm.com/bladecenter/, and click **Support**.

Important: Some blade server models include an expansion-card bracket in a separate package. The expansion-card bracket is used when you install a standard-form-factor expansion card (see "Installing a standard-form-factor expansion card" on page 42). If the expansion-card bracket does not have to be installed, save it in a safe place.

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/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/bladecenter/.
2. Click **Support**.
3. Under **Support information**, click **Product support and information**.
4. 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 LS22 or LS42
Machine type	7901 or 7902
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.

The LS22 Type 7901 single-width blade server requires only one blade bay in the BladeCenter unit. The LS42 Type 7902 blade server is a double-width type blade server that comes with a multi-processor expansion (MPE) unit. These models require two adjacent blade bays in the BladeCenter unit.

At the time of this publication, the MPE is not sold separately.

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

The single-width type (LS22 Type 7901) of blade server is shown in the following illustration.
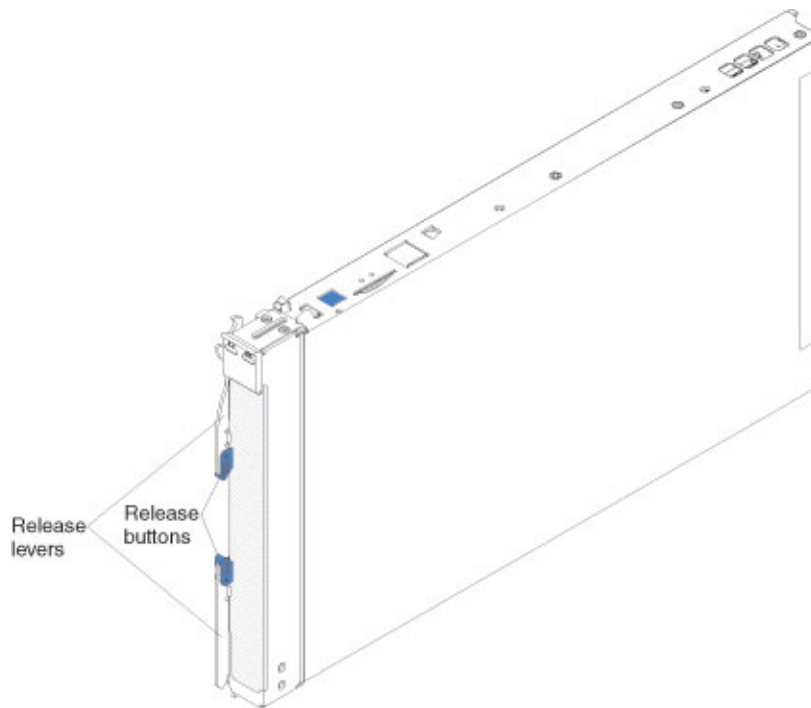
The double-width (LS42 Type 7902) of blade server is shown in the following illustration.

Release handles
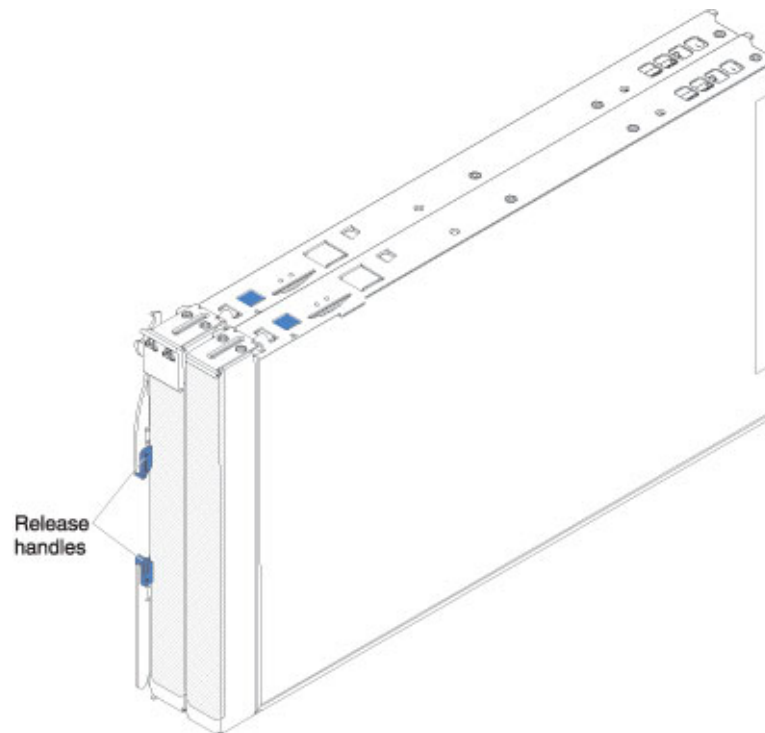
A set of blank labels comes with the blade server. When you install the blade server in the BladeCenter unit, write identifying information on a label and put the label on the BladeCenter unit bezel. See the documentation for your BladeCenter unit for recommended label placement.

Important: Do not put the label on the blade server itself or in any way block the ventilation holes on the blade server.

Related 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.

The blade server might have features that are not described in the documentation that comes with the server. 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 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/bladecenter/.
2. Click **Support**.
3. Under **Support information**, click **Product support and information**.
4. Under **Popular links**, click **Publications lookup**.
5. From the **Product family** menu, select **BladeCenter LS22** or **BladeCenter LS42** and click **Go**.

The IBM Documentation CD

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

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

- Microsoft® Windows® Windows NT®, Windows 2000, or Red Hat Linux®
- 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 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 or DVD 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-ROM 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

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 in your language 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

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

Notes:

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

Microprocessor:	7901 (LS22) integrated functions:	7902 (LS42) integrated functions:

• **7901 (LS22) models:** Supports up to two quad-core AMD Opteron microprocessors
• **7902 (LS42) models:** Supports up to four quad-core AMD Opteron microprocessors
 	
Note: Use the Configuration/Setup Utility program to determine the type and speed of the microprocessors in your blade server.
 	
Memory:
• Dual-channel DIMMs
• Type: Very low profile (VLP), double-data-rate 2 (DDR2), ECC SDRAM registered x4 (Chipkill) or x8 (non-Chipkill) DIMMs
• Supports 1 GB, 2 GB, and 4 GB DIMMs (as of the date of this publication)
• **7901 (LS22) models:** Up to 8 dual-channel DIMMs, supporting up to 32 GB of total memory.
• **7902 (LS42) models:** Up to 16 dual-channel DIMMs, supporting up to 64 GB of total memory.
 	
Drives: Supports up to two small-form-factor, Serial Attached SCSI (SAS) drives or solid state drives.
 	
Electrical Input: 12 V dc
	• Dual-port Gigabit Ethernet controller
	• Expansion card connector
	• Blade expansion connector
	• Local service processor: Baseboard management controller (BMC) with Intelligent Platform Management Interface (IPMI) firmware 1.5 compliant
	• ATI RN-50 video controller
	• LSI 1064E Serial Attached SCSI (SAS) controller
	• Light path diagnostics
	• Dynamic System Analysis (DSA) Preboot diagnostics
	• RS-485 interface for communication with the management module
	• Automatic server restart (ASR)
	• Serial over LAN (SOL)
	• Four USB buses for communication with keyboard, mouse, and removable media drives
	
	Size:
	• Height: 24.5 cm (9.7 inches)
	• Depth: 44.6 cm (17.6 inches)
	• Width:
	  – **7901 (LS22):** 2.9 cm (1.4 inches)
	  – **7902 (LS42):** 5.8 cm (2.8 inches)
	• Maximum weight:
	  – **7901 (LS22):** 4.9 kg (10.8 lb)
	  – **7902 (LS42):** 11.2 kg (24.7 lb)
		• Two dual-port Gigabit Ethernet controllers
		• Two expansion card connectors
		• Blade expansion connector
		• Local service processor: Baseboard management controller (BMC) with Intelligent Platform Management Interface (IPMI) firmware 1.5 compliant
		• ATI RN-50 video controller
		• LSI 1064E Serial Attached SCSI (SAS) controller
		• Light path diagnostics
		• Dynamic System Analysis (DSA) Preboot diagnostics
		• RS-485 interface for communication with the management module
		• Automatic server restart (ASR)
		• Serial over LAN (SOL)
		• Four USB buses for communication with keyboard, mouse, and removable media drives
		
		Environment:
		• Air temperature:
		  – Blade server on: 10° to 35°C (50° to 95°F). Altitude: 0 to 914 m (0 to 3000 ft)
		  – Blade server on: 10° to 32°C (50° to 90°F). Altitude: 914 to 2134 m (3000 to 7000 ft)
		  – Blade server off: -40° to 60°C (-40° to 140°F)
		• Humidity:
		  – Blade server on: 8% to 80%
		  – Blade server off: 5% to 80%
		
		Predictive Failure Analysis® (PFA) alerts:
		• Microprocessor
		• Memory
		• Hard disk drives

What your blade server offers

The design of the blade server takes advantage of advancements in memory management and data storage. The blade server uses the following features and technologies:

- **Baseboard management controller (BMC)**

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

- **Hard disk drive support**

  The blade server support up to two 2.5-inch, small-form-factor (SFF) Serial Attached SCSI (SAS) drives.

- **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 *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 56.

- **Impressive performance using the latest microprocessor technology**

  The blade server supports up to two dual-core AMD Opteron microprocessors in single-width models or up to four dual-core AMD Opteron microprocessors in double-width models. Depending on the model, the blade server comes with either one or two installed microprocessors. An optional second microprocessor can be added to single-width models, and up to two optional microprocessors can be added to double-width models.

- **Integrated network support**

  All of the blade server models come with an integrated Broadcom dual-port Gigabit Ethernet controller. The double-width type of blade server also has an additional dual-port Gigabit Ethernet controller in the MPE. Both controllers support connections to a 10 Mbps, 100 Mbps, or 1000 Mbps network through an Ethernet-compatible switch module in the BladeCenter unit. Both controllers also support 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. The double-width type of blade server also has expansion-card connectors in the MPE.

- **Large system-memory capacity**

Depending on the blade server model, it supports up to 32 GB (single-width models) or 64 GB (double-width models) of system memory. The memory controller for each microprocessor provides support for up to four industry-standard VLP, DDR2, ECC SDRAM registered x4 (Chipkill) or x8 (non-Chipkill) DIMMs. For the most current list of supported DIMMs, see 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 fully serial interface that can be used for universal connectivity as a chip-to-chip interconnect, I/O interconnect for adapters, and an I/O attachment point to Gigabit-networking devices. By using an expansion unit, you can add LAN interfaces.

- **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 efficient 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. 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 go to http://www.ibm.com/bladecenter/ and click **Support**.

Reliability, availability, and serviceability features

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 error retry or recovery
- Automatic server restart
- Built-in monitoring for temperature, voltage, and hard disk drives
- Chipkill™ memory for x4 DIMMs
- 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 controller
- ECC memory
- ECC protection on the L2 cache
- Error codes and messages
- Failover Ethernet support
- Light path diagnostics
- Microprocessor built-in self-test (BIST) during power-on self-test (POST)
- Microprocessor presence detection
- Microprocessor serial number access
- Power policy support

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

- Power-on self-test (POST)
- Predictive Failure Analysis (PFA) alerts
- Dynamic System Analysis (DSA) Diagnostics
- SDRAM with serial presence detect (SPD) and vital product data (VPD)
- Service processor that communicates with the management module to enable remote blade server management
- System error logging
- Wake on LAN capability

IBM Director

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 Windows 2000 Server, Windows Server 2003, Windows XP Professional, AIX, i5/OS, Red Hat Linux, SUSE Linux, VMware, and Novell NetWare. 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/systems/management/, which presents an overview of IBM Systems Management and IBM Director.

Major components of the blade server

The LS22 and LS42 blade servers have the same system board with components installed in the same locations. The LS42 Type 7902 blade server models also have an MPE with components that are similar to the blade server system board.

You must remove the blade server from the BladeCenter unit and remove the cover to see the components. For the LS42 Type 7902 blade server, you must remove the MPE unit to see the components on the blade server system board.

The following illustration shows the major components of the blade server.
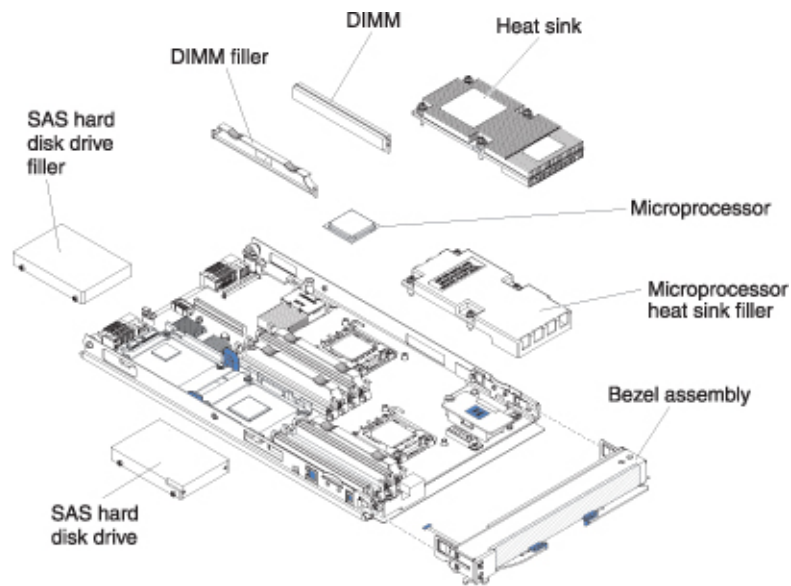
The following illustration shows the major components of the MPE that is installed on the LS42 Type 7902 blade server.
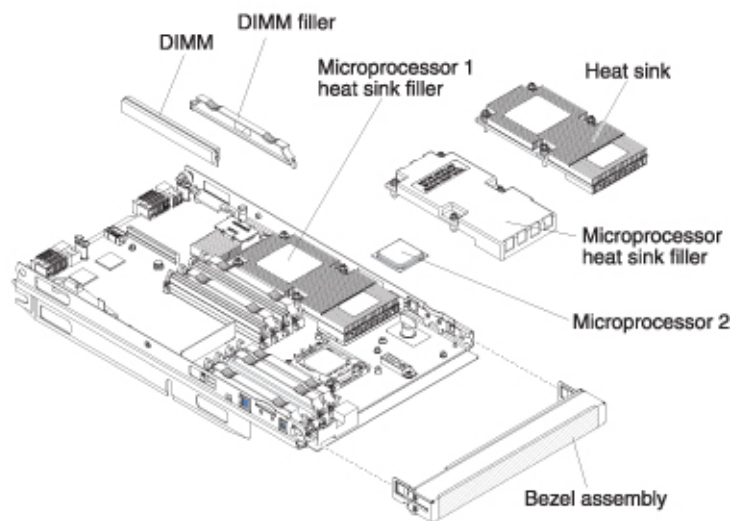
Chapter 2. Power, controls, and indicators

This chapter describes the power features, how to turn on and turn off the blade server, and what the controls and indicators mean. This chapter also identifies the system-board connectors.

Blade server control panel and LEDs

This section describes the controls and LEDs on the blade server.

Notes:

1. The control panel door is shown in the closed (normal) position in the following illustration. To access the power-control button, you must open the control panel door.
2. The following illustration shows a single-width type of blade server. The MPE also interacts with the control panel on the blade server.
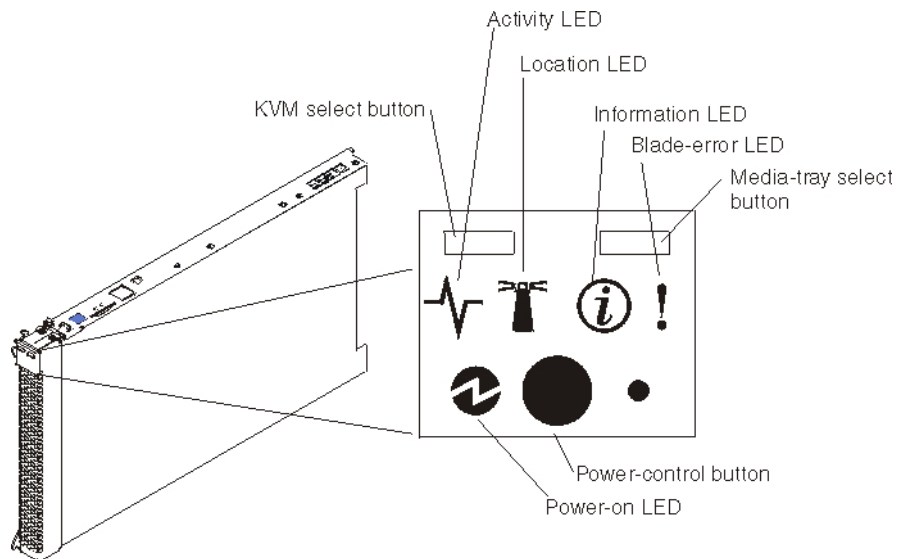
KVM select button: Press this button to associate the shared BladeCenter unit keyboard, video, and mouse port (KVM) with the blade server. The LED on this button flashes while the request is being processed and then is lit when the ownership of the keyboard, video, and mouse has been transferred to the 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:

  NumLock NumLock *bay_number* Enter

  Where *bay_number* is the two-digit number of the blade bay in which the blade server is installed. A blade server that occupies more than one blade 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.

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 KVM, a delay of up to 1 minute occurs the first time that you switch the KVM to the blade server. During this one-time-only delay, the blade server device manager enumerates the keyboard, video, and mouse and loads the device drivers. All subsequent switching happens in the normal KVM switching time frame (up to 20 seconds).

Media-tray select button: Press this button to associate the shared BladeCenter unit media tray (removable-media drives and front-panel USB ports) 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 and front-panel USB ports.

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 light this blue LED to aid in visually locating the blade server. When this LED is lit, the location LED on the BladeCenter unit is lit also. The location LED can be turned off through the management-module Web interface or through IBM Director Console.

Information LED: When this amber LED is lit, it indicates that information about a system error for 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 or through IBM Director Console.

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 will turn off only after the error is corrected.

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.

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.

Turning 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 control panel 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 control panel 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) 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

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 control panel and LEDs" on page 11). This starts an orderly shutdown of the operating system, if this feature is supported by the operating system.

  Note: After you turn off the blade server, wait at least 5 seconds before you press the power-control button to turn on the blade server again.

- 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.
  - If the system is not operating correctly, the management module will automatically turn off the blade server.
  - Through the management-module Web interface, you can also configure the management module to turn off the blade server. For additional information, see the *IBM BladeCenter Management Module User's Guide*.

Blade server connectors

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

Note: Only the BladeCenter LS22 Type 7901 blade server has an LS22 optimizer. The BladeCenter LS42 Type 7902 blade server does not have an LS22 optimizer.
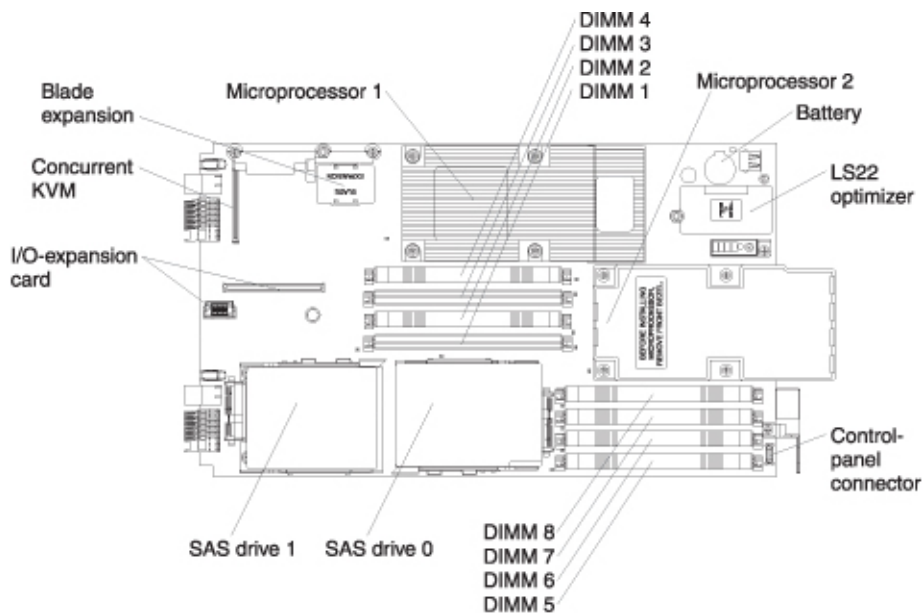
The following illustration shows the MPE components, including connectors for user-installable optional devices.

Chapter 3. Installing optional devices

This chapter provides instructions for installing optional hardware devices in the blade server. Instructions for removing some optional devices are provided in case you have to remove one option to install another.
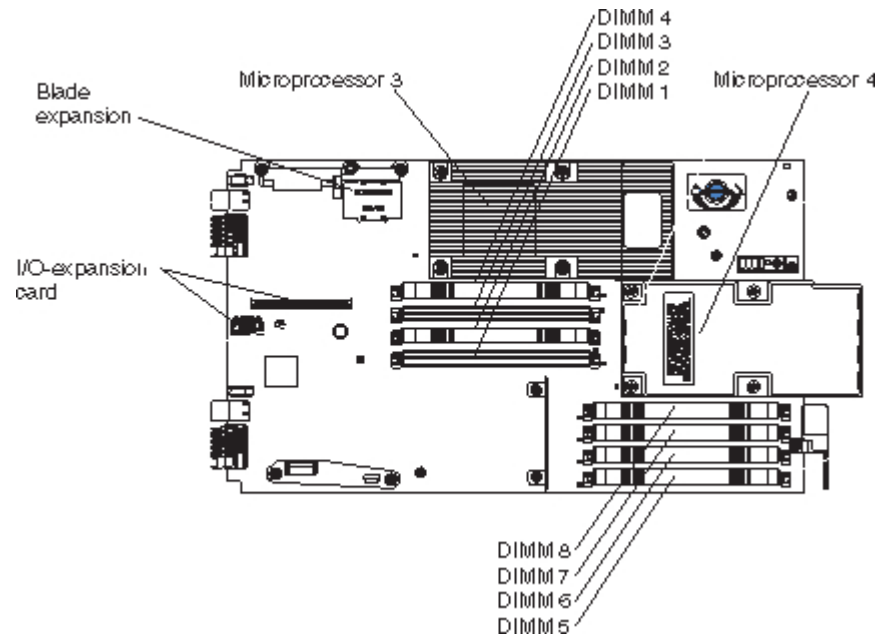
Installation guidelines

Before you install optional devices, read the following information:

- Read the safety information that begins on page "Safety" on page v and the guidelines in "Handling static-sensitive devices" on page 18. 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 make sure 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:

  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/bladecenter/.
  2. Click **Support**.
  3. Under **Support information**, click **Product support and information**.
  4. Under **Popular links**, click **Publications lookup**.
  5. From the **Product family** menu, select **Bladecenter LS22** or **BladeCenter LS42** and click **Go**.

  Download and install the latest firmware for the management module installed in your BladeCenter unit (see the documentation for your management module).

- Observe good housekeeping in the area where you are working. Put 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 hot-swap 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, or open or close a latch.

- Orange on a component or an orange label on or near a component indicates that the component can be hot-swapped, which means that you can remove or install the component while the BladeCenter unit is running. (Orange can also indicate touch points on hot-swap components.) See the instructions for removing or installing a specific hot-swap component for any additional procedures that you might have to perform before you remove or install the component.

- When you are finished working on the blade server, reinstall all safety shields, guards, labels, and ground wires.

- For a list of supported optional devices for the blade server, see http://www.ibm.com/servers/eserver/serverproven/compat/us/.

System reliability guidelines

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

- Each microprocessor socket always contains either a microprocessor dust cover and heat sink filler or a microprocessor and heat sink. If the blade server has only one microprocessor, it must be installed in microprocessor socket 1.
- Do not operate the BladeCenter unit without a blade server, expansion unit, or filler installed in each blade bay. See the documentation for your BladeCenter unit for additional information.
- Make sure that the ventilation holes on the blade server are not blocked.
- 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

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:

- 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 it down. 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

The following illustration shows how to remove an LS22 Type 7901 blade server from a Type 8677 BladeCenter unit. The procedure for removing the LS42 Type 7902 blade server and MPE is the same. The appearance of your BladeCenter unit might be different. See the documentation for your BladeCenter unit for additional information.
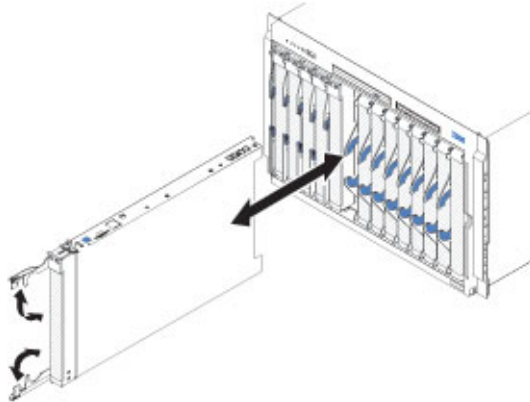
Attention:

- To maintain proper system cooling, do not operate the BladeCenter unit without a blade server, expansion unit, or filler installed in each blade bay.
- When you remove the blade server, note the bay number. Reinstalling a blade server into a different bay from the one it was removed from might have unintended consequences. Some configuration information and update options are established according to 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. Read the safety information beginning on page "Safety" on page v and "Installation guidelines" on page 17.
2. If the blade server is operating, shut down the operating system.
3. 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 hard disk drives stop spinning, before you proceed to the next step. The activity LED on the control panel turns off when the hard disk drive has stopped spinning (see "Blade server control panel and LEDs" on page 11).
4. Open the two release levers as shown in the illustration. The blade server moves out of the bay approximately 0.6 cm (0.25 inch).
5. Pull the blade server out of the bay.
6. Put either a blade filler or another blade server in the bay within 1 minute.

Opening the blade server cover

The following illustration show how to open the cover on a blade server. The procedure for opening the cover on an MPE or expansion unit is the same.
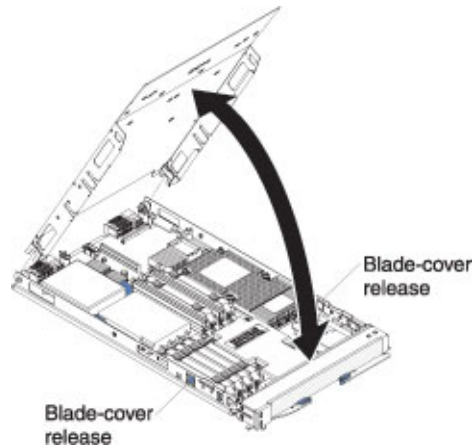
To open the blade server cover, complete the following steps:

1. Read the safety information that begins on page "Safety" on page v and "Installation guidelines" on page 17.
2. If the blade server is installed in a BladeCenter unit, remove it (see "Removing the blade server from the BladeCenter unit" on page 19 for instructions).
3. Carefully lay the blade server down on a flat, static-protective surface, with the cover side up.
4. Press the blade-cover release on each side of the blade server and lift the cover open, as shown in the illustration.
5. Lay the cover flat, or lift it from the blade server and store for future use.

Removing an expansion unit

The following illustration shows how to remove the MPE unit from an LS42 Type 7902 blade server. The procedure for removing another type of expansion unit from a blade server is similar.

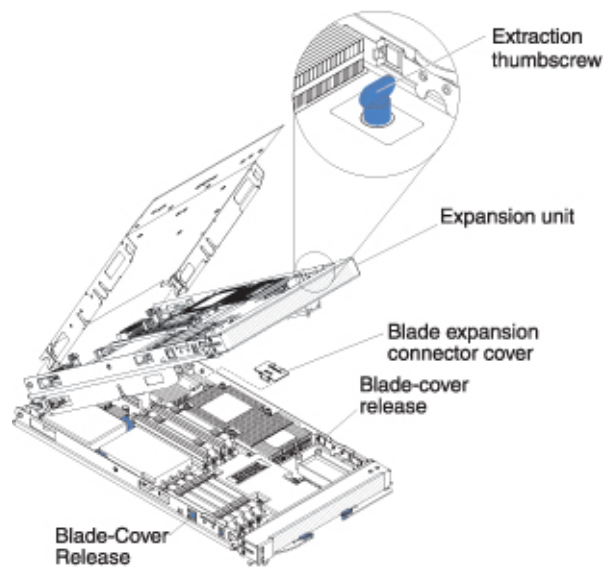To remove an MPE unit, complete the following steps:

1. Read the safety information that begins on page "Safety" on page v and "Installation guidelines" on page 17.

2. Open the blade server cover (see "Opening the blade server cover" on page 20 for instructions).

3. If the expansion unit has an extraction device (such as a thumbscrew or a lever), use it to disengage the expansion unit from the blade server; otherwise, press the blade-cover release on each side of the blade server to disengage the expansion unit from the blade server.

    Note: Do not rotate the expansion unit open to more than a 90 degree angle from the blade server.

4. Rotate the expansion unit open; then, lift the expansion unit from the blade server.

Removing the bezel assembly

To install certain optional devices, you must first remove the bezel assembly. The following illustration shows how to remove the blade server bezel assembly. The procedure for removing the MPE bezel assembly is the same, except that the MPE does not have a control-panel connector.
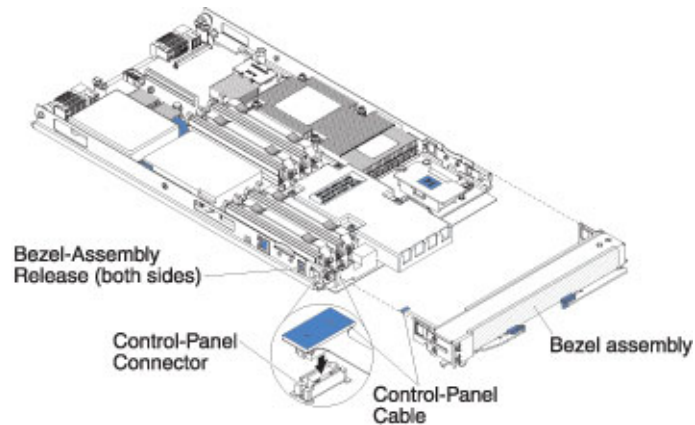
To remove the blade server bezel assembly, complete the following steps:

1. Read the safety information that begins on page "Safety" on page v and "Installation guidelines" on page 17.
2. Remove the blade server cover (see "Opening the blade server cover" on page 20 for instructions).
3. If you are removing the bezel assembly from the blade server and an MPE unit or an expansion unit is connected to the blade server, remove the expansion unit (see "Removing an expansion unit" on page 21).
4. Press the bezel-assembly release and pull the bezel assembly away from the blade server approximately 1.2 cm (0.5 inch).
5. If you are removing the bezel assembly from the blade server, disconnect the control-panel cable by lifting the cable from the control-panel connector. If you are removing a bezel assembly on an MPE unit, go to step 6.
6. Pull the bezel assembly away from the blade server.
7. Store the bezel assembly in a safe place.

Installing a SAS drive tray

The blade server has two connectors on the system board for installing optional small form factor (SFF) SAS hard disk drives or pin-compatible solid-state flash drives. You must install a drive tray before you install a new drive in the blade server. Depending on the blade server model, a drive tray might already be installed.

The following illustration shows how to install a SAS drive tray in the blade server.
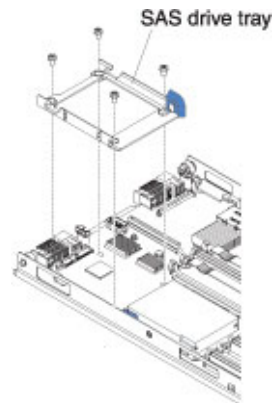
To install a drive tray, complete the following steps:

1. Read the safety information that begins on page "Safety" on page v and "Installation guidelines" on page 17.
2. Shut down the operating system, turn off the blade server, and remove the blade server from the BladeCenter unit. See "Removing the blade server from the BladeCenter unit" on page 19 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 20 for instructions).
5. If an MPE unit or an expansion unit is attached to the blade server, remove the device (see "Removing an expansion unit" on page 21).
6. Locate the SAS connector that you will be using (see "Blade server connectors" on page 14).
7. If you are installing a drive into SAS connector 1, complete the following steps:
   a. If an expansion-card bracket is installed, remove the bracket (see "Removing an expansion-card bracket" on page 38). Save the bracket and screws in a safe place.
   b. Remove the two screws near SAS connector 1 that secure the system board to the blade. Save the screws in a safe place.
8. Orient the drive tray so that the blue lever on the tray is toward the middle and front of the blade server.

9. Align the screw holes on the drive tray with the screw holes on the system board in front of the SAS connector.

10. Use a screwdriver to install the four screws, that you removed in step 7 on page 23, into the drive tray and secure the drive tray to the system board.

If you have other devices to install or remove, do so now; otherwise, go to "Completing the installation" on page 46.

Removing a SAS drive tray

Some expansion cards require SAS drive 1 and the corresponding drive tray to be replaced with an expansion-card tray. Depending on the blade server model, an expansion-card tray might already be installed.

The following illustration shows how to remove a SAS drive tray in the blade server.
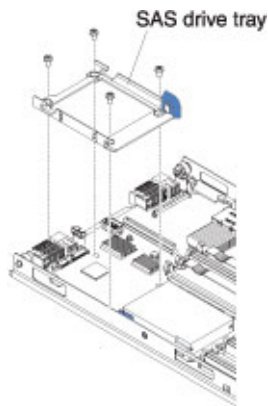
To remove a drive tray, complete the following steps:

1. Read the safety information that begins on page "Safety" on page v and "Installation guidelines" on page 17.

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

3. Open the blade server cover (see "Opening the blade server cover" on page 20 for instructions).

4. If an MPE unit or an expansion unit is attached to the blade server, remove the device (see "Removing an expansion unit" on page 21).

5. Locate SAS connector 1 and remove the SAS drive if one is installed (see "Removing a SAS drive" on page 26).

6. Locate the drive tray for SAS connector 1 (see "Blade server connectors" on page 14).

7. Use a screwdriver to remove the four screws that attach the drive tray to the system board. Save the screws in a safe place.

8. Lift the drive tray out of the blade server. Keep the drive tray in a safe place.

9. Use a screwdriver to install two of the screws back into the two screw holes on the system board closest to the middle of the blade server.

If you have other devices to install or remove, do so now; otherwise, go to "Completing the installation" on page 46.

Installing a SAS drive

The blade server has two connectors on the system board for installing optional small form factor (SFF) SAS hard disk drives or pin-compatible solid-state flash drives.

Depending on the blade server model, a SAS hard disk drive or solid-state drive might already be installed. Two SAS drives can be used to implement and manage a redundant array of independent disks (RAID) level-1 array. See "Configuring a SAS RAID array" on page 60 for information about SAS RAID configuration.

The following illustration shows how to install a SAS hard disk drive or solid-state drive in the blade server.
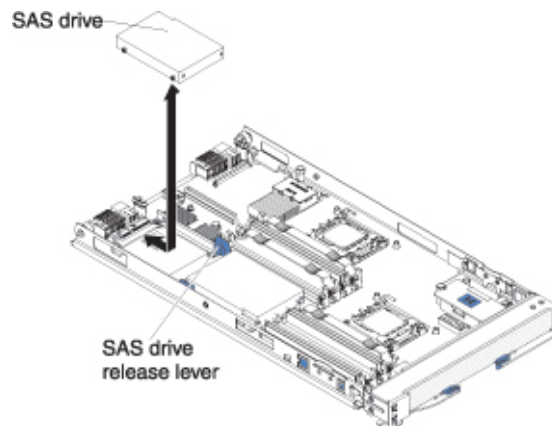
To install a SAS hard disk drive, complete the following steps:

1. Read the safety information that begins on page "Safety" on page v and "Installation guidelines" on page 17.
2. Shut down the operating system, turn off the blade server, and remove the blade server from the BladeCenter unit. See "Removing the blade server from the BladeCenter unit" on page 19 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 20 for instructions).
5. If you are installing a SAS hard disk drive in the blade server and an MPE unit or an expansion unit is attached to the blade server, remove the device (see "Removing an expansion unit" on page 21).
6. Locate the SAS hard disk drive tray.
7. Install a SAS drive tray if one is not already installed (see "Installing a SAS drive tray" on page 23).
8. Remove the SAS hard disk drive filler if one is installed:
   a. Pull the blue lever at the front of the hard disk drive tray away from the hard disk drive filler to disengage the filler from its tray.
   b. Slide the filler from the tray and lift it away from the system board.

   Note: If a SAS hard drive or solid-state drive is not installed in SAS connector 0, the SAS hard drive filler must be installed.
   Attention: Do not press on the top of the drive. Pressing the top might damage the drive.

9. Put the hard disk drive or solid-state drive into the drive tray and push it into the SAS connector, until the drive moves past the SAS drive release lever.

If you have other devices to install or remove, do so now; otherwise, go to "Completing the installation" on page 46.

Removing a SAS drive

The following illustration shows how to remove a SAS drive from the blade server.
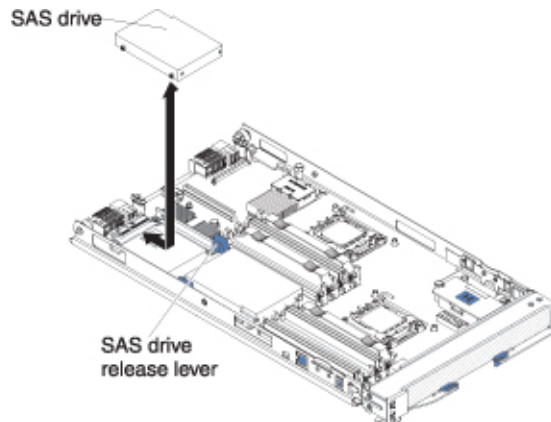
1. Read the safety information beginning on page "Safety" on page v and "Installation guidelines" on page 17.
2. Open the blade server cover (see "Opening the blade server cover" on page 20 for instructions).
3. If you are removing a SAS drive from the blade server and an MPE unit or an expansion unit is connected to the blade server, remove the device (see "Removing an expansion unit" on page 21).
4. Press the release lever away from the SAS drive; then, remove the SAS drive.

   Note: Press the release lever away from the SAS drive; then, remove the SAS drive.
   Attention: If two SAS drives are installed, you might damage one or both of the drives if you use too much force to remove the drive.

   • If you are removing a SAS drive from SAS connector 0, slide the drive backward to disengage it from the connector at the front of the drive tray; then, lift the drive out of the drive tray.

   • If you are removing a SAS drive from SAS connector 1, slide the drive forward to disengage it from the connector at the rear of the drive tray then, lift the drive out of the drive tray.

Installing additional memory

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

- The blade server system board contains eight DIMM connectors (four DIMM connectors per processor). If an MPE is installed, there are also eight DIMM connectors (four DIMM connectors per processor) on the MPE system board.
- The system supports error correcting code (ECC) protected, industry-standard 240-pin, 72-bit technology very low profile (VLP) double data rate synchronous DRAM dual inline memory modules (DDR-2 SDRAM DIMMs).
- The server supports two-way memory interleaving.
- Depending on the memory configuration, the blade server can support a minimum of 2 GB and a maximum of 32 GB of system memory for single-width blade servers or a maximum of 64 GB of system memory for blade servers with an MPE installed.
- The optional DIMMs that are available for the blade server are 1 GB, 2 GB, and 4 GB.
- All DIMMs must be installed in pairs of the same size, speed, type, technology, and physical design. You can use compatible DIMMs from different manufacturers.
- If you want to take advantage of Chipkill memory, each DIMM that is installed in the blade server must support the Chipkill technology.
- For a current list of supported DIMMs for the blade server, see http://www.ibm.com/servers/eserver/serverproven/compat/us/.
- For each installed microprocessor, a set of four DIMM connectors is enabled (see the following table for more information).

  The following table lists the available microprocessor and DIMM combinations for the blade server and MPE.

Note: Only the BladeCenter LS42 (Type 7902) with an installed MPE can support more than two microprocessors.

Number of micro-processors	Blade server								MPE							
	DIMM connector								DIMM connector							
	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8
1 (in blade server)	X		X													
	X	X	X	X												
2 (in blade server)	X		X													
	X		X		X		X									
	X	X	X	X	X		X									
	X	X	X	X	X	X	X	X								
3 (2 in blade server, 1 in MPE unit)	X		X													
	X		X		X		X									
	X		X		X		X		X		X					
	X	X	X	X	X		X		X		X					
	X	X	X	X	X	X	X	X	X		X					
	X	X	X	X	X	X	X	X	X	X	X	X				

| Number of micro-processors	Blade server								MPE							
	DIMM connector								DIMM connector							
	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8
4 (2 in blade server, 2 in MPE unit)	X		X													
	X		X		X		X									
	X		X		X		X		X		X					
	X		X		X		X		X		X		X		X	
	X	X	X	X	X		X		X		X		X		X	
	X	X	X	X	X	X	X	X	X		X		X		X	
	X	X	X	X	X	X	X	X	X	X	X	X	X		X	
	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

Attention: To avoid damage to the DIMM and DIMM connectors, carefully follow the following installation procedure. When you perform these steps, it is important that you observe the following precautions:

- Do not press or squeeze the chip surface of the DIMM during installation.
- When you insert a DIMM, simultaneously press down firmly and evenly on both ends of the DIMM.
- Handle the retaining clips on the DIMM connector gently when you open or close them.
- Grasp the DIMM gently when you remove it from the connector to avoid ejecting it.

To install a DIMM, complete the following steps:

1. Read the safety information that begins on page "Safety" on page v and "Installation guidelines" on page 17.
2. Read the documentation that comes with the DIMMs.
3. Shut down the operating system, turn off the blade server, and remove the blade server from the BladeCenter unit. See "Removing the blade server from the BladeCenter unit" on page 19 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 20 for instructions).
6. If you are installing a DIMM in the blade server and an MPE unit or expansion unit is attached to the blade server, remove the device (see "Removing an expansion unit" on page 21).

The following illustration shows how to install a DIMM in a blade server. This illustration also applies to installing or removing DIMM filler.
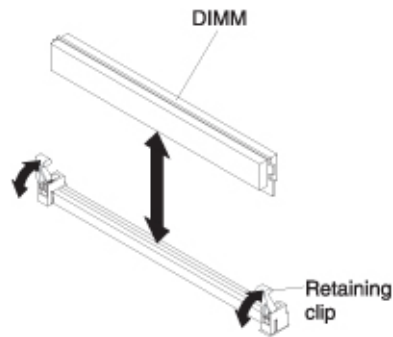
7. Repeat the following steps for each DIMM that you install:

    a. Locate the DIMM connectors (see "Blade server connectors" on page 14). Determine the connector into which you will install the DIMM.

    b. Remove the DIMM filler from the DIMM connector.

        Note: A DIMM or DIMM filler must occupy each DIMM socket.

    c. Make sure that both retaining clips on the DIMM connector in which you will install the DIMM are fully open.

    d. 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.

    e. 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.

    f. Carefully insert the DIMM straight down into the connector using the retaining clip slots as guides to align the DIMM with the connector.

    g. Simultaneously press down firmly and evenly on both ends of the DIMM until it is completely seated in the connector. Make sure that the retaining clips snap into the closed positions.

        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.

8. If you have other devices to install or remove, do so now; otherwise, go to "Completing the installation" on page 46.

Installing an additional microprocessor

The blade server comes with at least one microprocessor. If the blade server comes with one microprocessor, you can install an additional microprocessor in the second microprocessor socket. If an MPE unit is installed, additional microprocessors can be installed in the MPE unit. The blade server must have two microprocessors installed for the microprocessors in the MPE to become active. The blade server operates as a symmetric multiprocessing (SMP) server, regardless of how many microprocessors are installed. With SMP, certain operating systems and application programs can distribute the processing load among the microprocessors.
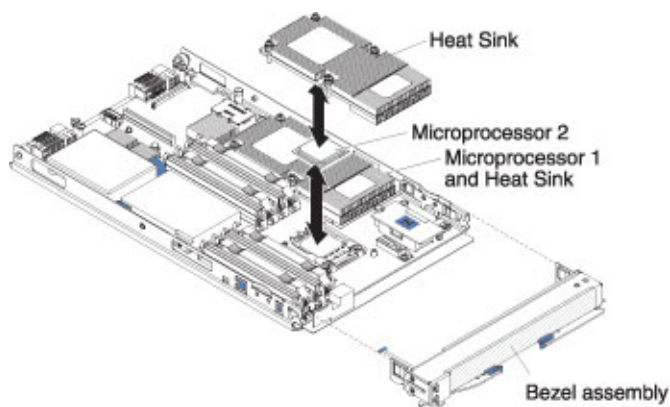
Note: If you install an additional microprocessor, it must have the same type, speed, and power specifications as the first microprocessor.

To use SMP, obtain an SMP-capable operating system. For a list of supported operating systems and other optional devices, see http://www.ibm.com/servers/eserver/serverproven/compat/us/.

The following notes describe the type of microprocessor that the server supports and other information that you must consider when you install a microprocessor:

- Always install microprocessors that have the same cache size and type, the same clock speed, electrical specifications, and identical internal and external clock frequencies (including system bus speed).
- Make sure that the microprocessor with the lowest feature set is the startup (bootstrap) microprocessor, which is installed in the microprocessor 1 socket (J244).
- For a list of microprocessors that the blade server supports, see http://www.ibm.com/servers/eserver/serverproven/compat/us/.
- Before you install a new microprocessor, download and install the most current level of BIOS code (see "Firmware updates" on page 59).
- The microprocessors terminate themselves; therefore, no terminator card is required if microprocessor socket 2 is empty on the blade server or on the MPE. However, for proper airflow, socket 2 must contain a microprocessor heat-sink filler, sometimes called a microprocessor baffle.
- The microprocessor speeds are automatically set for the blade server; therefore, you do not have to set any microprocessor frequency-selection jumpers or switches.

The following illustration shows how to install the second microprocessor in the blade server. This procedure also applies to the MPE unit.


To install an additional microprocessor, complete the following steps:

1. Read the safety information that begins on page "Safety" on page v and "Installation guidelines" on page 17.
2. Shut down the operating system, turn off the blade server, and remove the blade server from the BladeCenter unit. See "Removing the blade server from the BladeCenter unit" on page 19 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 20 for instructions).

5. If you are installing a microprocessor in the blade server and a MPE unit or expansion unit is attached to the blade server, remove the device (see "Removing an expansion unit" on page 21).

6. Locate microprocessor socket 1; if a microprocessor is already installed, locate microprocessor socket 2 (see "Blade server connectors" on page 14).

7. If you are installing a microprocessor in microprocessor socket 2, remove the bezel assembly (see "Removing the bezel assembly" on page 22 for instructions).

8. Loosen the four captive screws that secure the heat-sink filler and then remove the filler from the microprocessor socket.

9. Use your fingers to remove the dust cover from the microprocessor socket.

10. Use your fingers to remove the protective cover from the microprocessor retainer.

11. Install the microprocessor:
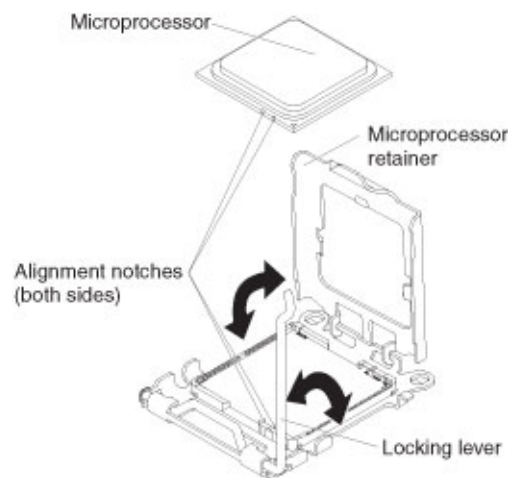
Attention:

- Do not use any tools or sharp objects to lift the locking lever on the microprocessor socket. Doing so might result in permanent damage to the system board.
- Hold the edges of the microprocessor. Do not touch the contacts on the microprocessor or the contacts on the microprocessor socket. Touching these contacts might result in permanent damage.
- Do not press the microprocessor into the socket.
- Make sure that the microprocessor is oriented and aligned correctly in the socket before you try to close the microprocessor retainer.

a. Rotate the locking lever on the microprocessor socket from its closed and locked position until it stops in the fully open position (approximately a 135° angle), as shown.

b. Rotate the microprocessor retainer on the microprocessor socket from its closed position until it stops in the fully open position (approximately a 135° angle), as shown.

c. Touch the static-protective package that contains the new microprocessor to any *unpainted* metal surface on the blade server or any *unpainted* metal surface on any other grounded rack component in the rack that you are installing the microprocessor in for at least 2 seconds; then, remove the microprocessor from the package.

d. Remove the cover from the bottom of the microprocessor.

e. Center the microprocessor over the microprocessor socket. Align the notches on both sides of the microprocessor with the notches in the socket and carefully put the microprocessor into the socket.

f. Carefully close the microprocessor retainer.

g. Rotate the locking lever on the microprocessor socket to the closed and locked position. Make sure that the lever is secured in the locked position by the tab on the microprocessor socket.

12. Install a heat sink on the microprocessor.

Attention:

- Do not set down the heat sink after you remove the plastic cover.
- Do not touch the thermal grease on the bottom of the heat sink. Touching the thermal grease will contaminate it. If the thermal grease on the microprocessor or heat sink becomes contaminated, contact your service technician.

a. Remove the plastic protective cover from the bottom of the heat sink.

b. Make sure that the thermal material is still on the bottom of the heat sink; then, align and put the heat sink on top of the microprocessor in the retention bracket, thermal material side down. Press firmly on the heat sink.

c. Align the four screws on the heat sink with the holes on the heat-sink retention module.

d. Press firmly on the captive screws and tighten them with a screwdriver. Follow the pattern that is shown on the following label. Rotate each screw two full rotations each time. Repeat the sequence until the screws are tight. Do not overtighten the screws by using excessive force.
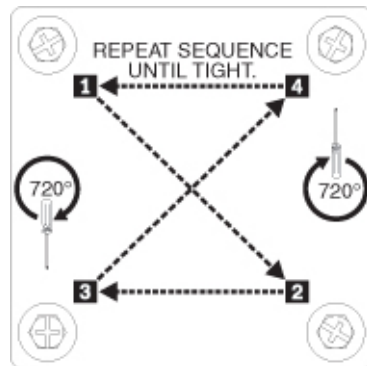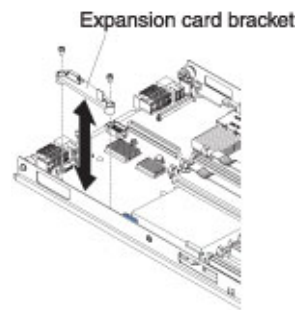

13. If you have other optional devices to install or remove, do so now; otherwise, go to "Completing the installation" on page 46.

Installing an expansion-card bracket

If you are installing a standard-form-factor expansion card, you must also install an expansion card tray. The expansion-card bracket comes in the box with your blade server. Some blade server models might already have an installed expansion-card bracket instead of a SAS drive tray where the connector for SAS drive 1 is located (see "Blade server connectors" on page 14).

The following illustration shows how to install the expansion-card bracket on the system board.
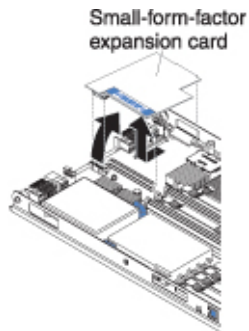

To install the expansion-card bracket, complete the following steps:
1. Read the safety information that begins on page "Safety" on page v and "Installation guidelines" on page 17.
2. Shut down the operating system, turn off the blade server, and remove the blade server from the BladeCenter unit. See "Removing the blade server from the BladeCenter unit" on page 19 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 20 for instructions).
5. If you are installing a standard-form-factor expansion card in the blade server and a MPE unit or expansion unit is attached to the blade server, remove the device (see "Removing an expansion unit" on page 21).
6. Locate SAS connector 1 (see "Blade server connectors" on page 14).
7. If a SAS drive is installed into SAS connector 1, remove the SAS drive and the drive tray (see "Removing a SAS drive" on page 26 and "Removing a SAS drive tray" on page 24).
8. Orient the expansion-card bracket so that the screw holes in the bracket are lined up with the two screw holes in front of SAS connector 1 and closest to the side of the blade server. The flat side of the expansion-card bracket should be towards the side of the blade server.
9. Use a screwdriver to install two screws into the expansion-card bracket to attach the tray to the system board.
10. If you have other devices to install or remove, do so now; otherwise, go to "Completing the installation" on page 46.

Removing a small-form-factor expansion card

The following illustration shows how to remove a small-form-factor expansion card from the blade server; removing a small-form-factor expansion card from the MPE unit is similar.
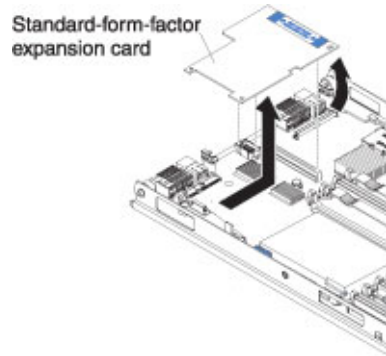

To remove a small-form-factor expansion card, complete the following steps:

1. Read the safety information that begins on page "Safety" on page v and "Installation guidelines" on page 17.

2. Shut down the operating system, turn off the blade server, and remove the blade server from the BladeCenter unit. See "Removing the blade server from the BladeCenter unit" on page 19 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 20 for instructions).

5. If you are removing the expansion card from the blade server and an MPE unit is installed, remove the MPE unit (see "Removing an expansion unit" on page 21).

6. Gently pivot the wide end of the card out of the expansion card connectors; then, slide the notched end of the card out of the raised hook on the expansion card bracket and lift the card out of the blade server.

7. If you have other devices to install or remove, do so now; otherwise, go to "Completing the installation" on page 46.

Removing a standard-form-factor expansion card

The following illustration shows how to remove a standard-form-factor expansion card from the system board of the blade server.
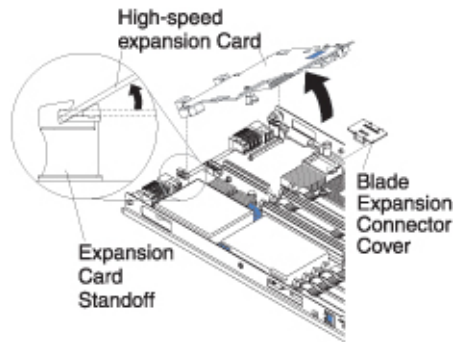
To remove a standard-form-factor expansion card, complete the following steps:

1. Read the safety information that begins on page "Safety" on page v and "Installation guidelines" on page 17.

2. Shut down the operating system, turn off the blade server, and remove the blade server from the BladeCenter unit. See "Removing the blade server from the BladeCenter unit" on page 19 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 20 for instructions).

5. If you are removing a standard-form-factor expansion card from the blade server and a MPE unit or expansion unit is attached to the blade server, remove the device (see "Removing an expansion unit" on page 21).

6. Locate the standard-form-factor expansion card in front of SAS connector 1 (see "Blade server connectors" on page 14).

7. Gently pivot the wide end of the card out of the expansion card connectors; then, slide the notched end of the card out of the raised hook on the expansion card bracket and lift the card out of the blade server.

8. If you have other devices to install or remove, do so now; otherwise, go to "Completing the installation" on page 46.

Removing a high-speed expansion card

The following illustration shows how to remove a high-speed expansion card from the blade server. The procedure for removing a high-speed expansion card from the MPE unit is similar.

To remove a high-speed expansion card, complete the following steps:

1. Read the safety information that begins on page "Safety" on page v and "Installation guidelines" on page 17.
2. Shut down the operating system, turn off the blade server, and remove the blade server from the BladeCenter unit. See "Removing the blade server from the BladeCenter unit" on page 19 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 20 for instructions).
5. Rotate the expansion-card extraction lever upward to disengage the blade-expansion connector.
6. Pivot the narrow end of the card away from the blade expansion connector; then, slide the slots at the back end of the card out of the expansion-card standoffs and lift the card out of the blade server.
7. If you have other options to install or remove, do so now; otherwise, go to "Completing the installation" on page 46.
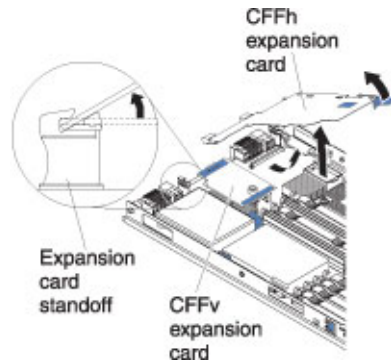
Removing a combination-form-factor expansion card

The combination-form-factor expansion card consists of two parts, the combination-form-factor vertical (CFFv) card and the combination-form-factor horizontal (CFFh) card. To remove a combination-form-factor expansion card, complete the following steps.
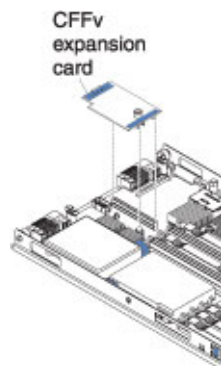
1. Read the safety information beginning on page "Safety" on page v and "Installation guidelines" on page 17.
2. Shut down the operating system, turn off the blade server, and remove the blade server from the BladeCenter unit. See "Removing the blade server from the BladeCenter unit" on page 19 for instructions.
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 20 for instructions).
5. Remove the CFFh card:

The following illustration shows how to remove a CFFh expansion card from the blade server; removing a combination-form-factor expansion card from a MPE unit is similar.

a. Locate the CFFh card in the blade-expansion connector (see "Blade server connectors" on page 14).

b. Pull up the release lever on the CFFh card until the card disconnects from the blade-expansion connector.

c. Pull the card toward the front of the blade server to remove it from the card retainer brackets.

6. Remove the CFFv card:

The following illustration shows how to remove a CFFv expansion card from the blade server; removing a combination-form-factor expansion card from a MPE unit is similar.


a. Locate the CFFv card in the I/O-expansion card connector (see "Blade server connectors" on page 14).

b. Pull up on the CFFv card to remove it from the expansion connector; then, lift the card out of the blade server.

7. If you have other devices to install or remove, do so now; otherwise, go to "Completing the installation" on page 46.

Removing an expansion-card bracket

The following illustration shows how to remove an expansion-card bracket from the system board of the blade server.
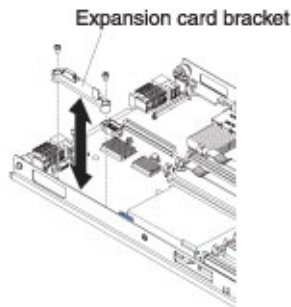
Expansion card bracket

To remove an expansion-card bracket, complete the following steps:

1. Read the safety information that begins on page "Safety" on page v and "Installation guidelines" on page 17.
2. Shut down the operating system, turn off the blade server, and remove the blade server from the BladeCenter unit. See "Removing the blade server from the BladeCenter unit" on page 19 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 20 for instructions).
5. If you are removing an expansion-card tray from the blade server and a MPE unit or expansion unit is attached to the blade server, remove the device (see "Removing an expansion unit" on page 21).
6. If a standard-form-factor expansion card is installed, remove it (see "Removing a standard-form-factor expansion card" on page 35).
7. Locate the expansion-card tray in front of SAS connector 1 (see "Blade server connectors" on page 14).
8. Use a screwdriver to remove the two screws that attach the expansion-card tray to the system board. Keep the screws and the card tray in a safe place.
9. If you are installing another expansion-card tray, install the card tray (see "Installing an expansion-card bracket" on page 33).
10. If you are installing a SAS drive, install the SAS drive tray and SAS drive (see "Installing a SAS drive tray" on page 23 and "Installing a SAS drive" on page 25).
11. If you have other devices to install or remove, do so now; otherwise, go to "Completing the installation" on page 46.

Installing an I/O-expansion card

If I/O expansion is supported by the BladeCenter unit in which the blade server is installed, you can add an I/O-expansion card to the blade server. An I/O-expansion card provides additional connections for communicating on a network.

The single-width type of blade server supports one I/O-expansion card of the small-form-factor, standard-form-factor, or high-speed design. The double-width type of blade server supports one additional I/O-expansion card of the small-form-factor, standard-form-factor, combination-form-factor, or high-speed design. Some expansion cards are available as both small-form-factor cards and standard-form-factor cards. Other expansion cards are available only as standard-form-factor or high-speed cards. 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.

Note: Some BladeCenter units do not support high-speed expansion cards, see the documentation for your BladeCenter unit for compatibility information.

You can install one expansion card in the system board of a BladeCenter LS22 Type 7901 or LS42 Type 7902 blade server. Make sure that the I/O modules to which the I/O-expansion card is mapped support the network-interface type of the I/O-expansion card. In a blade server with an MPE installed, you can install an additional small-form-factor card, standard-form-factor, combination-form-factor, or high-speed expansion card. If the blade server has an MPE installed, a high-speed expansion card can be installed only in the MPE unit.

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

When you add an I/O-expansion card, you must make sure that the I/O modules to which it is mapped both support the expansion-card network-interface type. These I/O modules are typically installed in I/O-module bays 3 and 4 on the BladeCenter unit. For example, if you add an Ethernet expansion card to a blade server that is installed in a Type 8677 BladeCenter unit, the I/O modules in I/O-module bays 3 and 4 of the BladeCenter unit must both be compatible with the expansion card. All other expansion cards that are installed on 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 would enable the use of several different types of compatible I/O-expansion cards on blade servers within the same BladeCenter unit.

The following expansion cards are supported by your blade server:
- High-speed expansion card (HSDC)
- Standard-form-factor expansion card
- Small-form-factor expansion card (SFF)
- Horizontal combination-form-factor expansion card (CFFh)
- Vertical combination-form-factor expansion card (CFFv)
- Concurrent KVM card (cKVM)
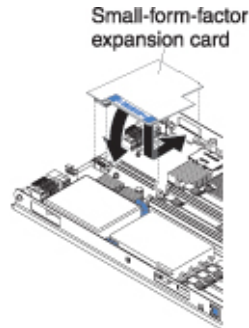
The following table lists the combination of expansion cards that work in the BladeCenter LS22 Type 7901 blade server.

Blade-expansion connector	I/O-expansion connector	cKVM	SAS drive 0	SAS drive 1
HSDC		X	X	X
	standard-form-factor expansion card	X	X	
	SFF	X	X	X
CFFh	CFFv	X	X	X

The following table lists the combination of expansion cards that will work in the BladeCenter LS42 Type 7902 blade server and MPE unit.

Blade-expansion connector (expansion unit)	I/O-expansion connector (expansion unit)	I/O-expansion connector (blade server)	cKVM (blade server)	SAS drive 0 (blade server)	SAS drive 1 (blade server)
HSDC		standard-form-factor expansion card	X	X	
HSDC		SFF	X	X	X
HSDC		CFFv	X	X	X
	standard-form-factor expansion card	standard-form-factor expansion card	X	X	
	standard-form-factor expansion card	SFF	X	X	X
	standard-form-factor expansion card	CFFv	X	X	X
	SFF	standard-form-factor expansion card	X	X	
	SFF	SFF	X	X	X
	SFF	CFFv	X	X	X
CFFh	CFFv	standard-form-factor expansion card	X	X	
CFFh	CFFv	SFF	X	X	X
CFFh	CFFv	CFFv	X	X	X

The following sections describe how to install an I/O-expansion card in the blade server.

Installing a small-form-factor expansion card

The following illustration shows how to install a small-form-factor expansion card in the blade server system board. This procedure also applies to the MPE unit.
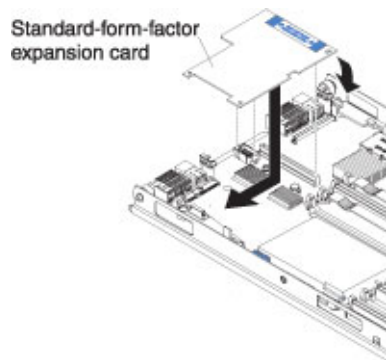

To install a small-form-factor expansion card, complete the following steps:

1. Read the safety information that begins on page "Safety" on page v and "Installation guidelines" on page 17.
2. Shut down the operating system, turn off the blade server, and remove the blade server from the BladeCenter unit. See "Removing the blade server from the BladeCenter unit" on page 19 for instructions.
3. Carefully lay the blade server on a flat, static-protective surface.
4. Open the cover (see "Opening the blade server cover" on page 20).
5. If you are installing the expansion card in the blade server and an expansion unit is installed, remove the expansion unit (see "Removing an expansion unit" on page 21).
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. Locate the expansion-card connector and orient the expansion card with the connector (see "Blade server connectors" on page 14).
8. Install the small-form-factor expansion card as shown in the illustration.
9. Slide the notch in the narrow end of the card into the raised hook on the tray; then, gently pivot the card into the expansion-card connectors.
10. For device-driver and configuration information to complete the installation of the expansion card, see the documentation that comes with the expansion card.
11. If you have other devices to install or remove, do so now; otherwise, go to "Completing the installation" on page 46.

Installing a standard-form-factor expansion card

The following illustration shows how to install a standard-form-factor expansion card in the blade server system board. This procedure also applies to the MPE unit.
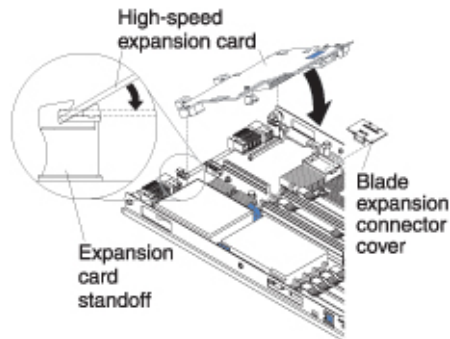

To install a standard-form-factor expansion card, complete the following steps:

1. Read the safety information that begins on page "Safety" on page v and "Installation guidelines" on page 17.
2. Shut down the operating system, turn off the blade server, and remove the blade server from the BladeCenter unit. See "Removing the blade server from the BladeCenter unit" on page 19 for instructions.
3. Carefully lay the blade server on a flat, static-protective surface.
4. Open the cover (see "Opening the blade server cover" on page 20).
5. If you are installing the expansion card in the blade server and an expansion unit is installed, complete the following steps:
   a. Remove the expansion unit (see "Removing an expansion unit" on page 21).
   b. If a drive is connected to SAS connector 1, remove the SAS drive (see "Removing a SAS drive" on page 26).
   c. If a drive tray is installed in front of SAS connector 1, remove the drive tray (see "Removing a SAS drive tray" on page 24). Save the screws and the drive tray in a safe place.
   d. Install the expansion-card bracket, if it is not already installed. Secure the bracket to the system board with the screws from the removed drive tray (see "Installing an expansion-card bracket" on page 33).
6. Install the expansion-card bracket, if it is not already installed. Secure the bracket to the system board with the screws from the removed drive tray (see "Installing an expansion-card bracket" on page 33).
7. 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.
8. Locate the expansion-card connector and orient the expansion card with the connector on the blade server (see "Blade server connectors" on page 14).
9. Slide the notch in the narrow end of the card into the raised hook on the expansion-card bracket; then, gently pivot the wide end of the card into the expansion-card connector.

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

11. If you have other devices to install or remove, do so now; otherwise, go to "Completing the installation" on page 46.

Installing a high-speed expansion card

The following illustration shows how to install a high-speed expansion card on the blade server system board. This procedure also applies to the MPE unit.

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

1. Read the safety information that begins on page "Safety" on page v and "Installation guidelines" on page 17.

2. Shut down the operating system, turn off the blade server, and remove the blade server from the BladeCenter unit. See "Removing the blade server from the BladeCenter unit" on page 19 for instructions.

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

4. Open the cover (see "Opening the blade server cover" on page 20 for instructions).

5. A high-speed expansion card can be installed in a blade server without an expansion unit or it can be installed in an MPE unit that is attached to the blade server. You cannot install a high-speed expansion card in a blade server to which an expansion unit will be connected. If you are installing a high-speed expansion card in a blade server that has an expansion unit, remove the expansion unit (see "Removing an expansion unit" on page 21).

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. Locate the expansion-card connectors and remove the blade expansion connector cover, if one is installed (see "Blade server connectors" on page 14).

8. Orient the expansion card and slide the slots at the back end of the card onto the pins on the expansion-card standoff; then, pivot the card into the expansion-card connector.

9. Firmly press on the indicated locations to seat the expansion card.

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

11. If you have other devices to install or remove, do so now; otherwise, go to "Completing the installation" on page 46.

Installing a combination-form-factor expansion card

The combination-form-factor expansion card consists of two parts, the combination-form-factor vertical (CFFv) card and the combination-form-factor horizontal (CFFh) card. To install a combination-form-factor expansion card, complete the following steps:

1. Read the safety information that begins on page "Safety" on page v and "Installation guidelines" on page 17.
2. Shut down the operating system, turn off the blade server, and remove the blade server from the BladeCenter unit. See "Removing the blade server from the BladeCenter unit" on page 19 for instructions.
3. Carefully lay the blade server on a flat, static-protective surface.
4. Open the cover (see "Opening the blade server cover" on page 20 for instructions).
5. Install the CFFv card:

   The following illustration shows how to install a CFFv expansion card into the blade server; installing a combination-form-factor expansion card in a MPE unit is similar.
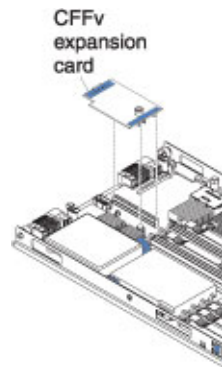
   a. Locate the I/O-expansion card connector (see "Blade server connectors" on page 14).
   b. Orient the CFFv card over the I/O-expansion card connector.
   c. Press the CFFv card into the I/O-expansion card connector.
6. Install the CFFh card:

   The following illustration shows how to install a CFFh expansion card into the blade server; installing a combination-form-factor expansion card in a MPE unit is similar.
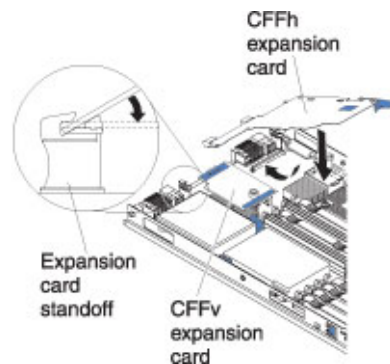
   a. Locate the blade-expansion connector (see "Blade server connectors" on page 14).

b. Orient the CFFh card with the blade-expansion connector.

c. Tilt the CFFh card into the card retainer brackets toward the rear of the blade server.

d. Press the CFFh card into the blade-expansion connector.

Installing a concurrent KVM card

If the BladeCenter unit and management module support the concurrent-KVM function (cKVM), you can add a cKVM card to the blade server system board.

The following illustration shows how to install a concurrent KVM expansion card in the blade server.
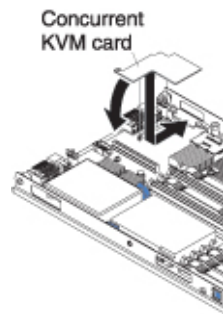
To install the cKVM card, complete the following steps:

1. Read the safety information that begins on page "Safety" on page v and "Installation guidelines" on page 17.

2. Shut down the operating system, turn off the blade server, and remove the blade server from the BladeCenter unit. See "Removing the blade server from the BladeCenter unit" on page 19 for instructions.

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

4. Open the cover (see "Opening the blade server cover" on page 20 for instructions).

5. If you are installing the cKVM card in the blade server and an expansion unit is installed, remove the expansion unit (see "Removing an expansion unit" on page 21).

6. If any of the following expansion cards are installed, remove the card:
    *   Small-form-factor card (see "Removing a small-form-factor expansion card" on page 34)
    *   Combination-form-factor card (see "Removing a combination-form-factor expansion card" on page 36)
    *   High-speed expansion card (see "Removing a high-speed expansion card" on page 36)

7. 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.

8. Locate the cKVM connectors and orient the cKVM card with the connector (see "Blade server connectors" on page 14).

9. Slide the wide end of the card into the raised hook on the card tray; then, gently pivot the card into the cKVM card connector.

10. If you removed any of the following expansion cards while you installed the concurrent KVM card, reinstall the card:
    - Small-form-factor card (see "Installing a small-form-factor expansion card" on page 41).
    - Combination-form-factor card (see "Removing a combination-form-factor expansion card" on page 36)
    - High-speed expansion card (see "Removing a high-speed expansion card" on page 36)
11. For device-driver and configuration information to complete the installation of the cKVM card, see the documentation that comes with the cKVM card.
12. If you have other devices to install or remove, do so now; otherwise, go to "Completing the installation."

Completing the installation

To complete the installation, complete the following tasks. Instructions for each task are in the following sections.

1. Reinstall the blade server bezel assembly, if you removed it (see "Installing the bezel assembly" on page 47).
2. If you removed an expansion unit from a double-width type of blade server, reinstall the expansion unit (see "Installing an expansion unit" on page 48).
3. Close the blade server cover (see "Closing the blade server cover" on page 49). If an expansion unit or MPE is installed, close the cover on the expansion unit.

   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.
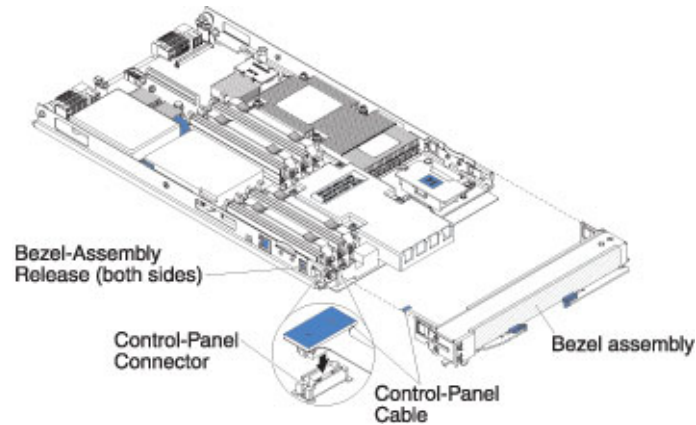
4. Reinstall the blade server into the BladeCenter unit (see "Installing the blade server in a BladeCenter unit" on page 50).
5. Turn on the blade server (see "Turning on the blade server" on page 13).
6. For certain optional devices, you might have to run the blade server Configuration/Setup Utility program to configure the blade server (see Chapter 4, "Configuring the blade server," on page 53).

   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.

Installing the bezel assembly

The following illustration shows how to install the blade server bezel assembly. The procedure for installing the MPE bezel assembly is the same, except that the MPE does not have a control-panel connector.

To install the blade server bezel assembly, complete the following steps:
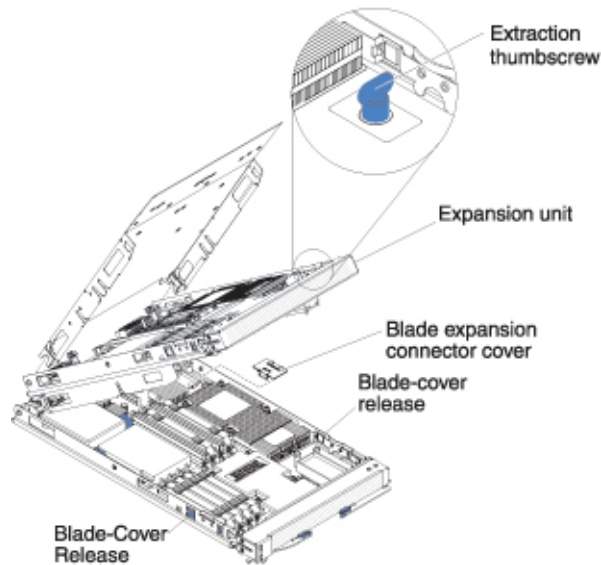
1. Read the safety information that begins on page "Safety" on page v and "Installation guidelines" on page 17.

2. If you are installing the bezel assembly on a blade server, connect the control-panel cable to the control-panel connector on the system board. If you are installing the bezel assembly on an MPE unit, go to step 3.

   Note: Align the control-panel cable with the notch in the air baffle on the blade server in front of the control-panel connector.

3. Carefully slide the bezel assembly onto the blade server or MPE until it clicks into place.

Installing an expansion unit

The following illustration shows how to install an MPE unit on the blade server; the procedure for installing another type of expansion unit on a blade server is similar.

Note: The MPE unit must be installed on a blade server and must not be installed on another expansion device.
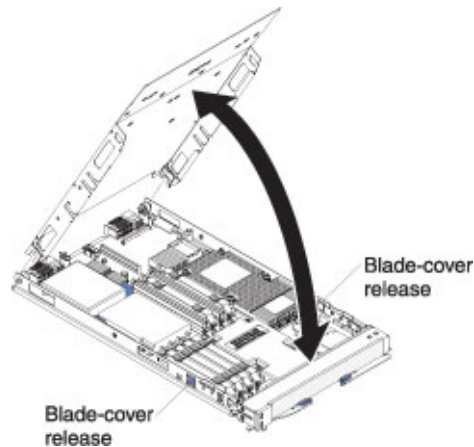
To install the MPE unit or an expansion unit, complete the following steps:

1. Read the safety information that begins on page "Safety" on page v and "Installation guidelines" on page 17.
2. If the blade server cover is installed, remove it (see "Opening the blade server cover" on page 20 for instructions).
3. If you removed the blade bezel assembly, install it (see "Installing the bezel assembly" on page 47 for instructions).
4. If the blade expansion connector cover on the blade server is installed, remove it by pulling the cover off the connector (see "Blade server connectors" on page 14).
5. If you are installing a new expansion unit, touch the static-protective package that contains the 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 expansion unit from the package.
6. Orient the expansion unit above the blade server.
7. Lower the expansion unit so that the slots at the rear slide down onto the cover pins at the rear of the blade server.
8. Pivot the expansion unit closed. The connectors on the expansion unit automatically align with and connect to the connectors on the blade server system board.
9. If the expansion unit has an extraction device (such as a thumbscrew or a lever), use it to secure the expansion unit on the blade server; otherwise, press the expansion unit firmly into the closed position until it clicks into place.

Closing 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.

The following illustration shows how to close the blade server cover.

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.

Attention: You cannot insert the blade server into the BladeCenter unit until the cover is installed and closed. 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 17.
2. If you removed the bezel assembly, install it (see "Installing the bezel assembly" on page 47 for instructions).
3. If you removed an expansion unit from a double-width type blade server, install it (see "Installing an expansion unit" on page 48 for instructions).
4. 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.
5. 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

The following illustration shows how to install a single-width type of blade server into a Type 8677 BladeCenter unit. The procedure for installing the double-width type of blade server is the same. The appearance of your BladeCenter unit might be different; see the documentation for your BladeCenter unit for additional information.
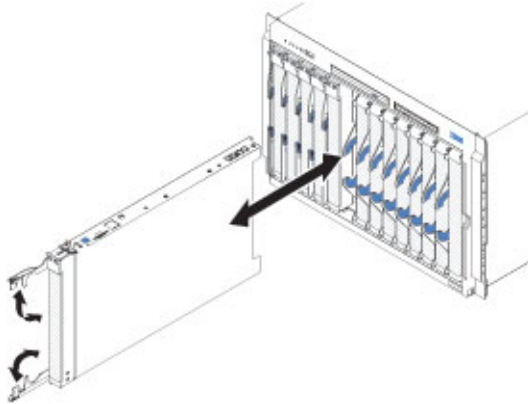
To install a blade server in a BladeCenter unit, complete the following steps.

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. Read the safety information that begins on page "Safety" on page v and "Installation guidelines" on page 17.

2. If you have not done so already, install any devices that you want, such as SAS drives or memory, in the blade server.

3. Select the bay for the blade server. An additional bay is required for each blade expansion device that is connected to the blade server.

   Note:
   - When any blade server or device is in blade bays 7 through 14 (in a BladeCenter unit) or in blade bays 5 through 8 (in a BladeCenter T unit), power modules must be present in all four power-module bays. For additional information, see the *Installation and User's Guide* that comes with the BladeCenter or BladeCenter T unit.
   - To help ensure proper cooling, performance, and system reliability, make sure that each blade bay on the front of the BladeCenter unit contains a blade server, expansion unit, or filler. Do not operate a BladeCenter unit for more than 1 minute or a BladeCenter T unit for more than 20 minutes without a blade server, expansion unit, or filler in each blade bay.
   - If you reinstall a blade server that you removed, you must install it in the same blade bay from which you removed it. Some blade server

configuration information and update options are established according to bay number. Reinstalling a blade server into a different blade bay from the one from which it was removed might have unintended consequences, and you might have to reconfigure the blade server.

4. Make sure that the release levers on the blade server are in the open position (perpendicular to the blade server).

5. Slide the blade server into the blade bay until it stops.

6. Push the release levers 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. (Optional) Write identifying information on one of the user labels that come with the blade servers and put the label on a BladeCenter unit bezel. See the documentation for your BladeCenter unit for information about the label placement.

   Important: Do not put the label on the blade server or in any way block the ventilation holes on the blade server.

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

11. Reinstall the bezel assembly on the BladeCenter T unit (BladeCenter T unit only). For detailed instructions for reinstalling the bezel assembly, see the *Installation and User's Guide* that comes with the BladeCenter T unit.

If this is the initial installation for 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 61 for details.

Updating 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 53 for more information about the Configuration/Setup Utility program.

Some devices 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 61 and your operating-system documentation for additional information.

Input/output connectors and devices

The input/output connectors that are available to the blade server are supplied by the BladeCenter unit. See the documentation that comes with the BladeCenter unit for information about the input/output connectors.

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 control panel and LEDs" on page 11 for information about these buttons and their functions.

The Ethernet controller on the blade server communicates with the network through the Ethernet-compatible I/O modules on 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

This chapter describes the configuration requirements for 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 59.

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 passwords. 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 SAS controller IDs. See "Using the LSI Logic Configuration Utility program" on page 60 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 56.

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

    The PXE boot agent utility program is part of the BIOS code in the blade server. 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 58.

The IBM Remote Deployment Manager (RDM) Version 4.4 program is available for purchase. You can use IBM RDM 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 if an operating system supports the RDM program or for updated information about RDM and information about purchasing the software, see http://www.ibm.com/servers/eserver/xseries/systems_management/.

Using 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 control panel 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 choices

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

- **System Summary**

  Select this choice to display 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 choice to view information about the microprocessors that are installed in the blade server.

  - **USB Device Summary**

    Select this choice to view information about the USB devices that are installed in the blade server.

- **System Information**

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

  - **Product Data**

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

  - **Video**

    Select this choice to view information about the integrated video controller.

  - **System MAC Addresses**

    Select this choice to view the MAC addresses for the Ethernet controllers on the blade server.

- **Date and Time**

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

- **System Security**

  Select this choice to set a power-on password. See "Using passwords" on page 56 for more information about passwords.

- **Start Options**

  Select this choice 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 choice to view or change 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 either of the integrated Gigabit Ethernet controllers. If the MPE unit is installed, you can enable or disable the PXE option for either of its integrated Gigabit Ethernet controllers. The default setting for **Planar Ethernet 1** and **Planar Ethernet 2** is enabled, and if the MPE is installed, the default setting for **Planar Ethernet 3** and **Planar Ethernet 4** is disabled.

  You can enable USB disk support, which enables the blade server to use a USB storage device that is connected to the USB port in the media tray of the BladeCenter unit. See the documentation for your BladeCenter unit for additional information.

  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 choice 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 choice 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 memory 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**.

  – **PCI Bus Control**

    Select this choice to view and set interrupts for PCI devices, enable or disable PCI ROM control, and to configure the master-latency-timer value for the blade server.

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

    Select this choice to enable or disable the **Reboot on System NMI** option on the menu. If you enable this option, the blade server will automatically restart 60 seconds after the service processor issues a nonmaskable interrupt (NMI) to the blade server. You can also select this choice to enable or disable and set the timeouts for the POST and OS loader watchdog timers.

  – **BMC Network Configuration**

    Select this choice to set the network addresses of the BMC.

  – **BMC System Event Log**

    Select this choice to view and clear BMC event log entries.

- **Save Settings**

  Select this choice to save the changes that you have made in the settings.
- **Restore Settings**

  Select this choice to cancel the changes that you have made in the settings and restore the previous settings.
- **Load Default Settings**

  Select this choice to cancel the changes that you have made in the settings and restore the factory settings.
- **Exit Setup**

  Select this choice 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

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 full 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 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

The *ServerGuide Setup and Installation* CD contains a setup and installation program that is designed for the IBM 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 you can purchase the CD from the ServerGuide fulfillment Web site at http://www.ibm.com/servers/eserver/ xseries/systems_management/serverguide/sub.html. To download the 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 described in this document.

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

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 performs the following tasks:
- 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

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

You can use the ServerGuide program to 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.

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

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 ServerGuide

If you have already configured the blade server hardware and you are not using the ServerGuide program to install the operating system, you can download the latest operating-system installation instructions from the IBM Web site. See "Downloading operating-system installation instructions" on page 62.

Using 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.

Note: The blade server does not support Remote Program Load (RPL) selection for the boot protocol option.

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. To select a choice from the menu, use the arrow keys and press Enter.
4. To change the settings of the selected items; follow the instructions on the screen.

Firmware updates

IBM periodically makes BIOS, service processor (BMC), and diagnostic firmware updates available for the blade server. Go to http://www.ibm.com/bladecenter/ to download the latest firmware for the blade server then, 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, service processor (BMC), and diagnostic firmware levels are consistent for the blade servers within the BladeCenter unit.

Configuring 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/bladecenter/.
2. Click **Support**.
3. Under **Support information**, click **Product support and information**.
4. Under **Popular links**, click **Publications lookup**.
5. From the **Product family** menu, select **BladeCenter LS22** or **BladeCenter LS42** and click **Go**.

Note: If an 1801 error code is displayed during startup and the startup process stops, the BIOS is trying to copy too much data from the device boot ROM into write-protected RAM. To correct an 1801 error that halts the boot process, restart the blade server, start the Configuration/Setup Utility program (see "Using the Configuration/Setup Utility program" on page 53), and disable unnecessary ROM shadowing. Only the device boot ROMs that enable the following components must be shadowed during startup:

- Video
- Hard disk drive (if you are using this as a primary or secondary boot device)
- PXE (if you are using PXE as a primary or secondary boot device)
- One Ethernet controller (if you are using PXE as a primary or secondary boot device)

The remaining options and components are enabled by device drivers in the operating system.

Configuring a SAS RAID array

Configuring a SAS RAID array applies to a blade server in which two SAS drives are installed.

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

Two SAS drives can be used to implement and manage RAID level-0 (striping) or RAID level-1 (mirror) arrays in operating systems that are listed at http://www.ibm.com/servers/eserver/serverproven/compat/us/. Use the LSI Configuration Utility program to configure the SAS RAID (see "Using the LSI Logic Configuration Utility program").

Using 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 (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 `<<<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

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) to install an operating system that is supported by your blade server and by RDM.
- Download the latest operating-system installation instructions from http://www.ibm.com/bladecenter/ and install the operating system. Local deployment of Microsoft Windows 2000 requires an integrated CD that contains Windows 2000 with Service Pack 3 applied. Instructions for creating a Windows 2000 Integrated CD are contained in the latest operating-system installation instructions for Windows 2000 at http://www.ibm.com/support/.

Important:

1. 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.

2. Some operating systems, such as Red Hat Linux 7.3, enable you to select the type of mouse that is being used. If you are offered this choice, select USB instead of PS/2. Although the mouse might be a PS/2-style device, communication with the mouse is through an internal USB bus in the BladeCenter unit; therefore, the operating system in the blade server must recognize the mouse as a USB device.

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

To start 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 64.
3. Follow the instructions on the screen to complete the following steps:
   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

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: The operating system must be supported by your blade server and by RDM.

- To determine whether your blade server supports the operating system that you plan to install, see http://www.ibm.com/servers/eserver/serverproven/compat/us/nos/ematrix.shtml.
- To determine whether RDM supports the operating system that you plan to install, see http://www.ibm.com/systems/management/.

Downloading operating-system installation instructions

You can download operating-system installation instructions from the IBM Web site.

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/bladecenter/.
2. Click **Support**.
3. Under **Support information**, click **Product support and information**.
4. Under **Popular links**, click **Operating system installation**.
5. Click **BladeCenter LS22** or **BladeCenter LS42** and click **Go**.

Chapter 6. Solving problems

This chapter provides basic information about the diagnostic tools that are available to help you solve some common problems that might occur while you are setting up 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 50).
- 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 still does not start, see the *Problem Determination and Service Guide* on the *BladeCenter Documentation* CD.

Diagnostic tools overview

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.

  – Additional beep codes are listed under "Diagnostics" in the *Problem Determination and Service Guide*.

- **POST error messages**

  The POST error messages indicate the detection of a problem. See the *Problem Determination and Service Guide* for more information.

- **ServerGuide problems**

  The table in "ServerGuide problems" on page 64 lists problem symptoms and steps to correct the problems.

- **Troubleshooting tables**

  Use the troubleshooting tables to find solutions to problems that have identifiable symptoms. These tables are in the *Problem Determination and Service Guide*.

- **Diagnostic programs and error messages**

  The diagnostic programs are the primary method of testing the major components of the blade server. These programs are stored in read-only memory (ROM) on the blade server. See the *Problem Determination and Service Guide* for more information.

  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 blade server system board and MPE to identify 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 and MPE error LEDs are described in the *Problem Determination and Service Guide*.

ServerGuide problems

The following table lists problem symptoms and suggested solutions.

Symptom	Action
The *ServerGuide Setup and Installation* CD will not start.	1. Make sure that the CD or DVD drive is associated with the blade server that you are configuring by pressing the media-tray select button (see Chapter 2, "Power, controls, and indicators," on page 11). 2. Make sure that the blade server supports the ServerGuide program (see "Using the ServerGuide Setup and Installation CD" on page 56). 3. If the startup (boot) sequence settings have been changed, make sure that the CD or DVD drive is first in the startup sequence in the Configuration/Setup Utility program (see "Using the Configuration/Setup Utility program" on page 53).
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 blade server supports the operating system (see http://www.ibm.com/servers/eserver/serverproven/compat/us/nos/ematrix.shtml). If it does, either no logical drive is defined (SAS RAID servers), 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. This section contains information about where to go for additional information about IBM and IBM products, what to do if you experience a problem with your system, and whom to call for service, if it is necessary.

Before you call

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

- Check all cables to make sure that they are connected.
- Check the power switches to make sure that the system and any optional devices are turned on.
- Use the troubleshooting information in your system documentation, and use the diagnostic tools that come with your system. Information about diagnostic tools is in the *Problem Determination and Service Guide* on the IBM *Documentation* CD that comes with your system.
- Go to the IBM support Web site at http://www.ibm.com/systems/support/ to check for technical information, hints, tips, and new device drivers or to submit a request for information.

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

Using the documentation

Information about your IBM system and preinstalled software, if any, or optional device is available in the documentation that comes with the product. That documentation can include printed documents, online documents, readme files, and help files. See the troubleshooting information in your system documentation for instructions for using the diagnostic programs. The troubleshooting information or the diagnostic programs might tell you that you need additional or updated device drivers or other software. IBM maintains pages on the World Wide Web where you can get the latest technical information and download device drivers and updates. To access these pages, go to http://www.ibm.com/systems/support/ and follow the instructions. Also, some documents are available through the IBM Publications Center at http://www.ibm.com/shop/publications/order/.

Getting help and information from the World Wide Web

On the World Wide Web, the IBM Web site has up-to-date information about IBM systems, optional devices, services, and support. The address for IBM System x™ and xSeries® information is http://www.ibm.com/systems/x/. The address for IBM BladeCenter information is http://www.ibm.com/systems/bladecenter/. The address for IBM IntelliStation® information is http://www.ibm.com/intellistation/.

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

Software service and support

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

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

Hardware service and support

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

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

IBM Taiwan product service

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

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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.

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Avis de conformité à la réglementation d'Industrie Canada

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Notice to Customers

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