IBM

BladeCenter
LS21 Type 7971
LS41 Type 7972

Installation and User's Guide

Welcome.

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

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

Additionally, a service information label is attached to each BladeCenter unit and blade server. This label provides a graphical summary of many of the installation and service activities that are associated with each device.

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

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

Before installing the BladeCenter LS21 Type 7971 or LS41Type 7972 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
- provided 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 options such as drives, memory modules, processor or expansion cards in the blade server, if applicable. Install the blade server in the BladeCenter unit. See Chapter 3 for more information.
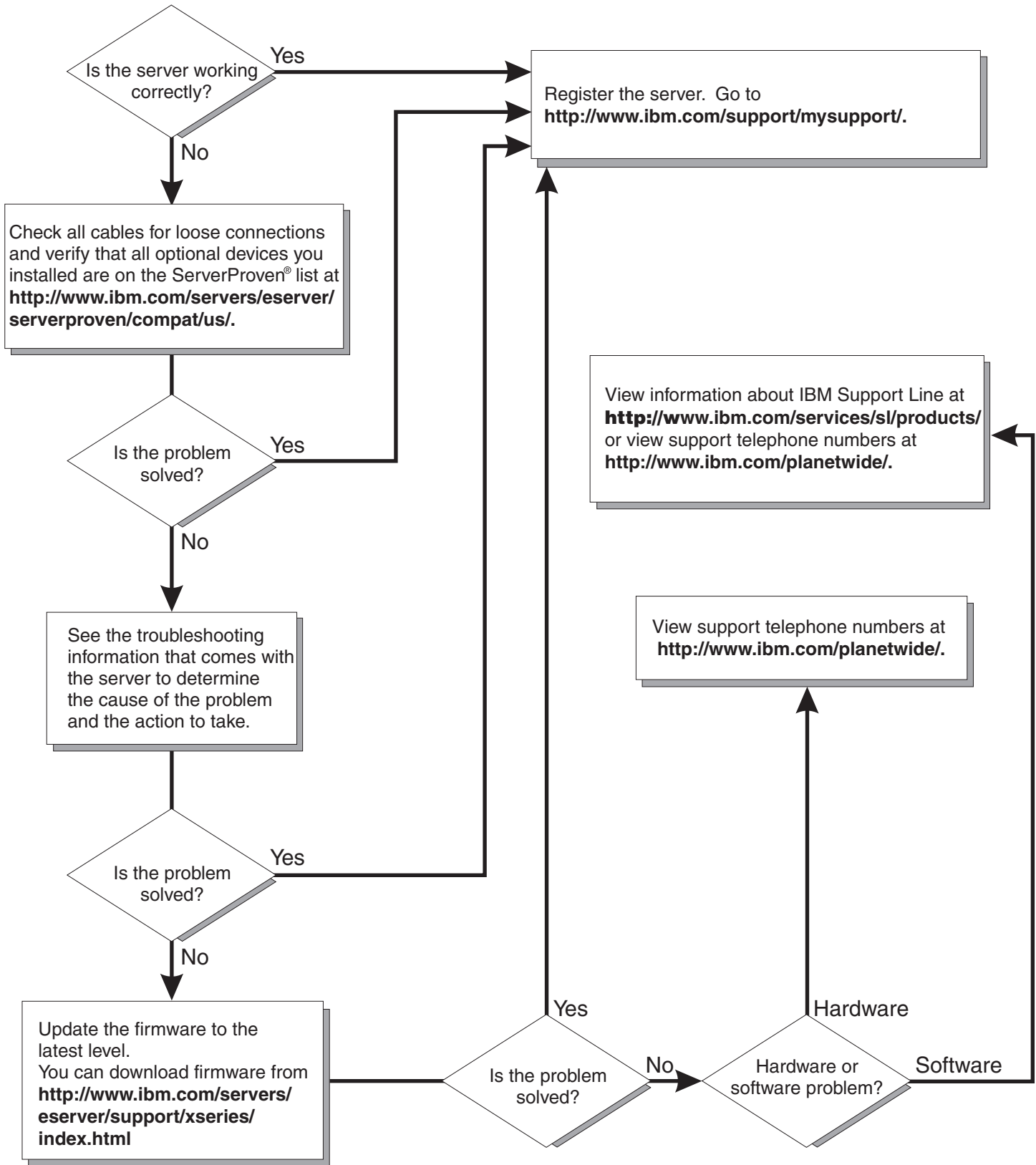
Configure the blade server. See Chapter 4 for more information.

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

Install additional applications according to the instructions provided 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/servers/eserver/support/xseries/index.html**

→

```
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 LS21 Type 7971 and LS41 Type 7972

Installation and User's Guide

Note: Before using this information and the product it supports, read the general information in Appendix B, "Notices," on page 57 and the *Warranty and Support Information* document for your blade server type on the *Documentation* CD.

Contents

Safety

Before installing this product, read the Safety Information.

قبل تركيب هذا المنتج، يجب قراءة الملاحظات الآمنية

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

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

安裝本產品之前，請先閱讀「安全資訊」。

Prije instalacije ovog produkta obavezno pročitajte Sigurnosne Upute.

Před instalací tohoto produktu si přečtěte příručku bezpečnostních instrukcí.

Læs sikkerhedsforskrifterne, før du installerer dette produkt.

Lees voordat u dit product installeert eerst de veiligheidsvoorschriften.

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

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

Vor der Installation dieses Produkts die Sicherheitshinweise lesen.

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

לפני שתתקינו מוצר זה, קראו את הוראות הבטיחות.

A termék telepítése előtt olvassa el a Biztonsági előírásokat!

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

製品の設置の前に、安全情報をお読みください。

본 제품을 설치하기 전에 안전 정보를 읽으십시오.

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

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:

All caution and danger statements in this documentation begin with a number. This number is used to cross reference an English caution or danger statement with translated versions of the caution or danger statement in the *IBM Safety Information* book.

For example, if a caution statement begins with a number 1, translations for that caution statement appear in the *IBM Safety Information* book under statement 1.

Be sure to read all caution and danger statements in this documentation before performing the instructions. 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 3:

CAUTION:
When laser products (such as CD-ROMs, DVD drives, fiber optic devices, or transmitters) are installed, note the following:
- **Do not remove the covers. Removing the covers of the laser product could result in exposure to hazardous laser radiation. There are no serviceable parts inside the device.**
- **Use of controls or adjustments or performance of procedures other than those specified herein might result in hazardous radiation exposure.**

DANGER

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

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

Statement 4:

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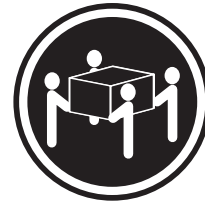
CAUTION:
Use safe practices when lifting.

Statement 5:

CAUTION:
The power control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.
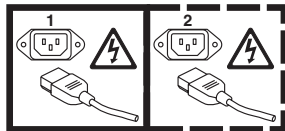
Statement 8:

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

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

Statement 13:

DANGER

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

Statement 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® LS21 Type 7971 and LS41 Type 7972 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 all BladeCenter and BladeCenter T 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**.

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 *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 http://www.ibm.com/bladecenter/. 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, go to http://www.ibm.com/bladecenter/ , click **Support**, select **BladeCenter LS21** or **BladeCenter LS41** from the **Hardware** list, and click **Go**. For firmware updates, click the **Download** tab. For documentation updates, click the **Install and use** tab, and click **Product documentation**.

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.

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 LS21 or LS41
Machine type	7971 or 7972
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 LS41 Type 7972 blade server is available in two configurations. Some models come with the optional multi-processor expansion (MPE) unit and are a double-width type blade servers. These models require two adjacent blade bays in the BladeCenter unit. The LS21 Type 7971 blade servers and the LS41 Type 7972 blade servers without the optional MPE are a single-width type blade server and require only one blade bay in the BladeCenter unit.

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

The single-width type LS21 Type 7971 and LS41 Type 7972 blade server is shown in the following illustration.

Release handles
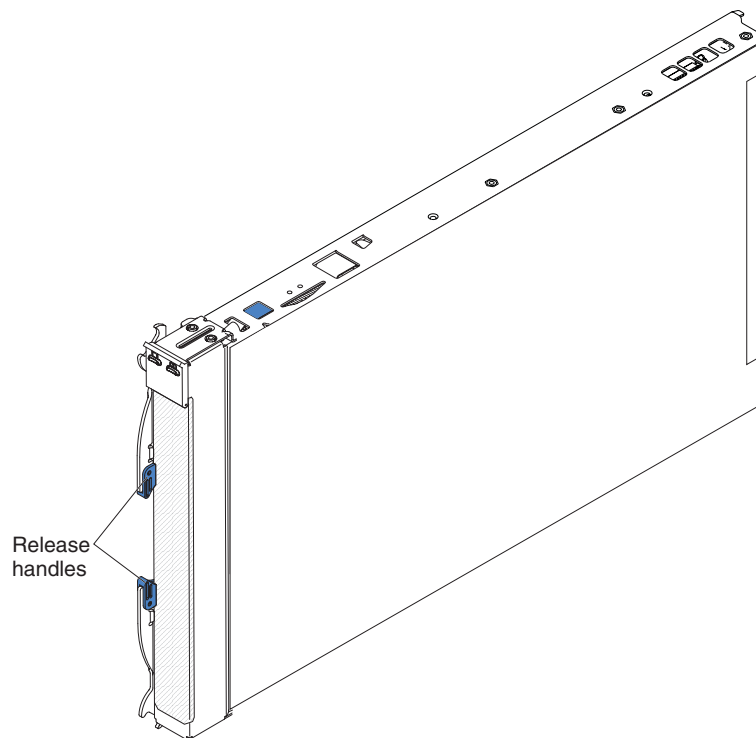
The double-width type LS41 Type 7972 blade server is shown in the following illustration.

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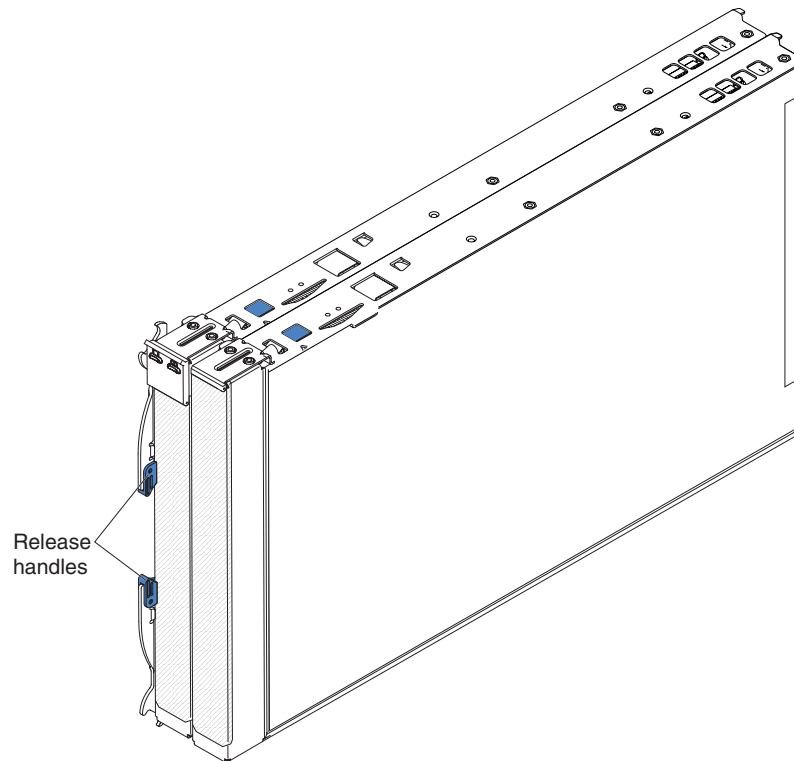
A set of blank labels comes with the blade server. When you install the blade server in the BladeCenter unit, write identifying information on a label and place the label on the BladeCenter unit bezel. See the documentation for your BladeCenter unit for recommended label placement.

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

Related documentation

This *Installation and User's Guide* contains general information about the blade server, including how to install supported options 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. From the **Hardware** list, select **BladeCenter LS21** or **BladeCenter LS41** and click **Go**.
3. Click the **Install and use** tab.
4. Click **Product documentation**.

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® NT 4.0 (with Service Pack 3 or later), 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. Acrobat Reader software is included on the CD, and you can install it when you run the Documentation Browser.

Using the Documentation Browser

Use the Documentation Browser to browse the contents of the CD, read brief descriptions of the documents, and view documents using Adobe Acrobat Reader or xpdf. The Documentation Browser automatically detects the regional settings in use in your system and displays the documents in the language for that region (if available). If a document is not available in the language for that region, the English-language version is displayed.

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

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

      `e:\win32.bat`

      where *e* is the drive letter of the CD-ROM drive, and click **OK**.
    - If you are using Red Hat Linux, insert the CD into the CD 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 appears under **Topic Description**. To select more than one document, press and hold the Ctrl key while you select the documents. Click **View Book** to view the selected document or documents in Acrobat Reader or xpdf. If you selected more than one document, all the selected documents are opened in Acrobat Reader or xpdf.

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

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

Notices and statements used in this document

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

The following notices and statements are used in this document:

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

Features and specifications

The following table provides 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: Supports dual-core AMD Opteron® microprocessors: Up to two in single-width models or four in double-width models Note: Use the Configuration/Setup Utility program to determine the type and speed of the microprocessors in your blade server. Memory: • Dual-channel DIMMs: 8 DIMM slots in single-width models or 16 DIMM slots in double-width models • Type: Very-low profile (VLP), double-data rate 2 (DDR2), ECC SDRAM registered x4 (Chipkill) or x8 (non-Chipkill) DIMMs • Supports 512 MB, 1 GB, and 2 GB (as of the date of this publication): Total memory of up to 16 GB in single-width models or 32 GB in double-width models Drives: Supports small-form-factor, Serial Attached SCSI (SAS) drives: One in single-width models or two in double-width models	Integrated functions: • Dual Gigabit Ethernet controllers • Expansion card interface • Local service processor: Baseboard management controller (BMC) with Intelligent Platform Management Interface (IPMI) firmware • ATI RN-50 video controller • LSI 1064 Serial Attached SCSI (SAS) controller • Light path 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 Predictive Failure Analysis® (PFA) alerts: • Microprocessor • Memory • Hard disk drives Electrical Input: 12 V dc	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% Size: • Height: 24.5 cm (9.7 inches) • Depth: 44.6 cm (17.6 inches) • Width: – Single-width models: 2.9 cm (1.14 inches) – Double-width models: 5.8 cm (2.28 inches) • Maximum weight: – Single-width models: 4.9 kg (10.8 lb) – Double-width models: 11.2 kg (24.7 lb)

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**

  Single-width models of the blade server support up to one 2.5-inch, small form factor (SFF), Serial Attached SCSI (SAS) hard disk drive; double-width models support up to two 2.5-inch, SFF, SAS hard disk 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 hardware options 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 45.

- **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 microprocessors installed. 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 two integrated Broadcom BCM5706S Gigabit Ethernet controllers. The blade server double-width types also have two additional Broadcom BCM5708S Gigabit Ethernet controllers 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. Double-width models of the blade server also have expansion card connectors in the MPE.

- **Large system memory**

  Depending on the blade server model, it supports up to 16 GB (single-width models) or 32 GB (double-width models) of system memory. The memory controller in 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 the ServerProven® list at http://www.ibm.com/servers/eserver/serverproven/compat/us/.

- **Light path diagnostics**

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

- **PCI Express**

  PCI Express is a fully-serial interface that can be used for universal connectivity for use as a chip-to-chip interconnect, I/O interconnect for adapters, and an I/O attachment point to Gigabit-networking devices. Using an expansion unit, you can add additional 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 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 controllers
- ECC memory
- ECC protection on the L2 cache
- Error codes and messages
- Failover Ethernet support
- Hot-swap drives on optional SAS storage expansion unit
- Light path diagnostics feature
- Microprocessor built-in self-test (BIST) during power-on self-test (POST)
- Microprocessor presence detection

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

- Microprocessor serial number access
- Power policy support
- Power-on self-test (POST)
- Predictive Failure Analysis (PFA) alerts
- ROM Resident 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 Intel-processor-based servers, desktop computers, workstations, and mobile computers on a variety of platforms

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

- Advanced self-management capabilities for maximum system availability.
- Multiple operating-system platform support, including Microsoft Windows 2000 Server, Windows 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/pc/support/site.wss/document.do?lndocid=MIGR-61788. It is updated every 6 to 8 weeks.
- Support for IBM and non-IBM servers, desktop computers, workstations, and mobile computers.
- Support for systems-management industry standards.
- Integration into leading workgroup and enterprise systems-management environments.
- Ease of use, training, and setup.

IBM Director also provides an extensible platform that supports advanced 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/fgm0_main.htm, and the IBM xSeries Systems Management Web page at http://www.ibm.com/servers/eserver/xseries/systems_management/, which presents an overview of IBM Systems Management and IBM Director.

Major components of the blade server

The blade server is available in two types: single width and double width. All models have the blade server system board with components installed in the same locations. The double-width type 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 double-width type 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.
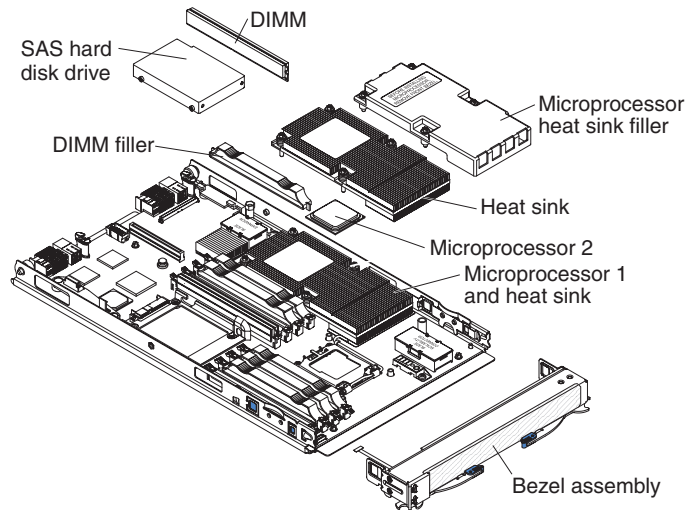
The following illustration shows the major components of the MPE.
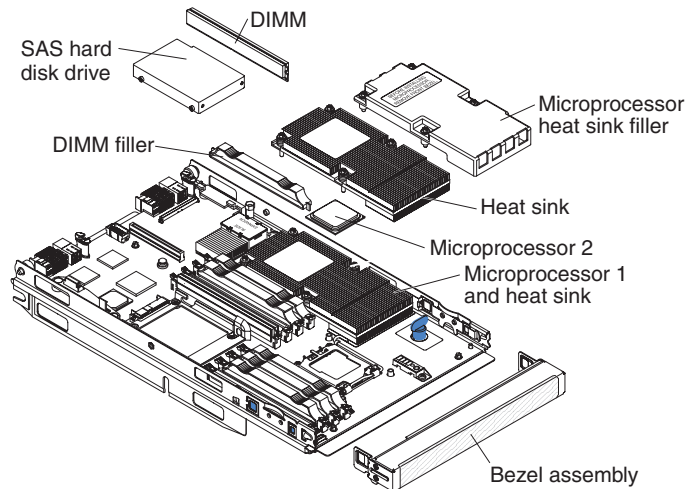
Chapter 2. Power, controls, and indicators

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.

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 "Understanding the control panel and LEDs" on page 14) to start the blade server.

  Notes:

  1. Wait until the power-on LED on the blade server flashes slowly before pressing 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 "Understanding the control panel and LEDs" on page 14 for the power-on LED states.

- If a power failure occurs, the BladeCenter unit and then the blade server can start automatically when power is restored, if the blade server is configured through the management module to do so.

- You can turn on the blade server remotely by using the management module.

- If the blade server is connected to power (the power-on LED is flashing slowly), the operating system supports the Wake on LAN feature, and the Wake on LAN feature has not been disabled through the management module, the Wake on LAN feature can turn on the blade server.

Turning off the blade server

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 "Understanding the control panel and LEDs" on page 14). This starts an orderly shutdown of the operating system, if this feature is supported by the operating system.

  Note: After turning 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*.

Understanding the control panel and LEDs

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

Note:

- 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.
- The following illustration shows a single-width type blade server. The double-width type blade server has the same control panel.
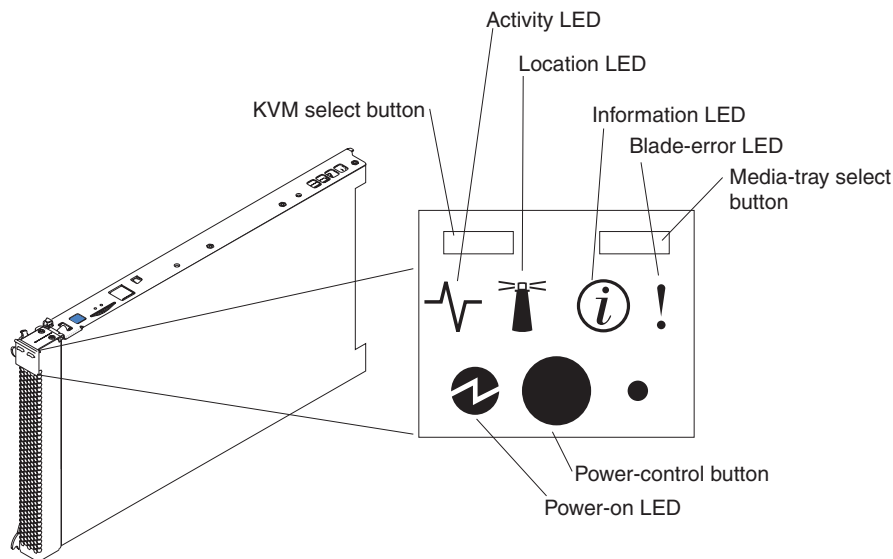
KVM select button: Press this button to associate the shared BladeCenter unit keyboard, video, and mouse port (KVM) with the blade server. The LED on this button flashes while the request is being processed, and then is lit when the ownership of the keyboard, video, and mouse has been transferred to 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 *blade_server_number* Enter

Where *blade_server_number* is the two-digit number for 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 takes place 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: When this blue LED is lit, it has been turned on by the system administrator to aid in visually locating the blade server. 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.

Blade server connectors

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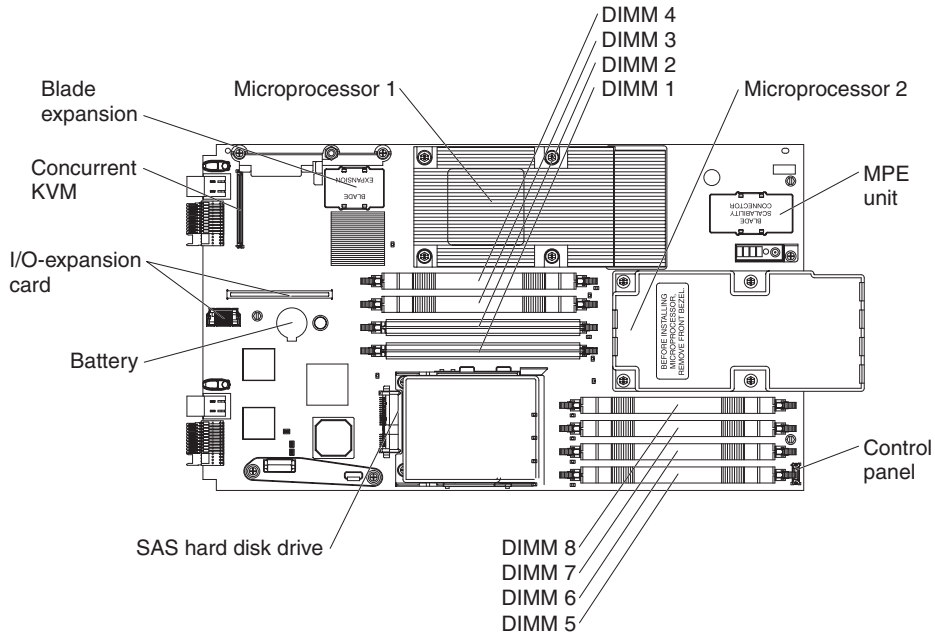
The following illustration shows the MPE components, including connectors for user-installable options.
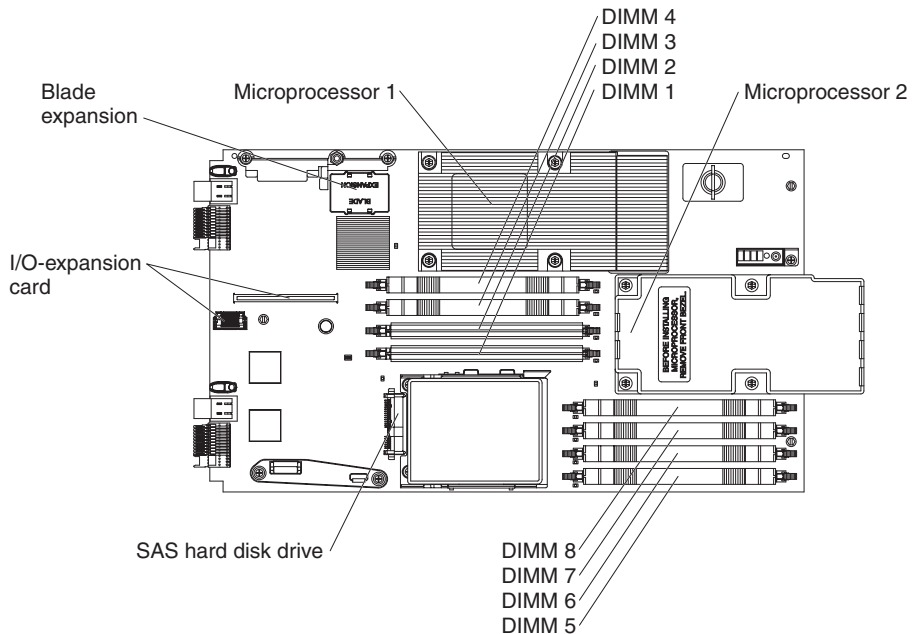
Chapter 3. Installing options

This chapter provides instructions for installing optional hardware devices in the blade server. Some option-removal instructions are provided in case you have to remove one option to install another.

Installation guidelines

Before you begin installing options in the blade server, read the following information:

- Read the safety information that begins 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, go to http://www.ibm.com/bladecenter/, click **Support**, select **BladeCenter LS21** or **BladeCenter LS41** from the **Hardware** list, click **Go**, and then click the **Download** tab.
- Observe good housekeeping in the area where you are working. Place removed covers and other parts in a safe place.
- Back up all important data before you make changes to disk drives.
- Before you remove a 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 options for the blade server, go to http://www.ibm.com/servers/eserver/serverproven/compat/us/.

System reliability guidelines

To help ensure proper cooling and system reliability, observe 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.
- You 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. Also, 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:

- When you work on a BladeCenter T unit, use an electrostatic discharge (ESD) wrist strap, especially when you handle modules, optional devices, or blade servers. To work correctly, the wrist strap must have a good contact at both ends (touching your skin at one end and firmly connected to the ESD connector on the front or back of the BladeCenter T unit).
- Limit your movement. Movement can cause static electricity to build up around you.
- Handle the device carefully, holding it by its edges or its frame.
- Do not touch solder joints, pins, or exposed circuitry.
- Do not leave the device where others can handle and damage it.
- While the device is still in its static-protective package, touch it to an *unpainted* metal part of the BladeCenter unit or any *unpainted* metal surface on any other grounded rack component in the rack in which you are installing the device for at least 2 seconds. This drains static electricity from the package and from your body.
- Remove the device from its package and install it directly into the blade server without setting 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 a single-width type blade server from a type 8677 BladeCenter unit. Removal of the double-width type blade server follows the same steps. The appearance of your BladeCenter unit might be different, see the documentation for your BladeCenter unit for additional information.

Release handles
(open)
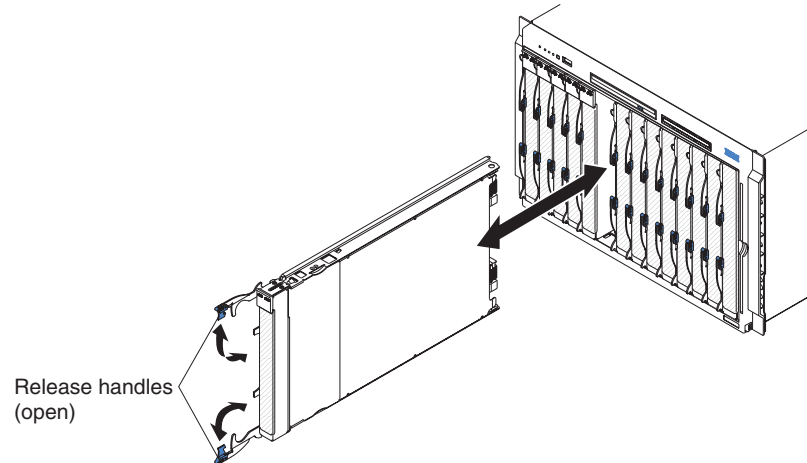
Attention:

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

To remove the blade server, complete the following steps:

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

    Attention: Wait at least 30 seconds, until the hard disk drives stop spinning, before proceeding to the next step.
2. Open the two release handles as shown in the illustration. The blade server moves out of the bay approximately 0.6 cm (0.25 inch).
3. Pull the blade server out of the bay.
4. Place either a blade filler or another blade in the bay within 1 minute.

Opening the blade server cover

The following illustrations show how to open the cover on a blade server.

Blade-cover
release

Blade-cover
release
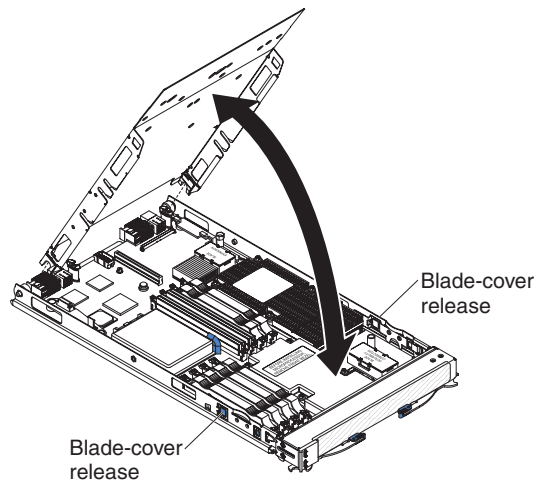
To open the blade server cover, complete the following steps:

1. Read the safety information beginning 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 or MPE 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 a double-width type blade server.

Note: The following illustration shows how to remove an MPE from the blade server; removing another type of expansion unit from a blade server is similar.
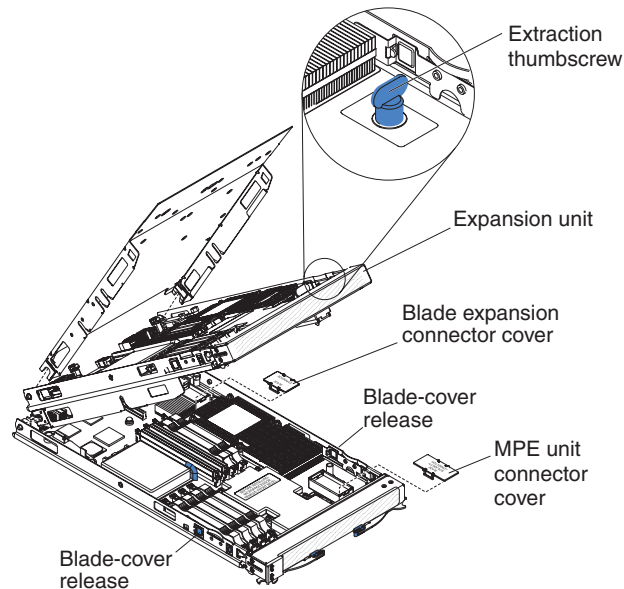
To remove an expansion unit, complete the following steps:

1. Read the safety information beginning 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.
4. Rotate the expansion unit open; then, lift 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.

Removing the bezel assembly

To install certain options, you must first remove the bezel assembly. The following illustration shows how to remove the blade server bezel assembly. The illustration and instructions also apply to the MPE bezel assembly, except that the MPE does not have a control-panel connector.

Bezel-assembly
release (both sides)

Bezel assembly

Control-panel
cable

Control-panel
connector

To remove the blade server bezel assembly, complete the following steps:

1. Read the safety information beginning 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).
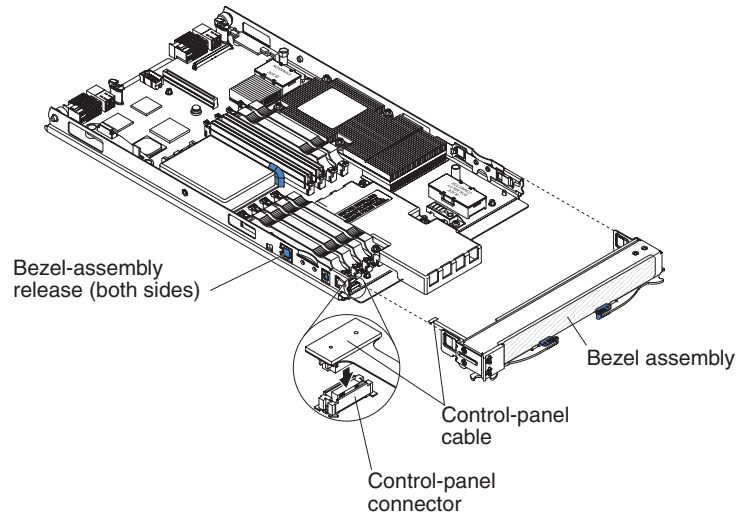3. If you are removing the bezel assembly from the blade server and an expansion unit is connected to the blade server, remove the expansion unit (see "Removing an expansion unit" on page 21).
4. Press the bezel-assembly release and pull the bezel assembly away from the blade server approximately 1.2 cm (0.5 inch).
5. If you are removing the bezel assembly from the blade server, disconnect the control-panel cable from the control-panel connector.
6. Pull the bezel assembly away from the blade server.
7. Store the bezel assembly in a safe place.

Installing a SAS hard disk drive

The blade server one connector on the system board for installing an optional SFF SAS hard disk drive.

Depending on the blade server model, a SAS hard disk drive might already be installed. If the blade server is equipped with a SAS hard disk drive, you can install an additional SAS hard disk drive using an MPE. These two SAS hard disk drives can be used to implement and manage a redundant array of independent disks (RAID) level-1 array. See "Configuring a RAID array" on page 49 for information about SAS RAID configuration.

The following illustration shows how to install a SAS hard disk drive in the blade server system board and also applies to the MPE.
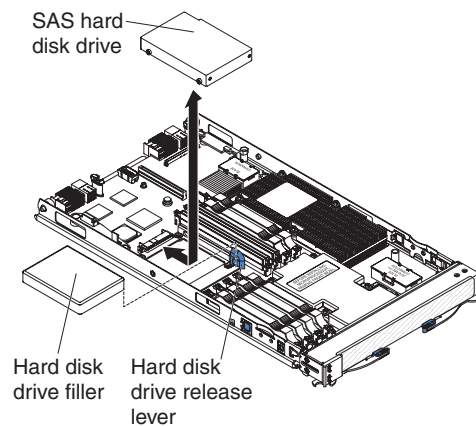
To install a SAS hard disk drive, complete the following steps:

1. Read the safety information beginning 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 expansion unit is attached to the blade server, remove the expansion unit (see "Removing an expansion unit" on page 21).
6. Locate the SAS hard disk drive tray.
7. Remove the SAS hard disk drive filler.
   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 away from the system board.

   Note: If a SAS hard drive will not be installed, the SAS hard drive filler must be installed.
8. Place the hard disk drive into the drive tray and push it into the connector at the rear of the drive tray, until the drive moves past the lever at the front of the tray.

If you have other options to install or remove, do so now; otherwise, go to "Completing the installation" on page 34.

Installing memory modules

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 installing DIMMs:

- The blade server system board contains eight DIMM connectors (4 DIMM connectors per processor). If an MPE is installed, there are also eight DIMM connectors (4 DIMM connectors per processor) on the MPE system board.
- The system supports Error Correction Code (ECC) protected, industry-standard 240-pin, 72-bit technology Very Low Profile (VLP) Double Data Rate Synchronous DRAM Dual In-Line Memory Modules (DDR-2 SDRAM DIMMs)
- The server supports two-way memory interleaving.
- The DIMM options that are available for the blade server are 512 MB, 1 GB, and 2 GB. Depending on the memory configuration set in blade server BIOS, the blade server can support a minimum of 1 GB and a maximum of 16 GB of system memory for single-width blade servers or a maximum of 32 GB of system memory for blade servers with an MPE installed.
- All DIMMs must be installed in pairs of the same size, speed, type, technology, and physical design. You can mix compatible DIMMs from different manufacturers.
- If you wish to take advantage of Chipkill memory, each DIMM installed in your blade server must support the Chipkill technology.
- For a current list of supported DIMMs for the blade server, go to http://www.ibm.com/servers/eserver/serverproven/compat/us/.
- For each installed microprocessor, a set of 4 DIMM sockets is enabled (see the following table for more information).

Installed microprocessors	Enabled DIMM sockets
1 (in blade server)	1, 2, 3, 4 (in blade server)
1 and 2 (in blade server)	1, 2, 3, 4, 5, 6, 7, 8 (in blade server)
1 and 2 (in blade server) 1 (in MPE unit)	1, 2, 3, 4, 5, 6, 7, 8 (in blade server) 1, 2, 3, 4 (in MPE unit)
1 and 2 (in blade server) 1 and 2 (in MPE unit)	1, 2, 3, 4, 5, 6, 7, 8 (in blade server) 1, 2, 3, 4, 5, 6, 7, 8 (in MPE unit)

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

No. of micro-processors	DIMM socket x															
	Blade server								MPE							
	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8
1	X	X														
1	X	X	X	X												
2	X	X														
2	X	X			X	X										
2	X	X	X	X	X	X										
2	X	X	X	X	X	X	X	X								
3	X	X														
3	X	X			X	X										
3	X	X			X	X			X	X						
3	X	X	X	X	X	X			X	X						
3	X	X	X	X	X	X	X	X	X	X						
3	X	X	X	X	X	X	X	X	X	X	X	X				
4	X	X														
4	X	X			X	X										
4	X	X			X	X			X	X						
4	X	X			X	X			X	X			X	X		
4	X	X	X	X	X	X			X	X			X	X		
4	X	X	X	X	X	X	X	X	X	X			X	X		
4	X	X	X	X	X	X	X	X	X	X	X	X	X	X		
4	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

The following illustration shows how to remove and install a DIMM. This illustration also applies to removing and installing a DIMM filler.
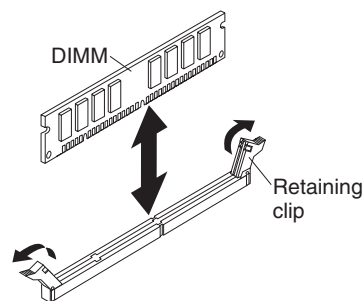
To install a DIMM, complete the following steps:

1. Read the safety information beginning 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 expansion unit is attached to the blade server, remove the expansion unit (see "Removing an expansion unit" on page 21).
7. To install the DIMMs, repeat the following steps for each DIMM that you install:

    a. Locate the DIMM connectors (see the illustrations in "Blade server connectors" on page 16). Determine the connector into which you will install the DIMM.

    b. Remove the DIMM filler from the DIMM socket.

      Note: If a DIMM is not installed, a DIMM filler must occupy each DIMM socket.

    c. 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.

    d. 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.

    e. Insert the DIMM by pressing the DIMM along the guides into 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 options to install or remove, do so now; otherwise, go to "Completing the installation" on page 34.

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 is installed, the blade server must have two microprocessors installed before the microprocessors on the MPE will become active. Additional microprocessors can be installed in the MPE. The blade server operates as a symmetric multiprocessing (SMP) server. With SMP, certain operating systems and application programs can distribute the processing load between the microprocessors.
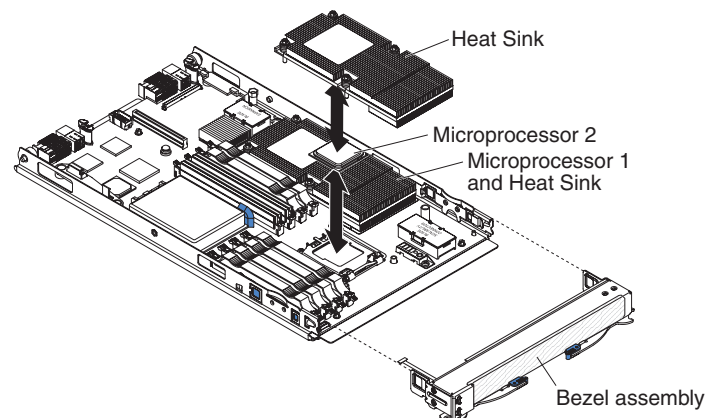
Note: If you install an additional microprocessor, you must install the same microprocessor type, speed, and power specifications as the first microprocessor.

To use SMP, obtain an SMP-capable operating system. For a list of supported operating systems and other options, go to 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 installing 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, go to the ServerProven list at http://www.ibm.com/servers/eserver/serverproven/compat/us/.
- Before installing a new microprocessor, download and install the most current level of BIOS code, from http://www.ibm.com/bladecenter/.
- 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, this socket must contain a microprocessor heat-sink filler, sometimes called a microprocessor baffle.
- The microprocessor speeds are automatically set for this 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 on the system board for the blade server and also applies to the MPE.

To install an additional microprocessor, complete the following steps:

1. Read the safety information beginning 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 an expansion unit is attached to the blade server, remove the expansion unit (see "Removing an expansion unit" on page 21).
6. Locate microprocessor socket one, if a microprocessor is already installed then locate the microprocessor socket two.
7. If you are installing a microprocessor in microprocessor socket two, remove the bezel assembly (see "Removing the bezel assembly" on page 22 for instructions).

8. Loosen the four captured 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:
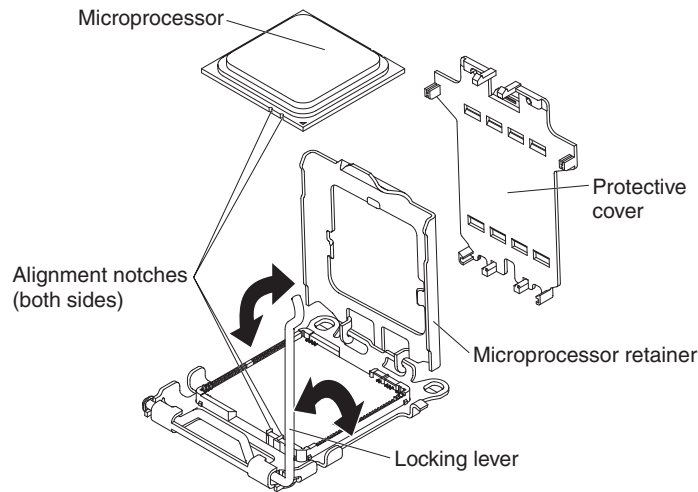
Attention:

- 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 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 place 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 place 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.
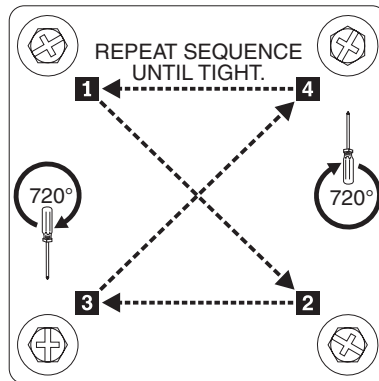
13. If you have other options to install or remove, do so now; otherwise, go to "Completing the installation" on page 34.

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 blade server supports one I/O-expansion card of either the small-form-factor, standard-form-factor, or high-speed design. The double-width type blade server supports one additional I/O-expansion card of either the small-form-factor, standard-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 LS21 Type 7971 or LS41 Type 7972 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 or standard-form-factor expansion card. If the blade server has an MPE installed, a high-speed expansion can only be installed in the MPE.
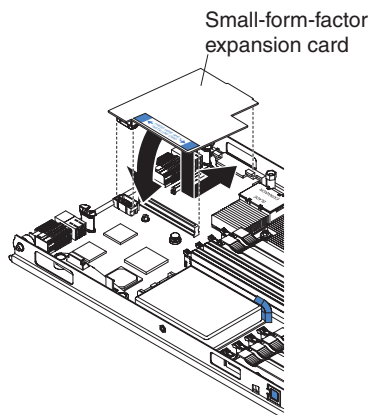
See the ServerProven list at http://www.ibm.com/servers/eserver/serverproven/ compat/us/ for a list of available I/O-expansion cards and their form-factor types.

When you add an I/O-expansion card, you must make sure that the I/O-modules it is mapped to 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 installed in a Type 8677 BladeCenter unit, the I/O-modules in I/O-module bays 3 and 4 on the BladeCenter unit must both be compatible with the expansion card. All other expansion cards that are installed on other blade servers in the BladeCenter unit must also be compatible with these I/O-modules. In this example, you could 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 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 and also applies to the MPE.

Small-form-factor expansion card

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

1. Read the safety information beginning 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 expansion card on 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.

8. Install the small-form-factor expansion card, as shown in the following 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 needed to complete the installation of the expansion card, see the documentation that comes with the expansion card.

11. If you have other options to install or remove, do so now; otherwise, go to "Completing the installation" on page 34.

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 and also applies to the MPE.
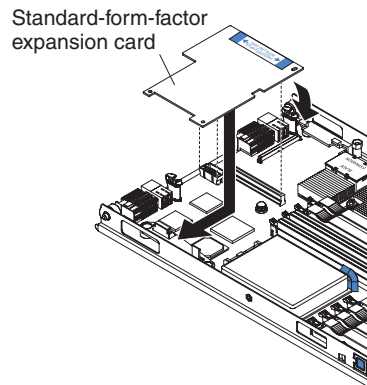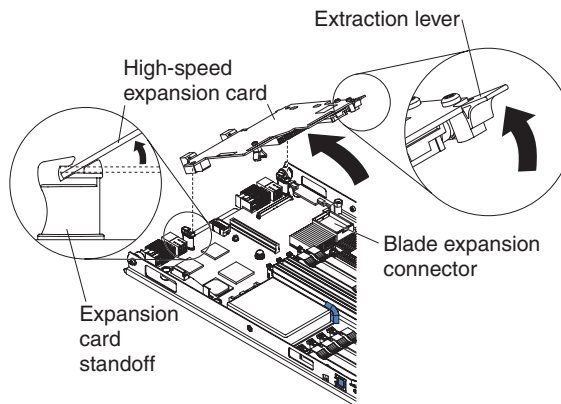

Standard-form-factor expansion card

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

1. Read the safety information beginning 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 expansion card on 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.

8. Slide the notch in the narrow end of the card into the raised hook on the card tray; then, gently pivot the wide end of the card into the expansion-card connectors.

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

10. If you have other options to install or remove, do so now; otherwise, go to "Completing the installation" on page 34.

Installing a high-speed expansion card

The following illustration shows how to install a high-speed expansion card in the blade server system board and also applies to the MPE.

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

1. Read the safety information beginning 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 on a blade server without an expansion unit or it can be installed in an MPE unit attached to the blade server. You can not install a high-speed expansion card on a blade server that will be connected to an expansion unit. If you will be installing a high-speed expansion card on the blade server with an expansion unit 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 connectors and remove the blade expansion connector cover, if one is installed.

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 connectors.

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

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

11. If you have other options to install or remove, do so now; otherwise, go to "Completing the installation" on page 34.

Installing a Concurrent KVM card

If the BladeCenter unit and management module support the concurrent-KVM function, you can add a Concurrent KVM Feature Card to the blade server system board.

The following illustration shows how to install a Concurrent KVM expansion card in the blade server system board and also applies to the MPE.

Concurrent KVM card
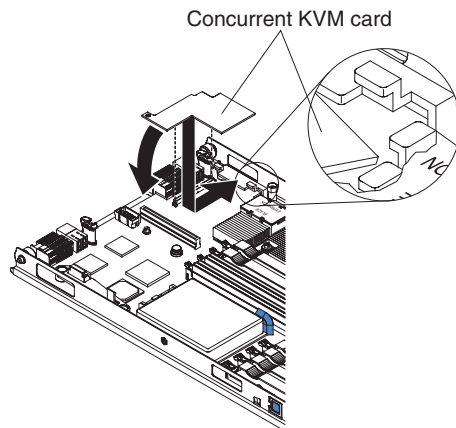
If the BladeCenter unit supports concurrent-KVM (cKVM), you can add a cKVM card to the blade server.

To install the cKVM card, complete the following steps:

1. Read the safety information beginning 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 on 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. Install the cKVM card, as shown in the following illustration.

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

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

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

11. If you have other options 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 35).

2. If you removed an expansion unit from a double-width type blade server, reinstall the expansion unit (see "Installing an expansion unit" on page 36).

3. Close the blade server cover, unless you installed an optional expansion unit (see "Closing the blade server cover" on page 37).

   **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 38).

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

6. For certain options, run the blade server Configuration/Setup Utility program (see Chapter 4, "Configuring the blade server," on page 41).

   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 illustration and instructions also apply to the MPE bezel assembly, except that the MPE does not have a control-panel connector.

Bezel-assembly release (both sides)

Bezel assembly

Control-panel cable

Control-panel connector
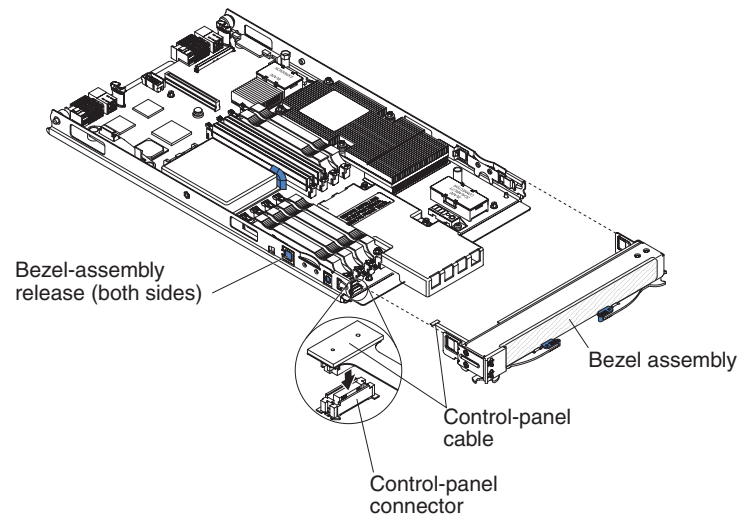
To install the blade server bezel assembly, complete the following steps:

1. Read the safety information beginning on page v and "Installation guidelines" on page 17.
2. If installing the bezel assembly on a blade server, connect the control-panel cable to the control-panel connector on the system board.

   Note: The MPE does not have a control-panel connector.
3. Carefully slide the bezel assembly onto the blade server, or MPE, until it clicks into place.

Installing an expansion unit

To install an expansion unit, complete the following steps.

Note: The following illustration shows how to install an MPE unit on the blade server; installing another type of expansion unit on a blade server is similar.
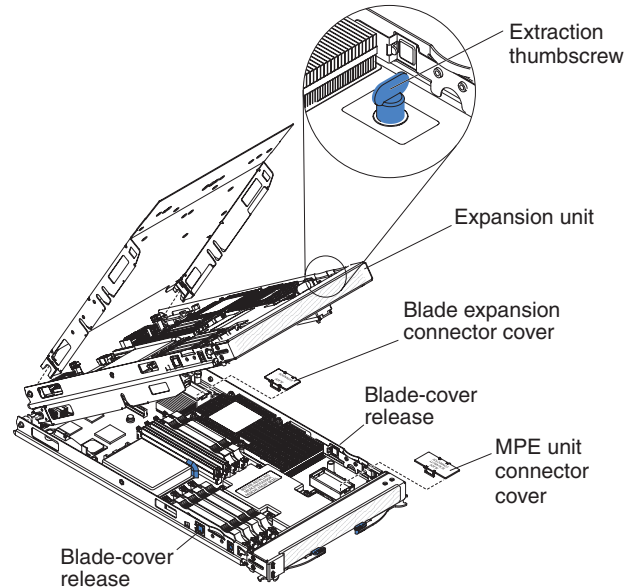
Note: The MPE unit must be installed on a blade server and should not be installed on another expansion device.

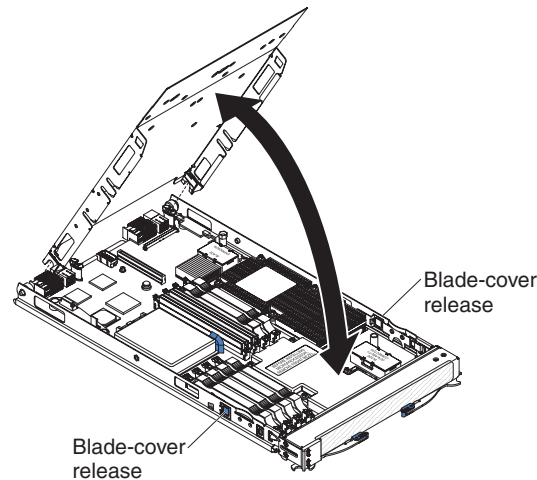To install the MPE unit or an expansion unit, complete the following steps:

1. Read the safety information that begins on page v and "Installation guidelines" on page 17.
2. If the blade server cover is installed, remove it now (see "Opening the blade server cover" on page 20 for instructions).
3. If you removed the blade bezel assembly, install it now (see "Installing the bezel assembly" on page 35 for instructions).
4. If the blade expansion connector cover on your blade server is installed, remove it by pulling the cover off of the connector.
5. If you are installing an MPE unit and the MPE connector cover on your blade server is installed, remove it by pulling the cover off of the connector.
6. 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.
7. Orient the expansion unit above the blade server.
8. Lower the expansion unit so that the slots at the rear slide down onto the cover pins at the rear of the blade server.
9. 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.
10. If the expansion unit has an extraction device (such as a thumbscrew or a lever), use it to fully engage 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.

Blade-cover release

Blade-cover release

To close the blade server cover, complete the following steps:

1. Read the safety information beginning on page v and "Installation guidelines" on page 17.
2. If you removed the bezel assembly, replace it now (see "Installing the bezel assembly" on page 35 for instructions).
3. If you removed an expansion unit from a double-width type blade server, replace it now (see "Installing an expansion unit" on page 36 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 closing 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 blade server into a Type 8677 BladeCenter unit. Installation of the double-width type blade server follows the same steps. The appearance of your BladeCenter unit might be different, see the documentation for your BladeCenter unit for additional information.

Release handles
(open)
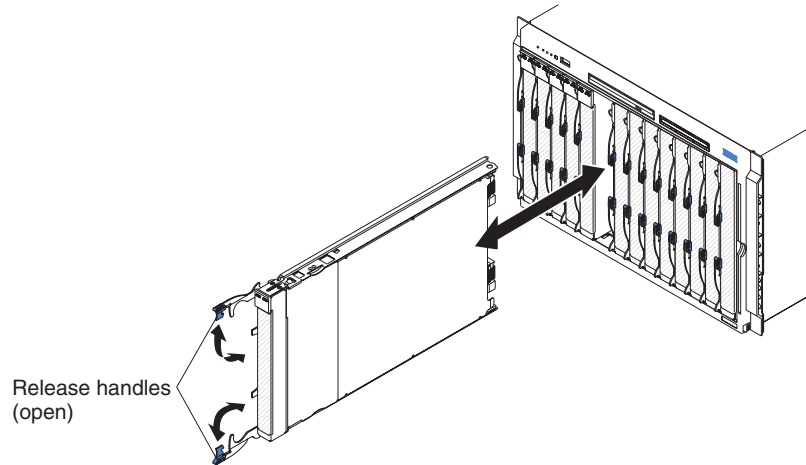
To install a blade server in a BladeCenter unit, complete the following steps.

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 beginning on page v and "Installation guidelines" on page 17.

2. If you have not done so already, install any options 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 connected to the blade server.

   Notes:

   - When any blade server or option 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 blade 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 blade filler in each blade bay.

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

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

6. Push the release handles on the front of the blade server to the closed position.

7. Turn on the blade server (see "Turning on the blade server" on page 13 for instructions).

8. Make sure that the power-on LED on the blade server control panel is lit continuously, indicating that the blade server is receiving power and is turned on.

9. (Optional) Write identifying information on one of the user labels that come with the blade servers and place the label on a BladeCenter unit bezel.

   See the documentation for your BladeCenter unit for information about the label placement.

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

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 could have unintended consequences, and you might have to reconfigure the blade server.

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 51 for details.

Updating the blade server configuration

When the blade server starts for the first time after you add or remove an internal option, 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 42 for more information about the Configuration/Setup Utility program.

Some options have device drivers that you must install. See the documentation that comes with each option 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 51 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 "Understanding the control panel and LEDs" on page 14 for information about these buttons and their functions.

The Ethernet controllers on the blade server communicate with the network through the Ethernet-compatible I/O modules 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, you should make sure that the blade server has the latest version of firmware code. For additional information, see "Firmware updates" on page 48.

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) code in the blade server. Use it to change system settings, such as interrupt requests (IRQ), date and time, and passwords. See "Using the Configuration/Setup Utility program" on page 42 for more information.

- **LSI Logic Configuration Utility program**

  The LSI Logic Configuration Utility program is part of the BIOS code in the blade server. 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 50 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 45.

  Note: The ServerGuide program works only with 32-bit Windows operating systems.

- **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 47.

The IBM Remote Deployment Manager (RDM) Version 4.20 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 if an operating system supports the RDM program or for updated information about RDM and information about purchasing the software, go to http://www.ibm.com/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 using the BladeCenter system console, press the KVM select button on the blade server (see "Understanding the control panel and LEDs" on page 14 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 appears, 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 options 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 installed in the blade server.

  – **USB Device Summary**

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

- **System Information**

  Select this choice to display information about the blade server. When you make configuration changes through other options 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 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.

With an optional BladeCenter Storage Expansion Unit 3, you can control all of the SAS hard disk drives in the host blade server. Set **BSE3 Controls All Blade SAS HDD** to **Enable** to control all of the hard disk drives in the host blade server.

– **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 45 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.

Note: To set the startup sequence, which is the order in which the blade server checks devices to find a boot record, you must use the management-module Web interface.

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. The default setting is **Planar Ethernet 1**, which enables the PXE option for the first Ethernet controller on the blade server system board.

You can enable or disable the Non-Planar Ethernet controllers, located on the MPE when installed. This setting is disabled by default.

You can enable USB disk support that allows the blade server to use a USB storage device connected to the USB port of the BladeCenter unit's media tray. 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 options 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 time-outs 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 you have made in the settings.

•   **Restore Settings**

    Select this choice to cancel the changes you have made in the settings and restore the previous settings.

•   **Load Default Settings**

    Select this choice to cancel the changes 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 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 in 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 hardware options 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.

Note: The ServerGuide program works only with 32-bit Windows operating systems.

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.

To download the image, go to the IBM ServerGuide Web page at http://www.ibm.com/pc/qtechinfo/MIGR-4ZKPPT.html. To purchase the latest *ServerGuide Setup and Installation* CD, go to the ServerGuide fulfillment Web site at http://www.ibm.com/servers/eserver/xseries/systems_management/serverguide/sub.html.

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-ROM drive. In addition to the *ServerGuide Setup and Installation* CD, you must have the operating-system CD to install the operating system.

The ServerGuide program has the following features:
- Sets system date and time
- Detects installed hardware options 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 shorten the installation time. The ServerGuide program 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-ROM 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 decide not to use the ServerGuide program to install the operating system, complete the following steps to download the latest operating-system installation instructions from the IBM Support Web page:

1. Go to http://www.ibm.com/servers/eserver/serverproven/compat/us/nos/ematrix.shtml.
2. Click **Operating System Installation Support**
3. In the **Family** section, click **BladeCenter LS21** or **LS41**.
4. In the **Operating System** section, click the operating system you will be installing.
5. Click **Continue**.
6. Click **Operating system installation**.
7. Select the instructions for the operating system.

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 appears, press Ctrl+S. You have 2 seconds (by default) to press Ctrl+S after the prompt appears.

If the PXE setup prompt is not displayed, use the Configuration/Setup Utility program to set the **Enable Ethernet PXE/DHCP** option.

3. Use the arrow keys or press Enter to select a choice from the menu.
4. Follow the instructions on the screen to change the settings of the selected items; then, press Enter.

Firmware updates

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 proper system performance, always make sure that the BIOS, service processor (BMC), and diagnostic firmware levels are consistent for all blade servers within the BladeCenter unit.

Configuring the Gigabit Ethernet controllers

Two Ethernet controllers are integrated on the blade server system board and on the MPE. Each 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).

Note: When the MPE is installed, only the Ethernet controllers on the blade server will be detected by POST and might show an 1801 error code. To enable the Ethernet controllers on the MPE, enable **Run PXE on Non-Planar Ethernet** in the Configuration/Setup Utility program (see "Using the Configuration/Setup Utility program" on page 42).

Each 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 I/O-module bay will vary based on blade server type and the operating system that is installed. See "Blade server Ethernet controller enumeration" on page 49 for information about how to determine the routing from an Ethernet controller to an I/O-module bay for the blade server.

Note: Other types of blade servers, such as the BladeCenter HS20 Type 8678 blade server, that are installed in the same BladeCenter unit as the BladeCenter LS21 Type 7971 or LS41 Type 7972 blade server might have different Ethernet controller routing. See the documentation that comes with the other blade servers for information.

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

The Ethernet controllers in your blade server support failover, which provides automatic redundancy for the Ethernet controllers. Without failover, you can have only one Ethernet controller from each server attached to each virtual LAN or subnet. With failover, you can configure more than one Ethernet controller from

each server to attach to the same virtual LAN or subnet. Either one of the integrated Ethernet controllers can be configured as the primary Ethernet controller. If you have configured the controllers for failover and the primary link fails, the secondary controller takes over. When the primary link is restored, the Ethernet traffic switches back to the primary Ethernet controller. (See the operating-system device-driver documentation for information about configuring for failover.)

Important: To support failover on the blade server Ethernet controllers, the Ethernet switch modules in the BladeCenter unit must have identical configurations.

Blade server Ethernet controller enumeration

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

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

1. Install only one Ethernet switch module or pass-thru module in I/O-module bay 1.
2. Make sure that the ports on the switch module or pass-thru module are enabled (click **I/O-module Tasks → Management → Advanced Management** in the management module Web-based user interface).
3. Enable only one of the Ethernet controllers on the blade server. Note the designation that the blade server operating system has for the controller.
4. Ping an external computer on the network connected to the switch module or pass-thru module. If you can ping the external computer, the Ethernet controller that you enabled is associated with the switch module or pass-thru module in I/O-module bay 1. The other Ethernet controller in the blade server is associated with the switch module or pass-thru module in I/O-module bay 2.

If you have installed an I/O-expansion card in the blade server, communications from the expansion card are routed to I/O-module bays 3 and 4, if these bays are supported by your BladeCenter unit type. You can verify which controller on the card is routed to which I/O-module bay by performing the same test and using a controller on the expansion card and a compatible switch module or pass-thru module in I/O-module bay 3 or 4.

Configuring a RAID array

Configuring a SAS RAID array applies to a blade server and MPE where a SAS hard disk drive is installed in both the blade server and the MPE unit.

Two SAS hard disk drives can be used to implement and manage RAID level-0 (striping) or RAID level-1 (mirror) arrays in operating systems that are listed on the ServerProven list at http://www.ibm.com/servers/eserver/serverproven/compat/us/. Use the LSI Configuration Utility program to configure the SAS RAID (see "Using the LSI Logic Configuration Utility program" on page 50).

If an optional BladeCenter Storage Expansion Unit 3 is installed, you can use it to control all of the SAS hard disk drives installed in the blade server. You enable this feature using the **Configuration/Setup Utility** program (see "Using the Configuration/Setup Utility program" on page 42).

Using the LSI Logic Configuration Utility program

You can use the LSI Logic Configuration Utility program to:

- Set the SAS device scan order
- Set the SAS ID for the controller
- Manage the SAS RAID configuration

Starting the LSI Logic Configuration Utility program

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) and watch the monitor screen.
2. When the LSI Logic Configuration Utility message appears, 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 at http://www.ibm.com/bladecenter/ and install the operating system. Local deployment for 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 on the IBM Support Web page.

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-ROM 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 54.

3. Follow the instructions on the screen to:
   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 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 you plan to install, see http://www.ibm.com/servers/eserver/xseries/systems_management/.

Downloading operating-system installation instructions

You can download operating-system installation instructions from the IBM BladeCenter site at http://www.ibm.com/bladecenter/. Changes are periodically made to the IBM web site. Procedures for locating firmware and documentation might change from what is described in this document.

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

1. Go to http://www.ibm.com/bladecenter/.

2. From the ″BladeCenter″ menu, click **Support**.

3. From the ″Select your product″ menu, select **BladeCenter LS21**, and click **Go**.

4. Click the **Install and use** tab.

5. Click **Product documentation**.

6. From the ″Personal computing support″ menu, click **Operating system installation**.

7. Select the installation instructions for your operating system.

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 38).
- If the power-on LED is flashing slowly, turn on the blade server (see "Turning on the blade server" on page 13).
- If you have just added a new optional device or component, make sure that it is correctly installed and compatible with the blade server and its components. If the device or component is not compatible, remove it from the blade server, reinstall the blade server in the BladeCenter unit, and then restart the blade server.

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

- **POST error codes**

  The POST error codes 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 54 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* for your blade server.

- **Diagnostic programs and error messages**

  Real Time Diagnostics tests the major components of the BladeCenter unit, including the management modules, I/O modules, removable media drives, and the blade servers, while the operating system is running. Real Time Diagnostics can be plugged into an existing IBM Director environment or installed without IBM Director present. For documentation and download information for Real Time Diagnostics, see http://www.ibm.com/servers/eserver/xseries/systems_management/. 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* for your blade server.

ServerGuide problems

The following table lists problem symptoms and suggested solutions.

Symptom	Suggested action
The *ServerGuide Setup and Installation* CD will not start.	• Make sure that the CD-ROM drive is associated with the blade server that you are configuring. • Make sure that the blade server supports the ServerGuide program and has a startable (bootable) CD-ROM (or DVD-ROM) drive. • If the startup (boot) sequence settings have been altered, make sure that the CD-ROM drive is first in the startup sequence.
The RAID configuration program cannot view all installed drives, or the operating system cannot be installed.	• Make sure that there are no duplicate SCSI/SAS IDs or IRQ assignments. • Make sure that the hard disk drive is connected correctly.
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 operating-system versions that support the ServerGuide program.
The operating system cannot be installed; the option is not available.	Make sure that the operating system is supported on your server. If the operating system is supported, either there is no logical drive defined (SCSI RAID systems) or the ServerGuide System Partition is not present. Run the ServerGuide program and make sure that setup is complete.

Appendix A. Getting help and technical assistance

If you need help, service, or technical assistance or just want more information about IBM products, you will find a wide variety of sources available from IBM to assist you. This appendix contains information about where to go for additional information about IBM and IBM products, what to do if you experience a problem with your BladeCenter product or optional device, 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 *Hardware Maintenance Manual and Troubleshooting Guide* or *Problem Determination and Service Guide* on the IBM *Documentation* CD that comes with your system.
- Go to http://www.ibm.com/bladecenter/ and click **Support** to check for information to help you solve the problem.

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 BladeCenter systems also describes the diagnostic tests that you can perform. Most BladeCenter 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 software.

Using the documentation

Information about your IBM BladeCenter 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/bladecenter/, click **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 BladeCenter systems, optional devices, services, and support at http://www.ibm.com/bladecenter/. For service information, click **Support**.

Software service and support

Through IBM Support Line, you can get telephone assistance, for a fee, with usage, configuration, and software problems with BladeCenter products. 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 IBM Services or through your IBM reseller, if your reseller is authorized by IBM to provide warranty service. See http://www.ibm.com/planetwide/ for support telephone numbers, or 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.

Appendix B. Notices

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Important notes

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

CD drive speeds list the variable read rate. Actual speeds vary and are often less than the maximum possible.

When referring to processor storage, real and virtual storage, or channel volume, KB stands for approximately 1000 bytes, MB stands for approximately 1 000 000 bytes, and GB stands for approximately 1 000 000 000 bytes.

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

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

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

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

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

Product recycling and disposal

This unit must be recycled or discarded according to applicable local and national regulations. IBM encourages owners of information technology (IT) equipment to responsibly recycle their equipment when it is no longer needed. IBM offers a variety of product return programs and services in several countries to assist equipment owners in recycling their IT products. Information on IBM product recycling offerings can be found on IBM's Internet site at http://www.ibm.com/ibm/environment/products/prp.shtml.
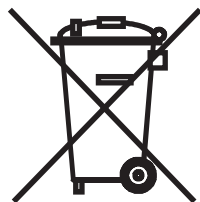
Notice: This mark applies only to countries within the European Union (EU) and Norway.

This appliance is labeled in accordance with European Directive 2002/96/EC concerning waste electrical and electronic equipment (WEEE). The Directive determines the framework for the return and recycling of used appliances as applicable throughout the European Union. This label is applied to various products to indicate that the product is not to be thrown away, but rather reclaimed upon end of life per this Directive.

注意: このマークは EU 諸国およびノルウェーにおいてのみ適用されます。

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Remarque : Cette marque s'applique uniquement aux pays de l'Union Européenne et à la Norvège.

L'etiquette du système respecte la Directive européenne 2002/96/EC en matière de Déchets des Equipements Electriques et Electroniques (DEEE), qui détermine les dispositions de retour et de recyclage applicables aux systèmes utilisés à travers l'Union européenne. Conformément à la directive, ladite étiquette précise que le produit sur lequel elle est apposée ne doit pas être jeté mais être récupéré en fin de vie.

In accordance with the European WEEE Directive, electrical and electronic equipment (EEE) is to be collected separately and to be reused, recycled, or recovered at end of life. Users of EEE with the WEEE marking per Annex IV of the WEEE Directive, as shown above, must not dispose of end of life EEE as unsorted municipal waste, but use the collection framework available to customers for the return, recycling, and recovery of WEEE. Customer participation is important to minimize any potential effects of EEE on the environment and human health due to the potential presence of hazardous substances in EEE. For proper collection and treatment, contact your local IBM representative.

Battery return program

This product may contain a sealed lead acid, nickel cadmium, nickel metal hydride, lithium, or lithium ion battery. Consult your user manual or service manual for specific battery information. The battery must be recycled or disposed of properly. Recycling facilities may not be available in your area. For information on disposal of batteries outside the United States, go to http://www.ibm.com/ibm/environment/products/batteryrecycle.shtml or contact your local waste disposal facility.

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

In the Netherlands, the following applies.

For Taiwan: Please recycle batteries.

Electronic emission notices

Federal Communications Commission (FCC) statement

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

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

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

Industry Canada Class A emission compliance statement

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

Avis de conformité à la réglementation d'Industrie Canada

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

Australia and New Zealand Class A statement

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

United Kingdom telecommunications safety requirement

Notice to Customers

This apparatus is approved under approval number NS/G/1234/J/100003 for indirect connection to public telecommunication systems in the United Kingdom.

European Union EMC Directive conformance statement

This product is in conformity with the protection requirements of EU Council Directive 89/336/EEC on the approximation of the laws of the Member States relating to electromagnetic compatibility. IBM cannot accept responsibility for any failure to satisfy the protection requirements resulting from a nonrecommended modification of the product, including the fitting of non-IBM option cards.

This product has been tested and found to comply with the limits for Class A Information Technology Equipment according to CISPR 22/European Standard EN

55022. The limits for Class A equipment were derived for commercial and industrial environments to provide reasonable protection against interference with licensed communication equipment.

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

Taiwanese Class A warning statement

警告使用者:
這是甲類的資訊產品,在
居住的環境中使用時,可
能會造成射頻干擾,在這
種情況下,使用者會被要
求採取某些適當的對策。

Chinese Class A warning statement

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

Japanese Voluntary Control Council for Interference (VCCI) statement

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

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