IBM

@server

BladeCenter HS40
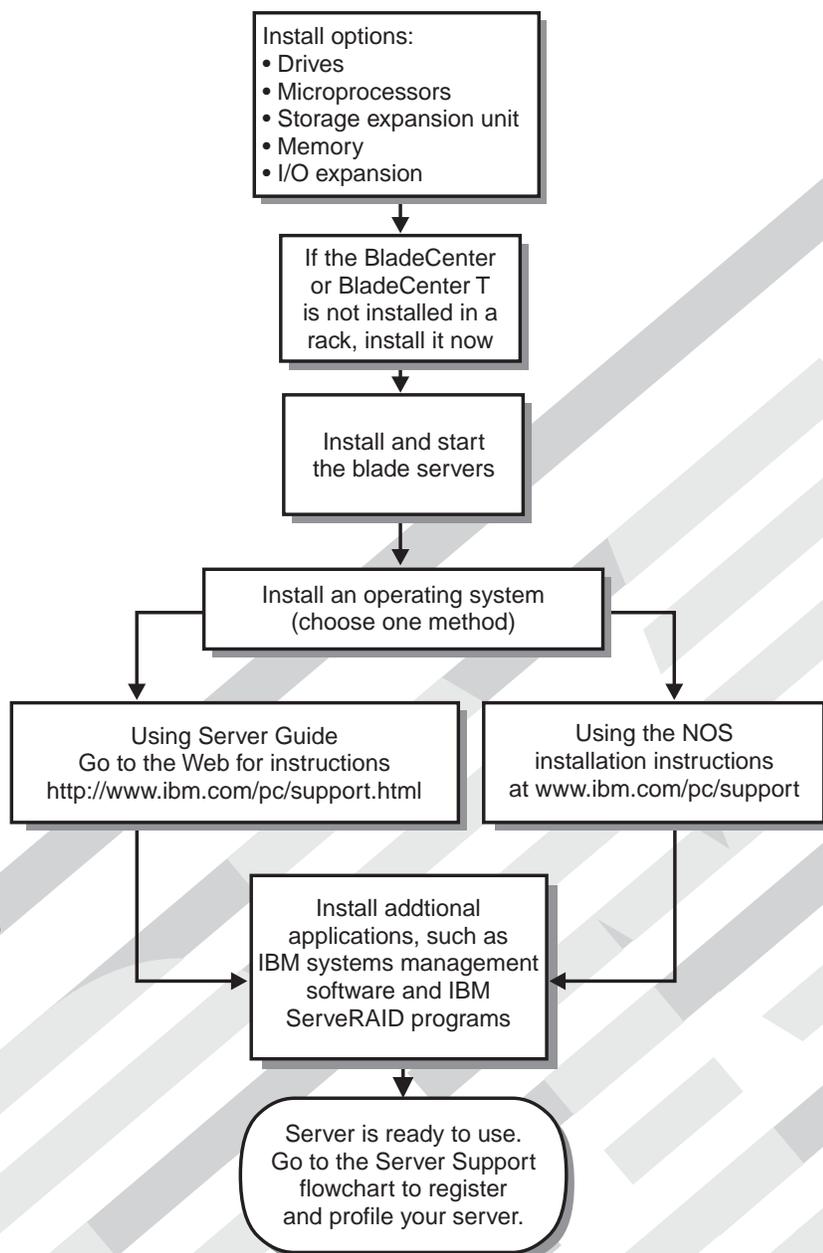Type 8839

Installation and User's Guide

Welcome. . .

Thank you for buying an IBM server. Your server is based on Enterprise X-Architecture, and it features superior performance, availability, and scalability.
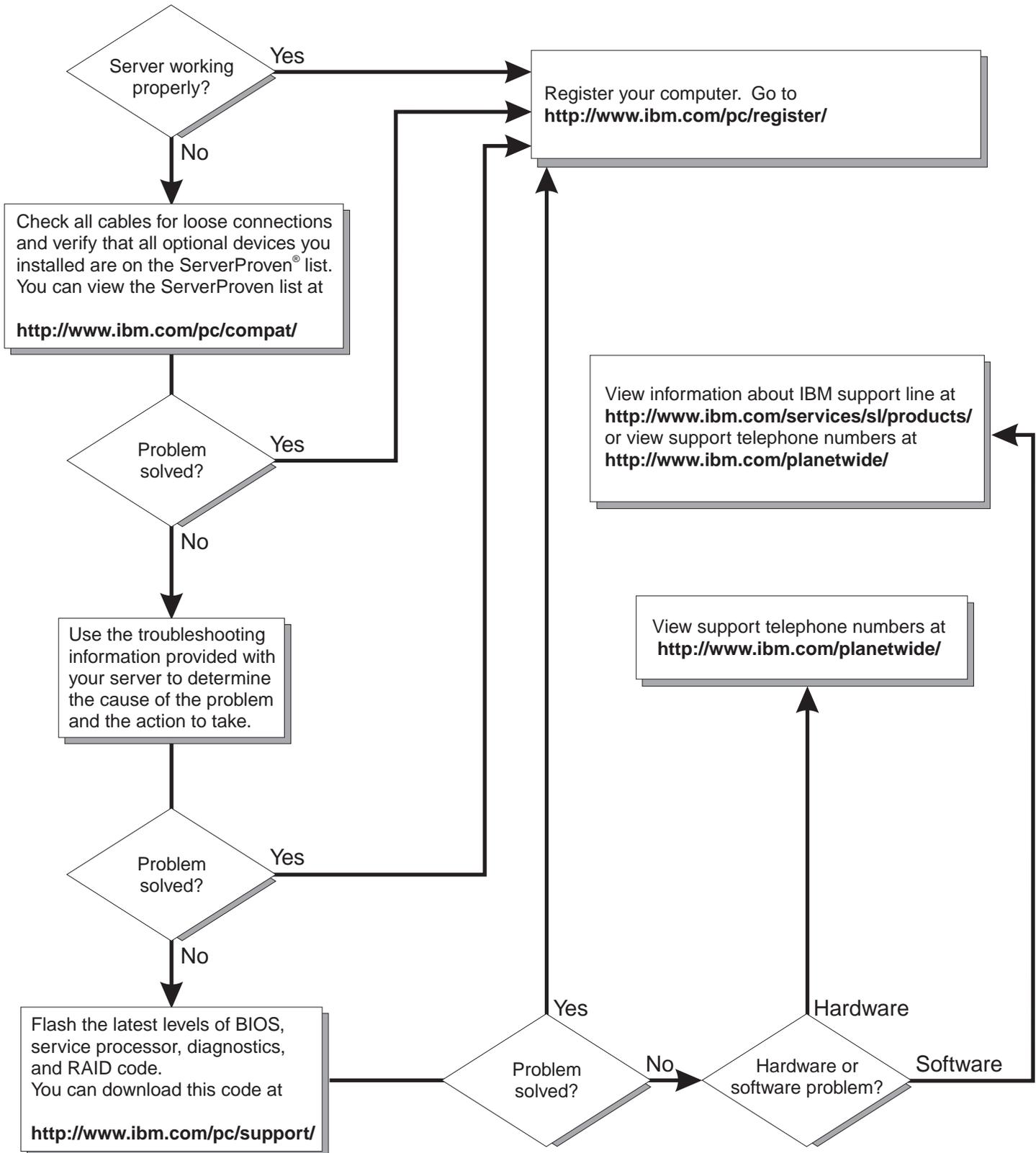
This server *Installation and User's Guide* contains information for setting up, configuring, and using your server.
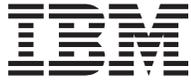
For detailed information about your server, view the publications on the Documentation CD.

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

---

Install options:
- Drives
- Microprocessors
- Storage expansion unit
- Memory
- I/O expansion

↓

If the BladeCenter or BladeCenter T is not installed in a rack, install it now

↓

Install and start the blade servers

↓

Install an operating system (choose one method)

Using Server Guide
Go to the Web for instructions
http://www.ibm.com/pc/support.html

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

↓

Install addtional applications, such as IBM systems management software and IBM ServeRAID programs

↓

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

Server Support

Server working properly? — **Yes** → Register your computer. Go to **http://www.ibm.com/pc/register/**

No

↓

Check all cables for loose connections and verify that all optional devices you installed are on the ServerProven® list. You can view the ServerProven list at

http://www.ibm.com/pc/compat/

↓

Problem solved? — **Yes** → Register your computer. Go to **http://www.ibm.com/pc/register/**

No

↓

Use the troubleshooting information provided with your server to determine the cause of the problem and the action to take.

↓

Problem solved? — **Yes** → Register your computer. Go to **http://www.ibm.com/pc/register/**

No

↓

Flash the latest levels of BIOS, service processor, diagnostics, and RAID code.
You can download this code at

http://www.ibm.com/pc/support/

→ Problem solved? — **Yes** ↑ Register your computer.

No → Hardware or software problem?

Hardware ↑ 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/**

Software →

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

IBM

@server

BladeCenter HS40 Type 8839

Installation and User's Guide

Note: Before using this information and the product it supports, read the general information in Appendix B, "IBM Statement of Limited Warranty Z125-4753-07 11/2002," on page 79 and Appendix C, "Notices," on page 95.

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 your 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 16G8095 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:
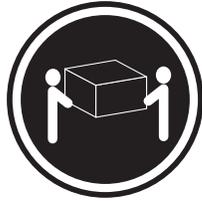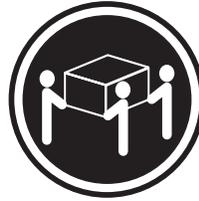
≥ 18 kg (39.7 lb)   ≥ 32 kg (70.5 lb)   ≥ 55 kg (121.2 lb)
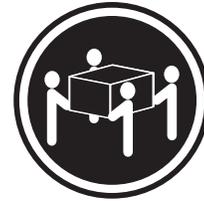
CAUTION:
Use safe practices when lifting.

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.
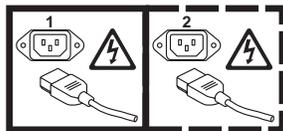
Statement 8:

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® @server BladeCenter™ HS40 Type 8839 blade server is based on the IBM Enterprise X-Architecture™ technologies[1].

Your HS40 blade server is a double-width blade-model server and can be installed in an IBM @server BladeCenter Type 8677 unit or IBM @server BladeCenter T Types 8720 and 8730 units.

Note: Unless otherwise stated, references to the BladeCenter unit also apply to the BladeCenter T unit.

A combination of single-width HS20 blade servers and double-width HS40 blade servers can be installed in the same BladeCenter unit. These high-performance blade servers are ideally suited for networking environments that require superior microprocessor performance, efficient memory management, flexibility, and reliable data storage.

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

Packaged with the *Installation and User's Guide* 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 the IBM Support Web site at http://www.ibm.com/pc/support/.

The blade server comes with a limited warranty. For information about your warranty, see Appendix B, "IBM Statement of Limited Warranty Z125-4753-07 11/2002," on page 79. You can obtain up-to-date information about your BladeCenter HS40 Type 8839 model and IBM xSeries® server products at http://www.ibm.com/eserver/xseries/.

You can register the blade servers at http://www.ibm.com/pc/register/.

Record information about your BladeCenter HS40 blade server in the following table.

Product name	BladeCenter HS40
Machine type	8839
Model number	_____
Serial number	_____

---

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

1

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 left side of the blade server that is visible when the blade server is not in the BladeCenter unit. You will need these numbers when you register your blade server with IBM.

Your BladeCenter HS40 blade server will have one of the bezels shown in the following illustration.
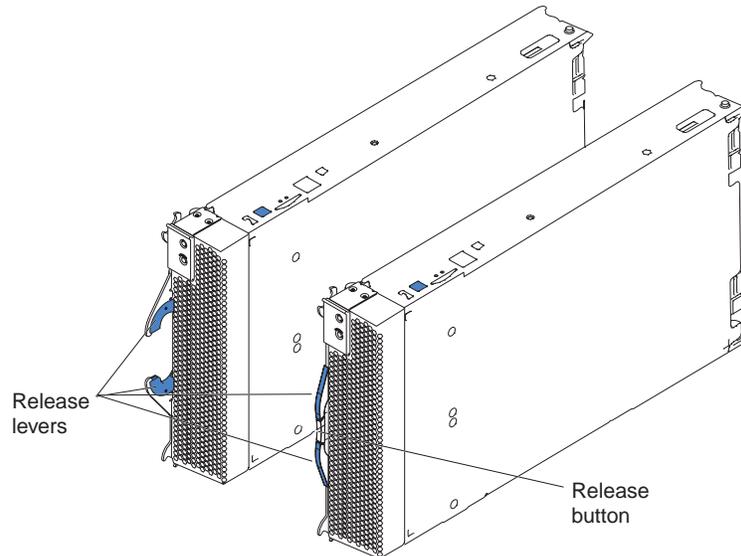
A set of user labels comes with the blade server. When you install the blade server in the BladeCenter unit, write identifying information on a label and place the label on the BladeCenter unit bezel.

The following illustration shows the placement of the label, just below the blade server, on the BladeCenter unit.
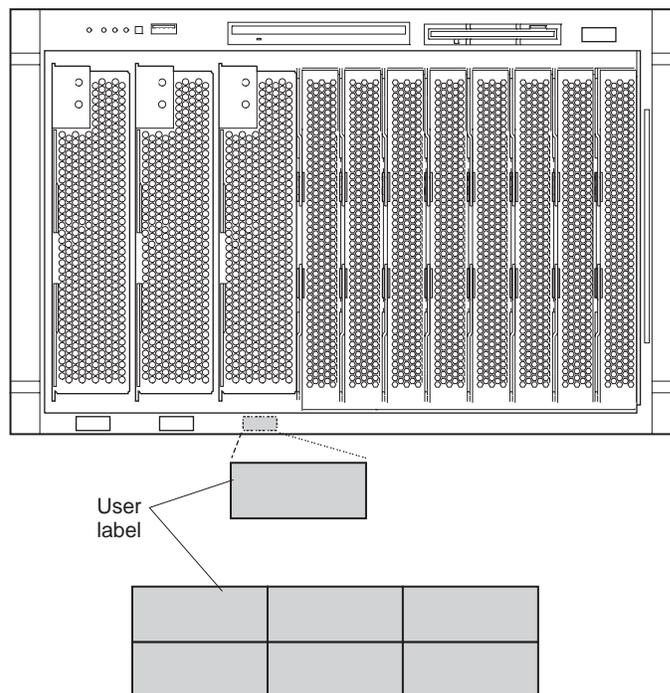
Important: Do not place the label on the blade server itself or in any way block the ventilation holes on the blade server.

The following illustration shows the placement of the label, just to the side of the blade server, on the BladeCenter T unit.

User label
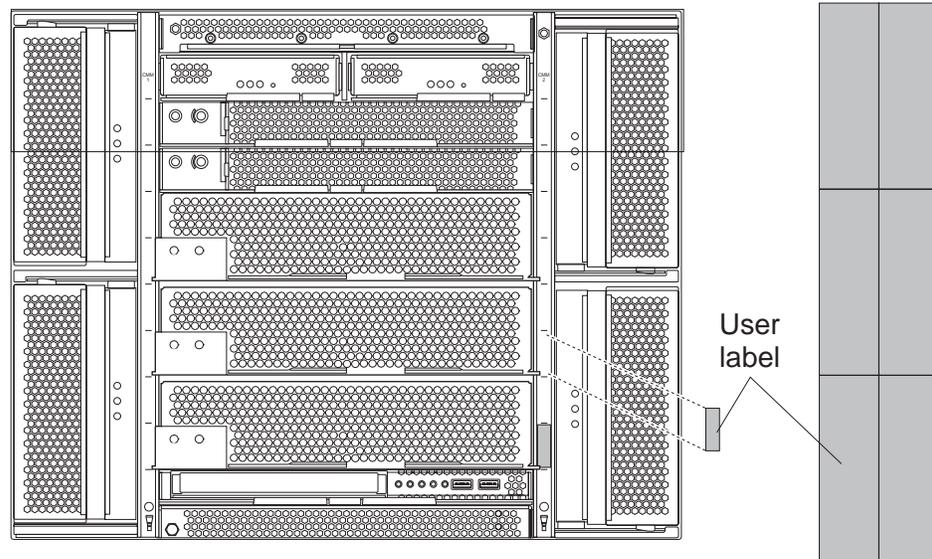
Related documentation

In addition to this *Installation and User's Guide*, the following documentation is provided in Portable Document Format (PDF) on the IBM *BladeCenter Documentation* CD or the IBM *BladeCenter T Documentation* CD that comes with your IBM BladeCenter HS40 Type 8839 blade server:

- *Safety Information*

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

- *BladeCenter HS40 Type 8839 Hardware Maintenance Manual and Troubleshooting Guide*

  This document contains information to help you solve BladeCenter HS40 problems yourself, and it contains information for service technicians.

- *BladeCenter Type 8677 Installation and User's Guide*

  This document contains instructions for setting up and configuring the BladeCenter unit and basic instructions for installing some options. It also contains general information about the BladeCenter unit.

- *BladeCenter T Types 8720 and 8730 Installation and User's Guide*

  This document contains instructions for setting up and configuring the BladeCenter T unit and basic instructions for installing some options. It also contains general information about the BladeCenter T unit.

- *BladeCenter Type 8677 Hardware Maintenance Manual and Troubleshooting Guide*

  This document contains information to help you solve BladeCenter problems yourself, and it contains information for service technicians.

- *BladeCenter T Types 8720 and 8730 Hardware Maintenance Manual and Troubleshooting Guide*

  This document contains information to help you solve BladeCenter T problems yourself, and information for service technicians.
- *BladeCenter Type 8677 Rack Installation Instructions*

  This document contains instructions for installing the BladeCenter unit in a rack.
- BladeCenter T rack installation instructions

  These documents contain instructions for installing the BladeCenter T unit in 4-post, universal telco frame (UTF), and 2-post racks.
- *IBM eServer BladeCenter Serial over LAN Setup Guide*

  This document explains how to update and configure BladeCenter components for Serial over LAN (SOL) operation. The SOL connection provides access to the text-console command prompt on each blade server, enabling the blade servers to be managed from a remote location.

Additional documentation might be included on the IBM *BladeCenter Documentation* CD or the IBM *BladeCenter T Documentation* CD.

Your server might have features that are not described in the documentation that you received 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 your server documentation. These updates are available from the IBM Web site. Complete the following steps to check for updated documentation and technical updates:

1. Go to http://www.ibm.com/pc/support/.
2. In the **Learn** section, click **Online publications**.
3. On the "Online publications" page, in the **Brand** field, select **Servers**.
4. In the **Family** field, select **BladeCenter HS40**.
5. Click **Continue**.

Features and specifications

This section provides a summary of the features and specifications of your blade server. Use the Configuration/Setup Utility program in your server to determine the specific type of microprocessor that is in the blade server.

BladeCenter HS40 specifications for non-NEBS/ETSI environments

The following table provides a summary of the features and specifications of your BladeCenter HS40 Type 8839 blade server operating in a non-NEBS/ETSI environment.

Note: Power, cooling, removable-media drives, external ports, and advanced system management are provided by the IBM @server BladeCenter Type 8677 and IBM @server BladeCenter T Types 8720 and 8730.

Microprocessor:	Size:	Predictive Failure Analysis (PFA) alerts:
Supports up to 4 microprocessors • Intel™ Xeon 2.0 GHz or faster • L2 and L3 caches, size dependant on microprocessor	• Height: 24.5 cm (9.7 inches) • Depth: 44.6 cm (17.6 inches) • Width: 5.9 cm (2.32 inches) • Maximum weight: 7.0 kg (15.4 lb)	• Microprocessor • Memory • Hard disk drives

Memory:
• Eight double data rate (DDR) PC2100 184-pin DIMM sockets
• Minimum: 512 MB
• Maximum: 16 GB[1]
• Type: 2-way interleaved, DDR, PC2100, ECC SDRAM registered x4 (Chipkill™) dual inline memory modules (DIMMs) only
• Supports 256 MB, 512 MB, 1 GB, and 2 GB DIMMs
• Hot Spare memory
	Integrated functions:
	• Four Gigabit Ethernet controllers
	• ATI Radeon 7000 video controller
	• Light path diagnostics
	• Local service processor
	• IDE controller
	• RS-485 interface for communication with the management module
	• Integrated Baseboard Management Controller
	• Universal Serial Bus (USB) v1.1 for communication with keyboard, mouse, diskette drive, and CD-ROM drive[2]
	• Serial over LAN (SOL) management interface
		Environment:
		• Air temperature:
		  – Blade server on: 10° to 35°C (50° to 95°F). Altitude: 0 to 914 m (2998.69 ft)
		  – Blade server on: 10° to 32°C (50° to 95°F). Altitude: 914 m to 2134 m (2998.69 ft 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%

Expansion: • Two I/O expansion card connectors		
Drives: • Support for up to two Ultra320 SCSI hot-swap hard disk drives available in an optional SCSI storage expansion unit	**Electrical input:** • Input power: 400 W, maximum	

Notes:

1. You might have to enable large-memory support for your operating system to access all of the memory that is installed in your blade server. See the documentation for your operating system for information.

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

BladeCenter HS40 specifications for NEBS/ETSI environments

The following table provides a summary of the features and specifications of the BladeCenter T HS40 Type 8839 blade server operating in a NEBS/ETSI environment.

Note: Power, cooling, removable-media drives, external ports, and advanced system management are provided by the IBM @server BladeCenter T Type 8720.

Microprocessor:	Size:	Predictive Failure Analysis (PFA) alerts:

Supports up to 4 microprocessors
• Intel Xeon 2.0 GHz or faster
• L2 and L3 caches, size dependant on microprocessor
 	
Memory:
• Eight double data rate (DDR) PC2100 184-pin DIMM sockets
• Minimum: 1 GB
• Maximum: 16 GB[1]
• Type: 2-way interleaved, DDR, PC2100, ECC SDRAM registered x4 (Chipkill) dual inline memory modules (DIMMs) only
• Supports 512 MB, 1 GB, and 2 GB DIMMs
• Hot Spare memory
 	
Expansion:
• Two I/O expansion card connectors
 	
Drives:
• Support for up to two Ultra320 SCSI hot-swap hard disk drives available in an optional SCSI storage expansion unit
	• Height: 24.5 cm (9.7 inches)
	• Depth: 44.6 cm (17.6 inches)
	• Width: 5.9 cm (2.32 inches)
	• Maximum weight: 7.0 kg (15.4 lb)
	
	Integrated functions:
	• Four Gigabit Ethernet controllers
	• ATI Radeon 7000 video controller
	• Light path diagnostics
	• Local service processor
	• IDE controller
	• RS-485 interface for communication with management module
	• Integrated Baseboard Management Controller
	• Universal Serial Bus (USB) v1.1 for communication with keyboard, mouse, diskette drive, and CD-ROM drive[2]
	• Serial over LAN (SOL) management interface
	
	Electrical input:
	• Input power: 400 W, maximum
		• Microprocessor
		• Memory
		• Hard disk drives
		
		Environment (NEBS):
		• Air temperature:
		  – Blade server on: 5° to 40°C (41° to 104°F). Altitude: -60 to 1800 m (-197 to 6000 ft)
		  – Blade server on (short term): -5° to 55°C (23° to 131°F) Altitude: -60 to 1800 m (-197 to 6000 ft)
		  – Blade server on: 5° to 30°C (41° to 86°F). Altitude: 1800 to 4000 m (6000 to 13 000 ft)
		  – Blade server on (short term): -5° to 45°C (23° to 113°F). Altitude: 1800 to 4000 m (6000 to 13 000 ft)
		  – Blade server off: -40° to 70°C (-40° to 158°F)
		• Humidity:
		  – Blade server on: 5% to 80%
		  – Blade server on (short term): 5% to 90% but not to exceed 0.024 kg water/kg of dry air
		  – Blade server off: uncontrolled
		
		Note: ″Short term″ refers to a period of not more than 96 consecutive hours and a total of not more than 15 days in 1 year. (This refers to a total of 360 hours in any given year, but no more than 15 occurrences during that 1-year period.)

Notes:

1. You might have to enable large-memory support for your operating system to access all of the memory that is installed in your blade server. See the documentation for your operating system for information.
2. The operating system in the blade server must provide USB support for the blade server to recognize and use the keyboard, mouse, CD-ROM drive, and an external diskette drive. The BladeCenter T unit uses USB for internal communications with these devices.

The IBM BladeCenter and BladeCenter T Documentation CDs

The IBM *BladeCenter* and *BladeCenter T Documentation* CDs contain documentation for your server in PDF and includes the IBM Documentation Browser to help you find information quickly.

Hardware and software requirements

The IBM *BladeCenter* and *BladeCenter T Documentation* CDs require the following minimum hardware and software:

- Microsoft Windows NT 4.0 (with Service Pack 3 or later), Windows 98, or 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 version is displayed.

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

- If Autostart is enabled, insert the CD into your CD-ROM 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 your CD-ROM drive and click **Start --> Run**. In the **Open** field, type

    `e:\win32.bat`

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

    `sh runlinux.sh`

Select your server from the **Product** menu. The **Available Topics** list displays all the documents for your 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 *BladeCenter Documentation* CD and IBM *BladeCenter T 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:
- **Notes:** 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 potential damage to programs, devices, or data. An attention notice is placed just before the instruction or situation in which damage could occur.
- **Caution:** These statements indicate situations that can be potentially hazardous to you. A caution statement is placed just before the description of a potentially hazardous procedure step or situation.
- **Danger:** These statements indicate situations that can be potentially lethal or extremely hazardous to you. A danger statement is placed just before the description of a potentially lethal or extremely hazardous procedure step or situation.

What your IBM BladeCenter HS40 Type 8839 offers

Your server uses the following features and technologies:
- **IBM Director**

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

  Note: As of the date of this document, the *IBM Director* CD does not come with the BladeCenter T unit. If you have the BladeCenter T unit, see "IBM Director" on page 10 for more information about the IBM Director program.
- **IBM Enterprise X-Architecture technology**

  IBM X-Architecture technology combines proven, innovative IBM designs to make your Intel-processor-based server powerful, scalable, and reliable. For more information, go to http://www.ibm.com/pc/us/eserver/xseries/xarchitecture/enterprise/index.html.
- **IBM *ServerGuide™ Setup and Installation* CD**

  The *ServerGuide Setup and Installation* CD that comes with your blade server provides programs to help you set up your server and install a 32-bit 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 54.

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

  Your blade server supports up to four Intel Xeon microprocessors. Your blade server comes with at least one microprocessor installed; you can install additional microprocessors to further enhance performance and symmetric multiprocessing (SMP) capability.

- **I/O expansion**

  Your blade server comes with two connectors on the I/O board for optional I/O expansion cards for adding more network communication capabilities to the blade server.

- **Integrated network support**

  Your blade server comes with four integrated Gigabit Ethernet controllers. Each Ethernet controller has an interface for connecting to 10/100/1000-Mbps networks through an Ethernet switch module in the BladeCenter unit. The blade server automatically selects between 10BASE-T and 100/1000BASE-TX environments. Each controller provides full-duplex (FDX) capability, which enables simultaneous transmission and reception of data on the Ethernet local area network (LAN). The controllers support Wake on LAN® technology.

- **Light path diagnostics**

  Light path diagnostics provides LEDs to help you diagnose problems. For more information, see "Light path diagnostics" on page 72.

- **Serial over LAN**

  Your blade server supports serial over LAN (SOL) technology, which provides advanced remote management capability. It provides the ability to redirect server serial data over a LAN without the use of serial concentrators. It also eliminates the need for serial cabling by internally rerouting serial packets over the LAN. The SOL feature is accessed through the management-module command-line interface. The SOL feature does not require any special client software because it is designed to work with existing standard Telnet consoles. See the *BladeCenter Management Module Command-Line Interface User's Guide* and the *BladeCenter Serial Over LAN Setup Guide* for information.

- **Symmetric multiprocessing (SMP)**

  Your server supports up to four Intel microprocessors. If the server comes with only one microprocessor, you can install an additional microprocessor to enhance performance and provide SMP capability.

Reliability, availability, and serviceability features

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

Your server has the following RAS features:
- Advanced Configuration and Power Interface (ACPI)
- Automatic server restart
- Built-in monitoring for temperature, voltage, hard disk drives, and flash drives
- Chipkill memory
- Customer-upgradeable basic input/output system (BIOS) code

- Customer support center 24 hours per day, 7 days a week[2]
- Diagnostic support of Ethernet controllers
- Error codes and messages
- Error correcting code (ECC) protection on the L2 and L3 caches
- ECC memory
- Failover Ethernet support
- Hot Spare Memory feature
- Hot-swap drives on optional small computer system interface (SCSI) storage expansion unit
- Light path diagnostics
- Power-on self-test (POST)
- Predictive Failure Analysis (PFA) alerts
- Service processor that communicates with the BladeCenter management module to enable remote blade server management
- SDRAM with serial presence detect (SPD) and vital product data (VPD)
- System error logging
- VPD (includes information stored in nonvolatile memory for easier remote viewing)
- Wake on LAN capability

IBM Director

With IBM Director, a network administrator can:

- 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-based servers, desktop computers, workstations, and mobile computers on a variety of platforms

IBM Director provides a comprehensive entry-level workgroup hardware manager. Key features include:

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

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

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:

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

For more information about IBM Director, see the documentation on the *IBM Director* CD that comes with the BladeCenter unit or go to the IBM xSeries Systems Management Web page at http://www.ibm.com/servers/eserver/xseries/systems_management/xseries_sm.html. This Web page presents an overview of IBM Systems Management and IBM Director.

Major components of the BladeCenter HS40 Type 8839 blade server

You must remove the blade server from the BladeCenter unit and remove the blade server cover to see the components.

The following illustration shows the major components in the BladeCenter HS40 blade server.

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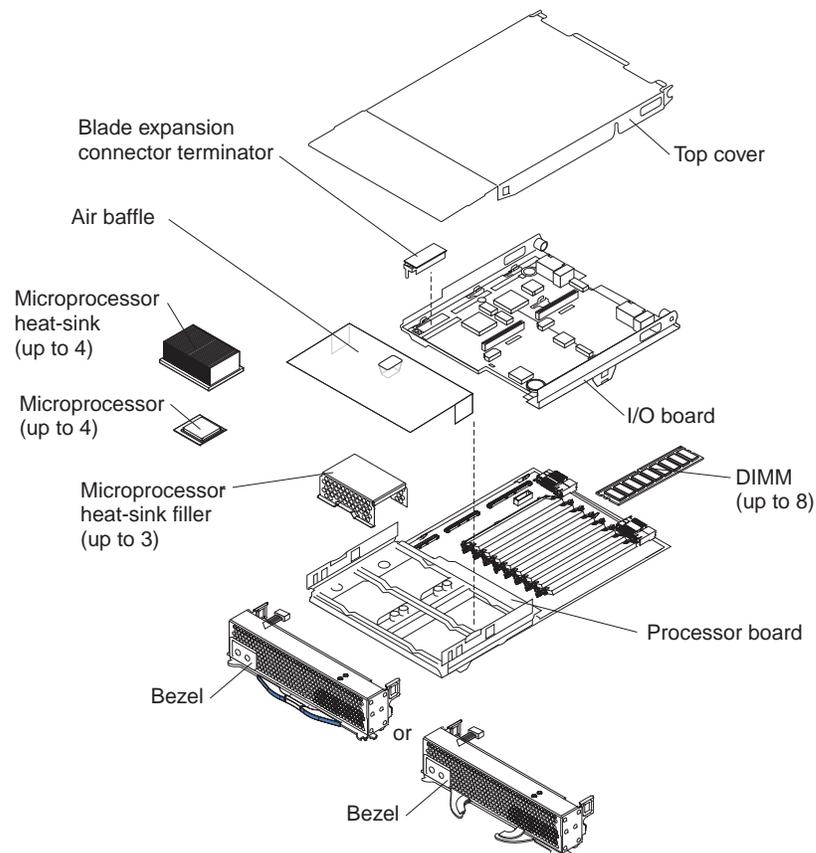
Processor board components

The following illustration shows the components on the processor board.

DIMM socket 8 (J9H1)
DIMM socket 7 (J9G1)
DIMM socket 6 (J9F1)
DIMM socket 5 (J9E2)
DIMM socket 4 (J9E1)
DIMM socket 3 (J9D1)
DIMM socket 2 (J9C2)
DIMM socket 1 (J9B3)

Microprocessor socket 1

Microprocessor socket 2

DIMM 8
DIMM 7
DIMM 6
DIMM 5
DIMM 4
DIMM 3
DIMM 2
DIMM 1

Control panel connector (J1A1)

Flex-cable connectors (to I/O board)

Microprocessor socket 4

Microprocessor socket 3
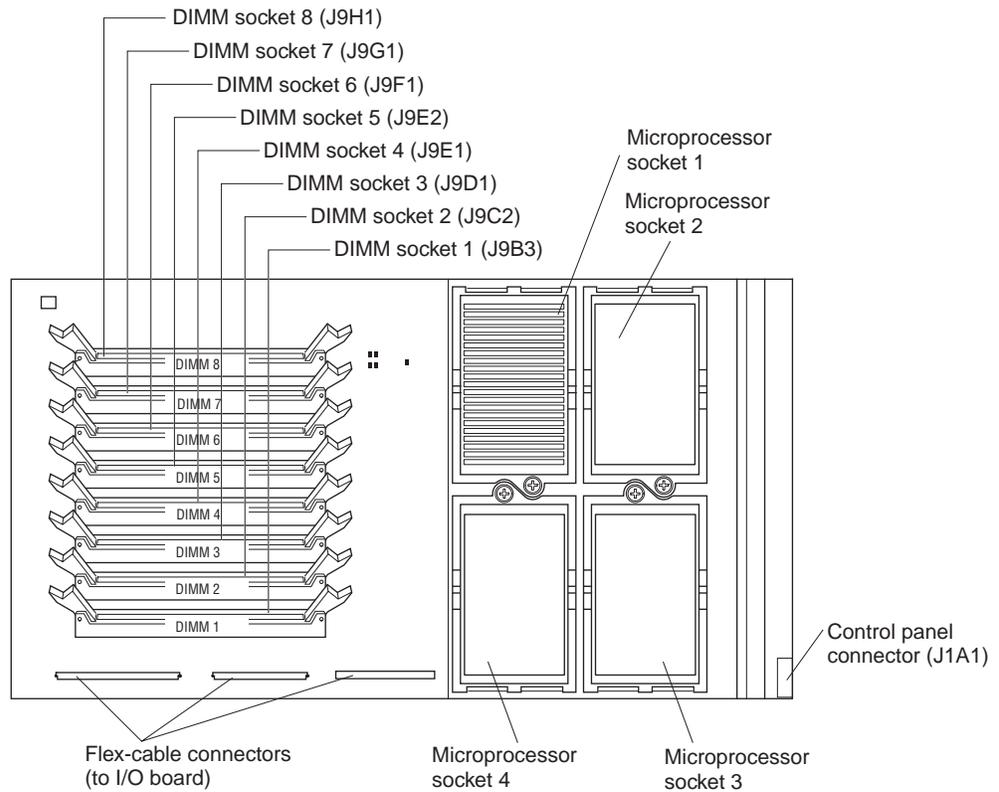
I/O board components

The following illustration shows the components on the I/O board.

J8H1 connector   J4H1 connector   Battery

I/O expansion
option 1 connectors

I/O expansion
option 2 connectors

Blade expansion
connector (J3A1)

Flex-cable
connectors
(to processor board)
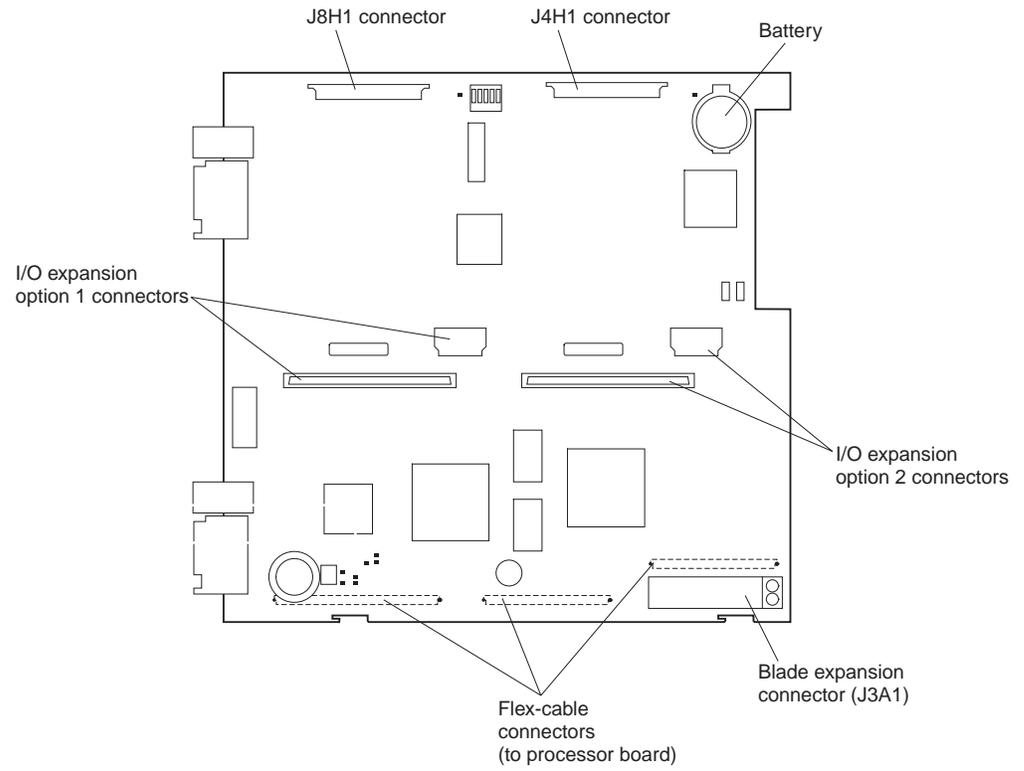
LED locations

The following illustrations show the LEDs and LED power switches on the processor board and I/O board. You need to remove the blade server from the BladeCenter unit, open the cover, and press one of the light path diagnostics buttons to light any error LEDs that were lit during blade server operation. These LEDs will remain lit for a maximum of 25 seconds. See "Light path diagnostics" on page 72 for detailed information about this feature.

The following illustration shows the LEDs on the processor board.

Microprocessor 2 error LED (DS5H4)

Microprocessor 1 error LED (DS5H5)

Microprocessor 3 error LED (DS5H1)

Microprocessor 4 error LED (DS5H2)

Microprocessor mismatch error LED (DS5H3)

Light path diagnostics button (SW9J1)

Microprocessor socket 1

Microprocessor socket 2

Light path diagnostics LED (green) (DS9J1)

DIMM 8

DIMM 7

DIMM 6

DIMM 5

DIMM 4

DIMM 3

DIMM 2

DIMM 1

DIMM 1 error LED (DS6C1)

DIMM 2 error LED (DS6D1)

DIMM 3 error LED (DS6D2)

DIMM 4 error LED (DS6E1)

DIMM 5 error LED (DS6F1)

DIMM 6 error LED (DS6G1)

DIMM 7 error LED (DS6G2)

DIMM 8 error LED (DS6H1)

Microprocessor socket 3

Microprocessor socket 4

The following illustration shows the LEDs on the I/O board.

Secondary IDE
error LED (DS6H1)

Primary IDE
error LED (DS2H1)

Board error
(DS7A2)

Processor
board
error LED (DS8A2)

Light path
diagnostics
button (S8A1)

Light path
diagnostics LED (green)
(DS8A1)

BMC error LED (DS7B1)

NMI error LED (DS7A3)

Temperature error LED (DS7A4)

I/O board error LED (DS7A1)

Switches and jumpers

The following illustration shows the switches and jumpers on the I/O board.

Configuration
switch block (S6H1)

3
2
1

BIOS code
page jumper
(J1E2)

Light path
diagnostics button (S8A1)
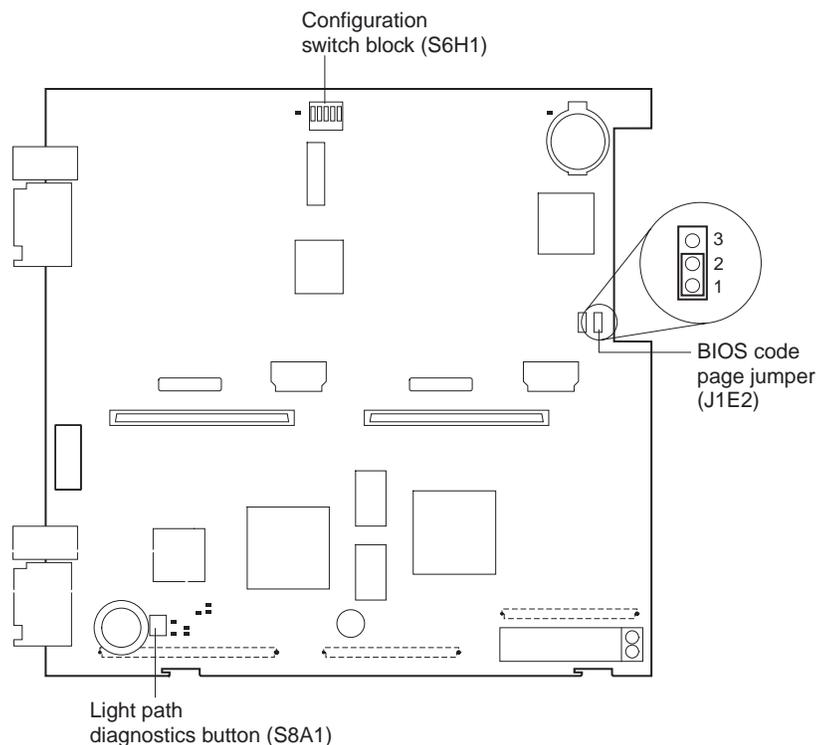
Switches

Table 1 describes the function of each switch on switch block (S6H1).

Table 1. Configuration Switch block (S6H1)

Switch number	Default value	Switch description
1	Off	Reserved
2	Off	Password clear
3 through 5	Off	Reserved

Jumpers

When the BIOS code page jumper (J1E2) is moved from pins 1 and 2 to pins 2 and 3, you can start the blade server from a backup BIOS page. The default position is pins 1 and 2. See the blade server *Hardware Maintenance Manual and Troubleshooting Guide* on the IBM *BladeCenter Documentation* CD or the IBM *BladeCenter T Documentation* CD for more information.

Note: If you start the blade server from the backup page because the primary BIOS page has become damaged, you need to flash the primary BIOS code.

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.

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:

Note: Unless otherwise stated, references to the BladeCenter unit also apply to the BladeCenter T unit.

- You can press the power-control button on the front of the blade server (behind the control panel door) to start the server.

  Notes:

  1. Wait until the power-on LED on the blade server flashes slowly before pressing the blade server power-control button. During this time, the service processor in the BladeCenter management module is initializing; therefore, the power-control button on the blade server does not respond.

  2. While the blade server is starting up, the power-on LED on the front of the server is lit steady. See "Controls and LEDs" on page 18 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 BladeCenter management module to do so).

- You can turn on the blade server remotely by means of the service processor in the BladeCenter management module.

- If your operating system supports the Wake on LAN feature and the blade server power-on LED is flashing slowly, the Wake on LAN feature can turn on the blade server under the following conditions:

  – The Wake on LAN feature has not been disabled through the management-module Web interface.

  – The blade server was previously turned on and the operating system was shut down properly.

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 your operating system before you turn off the blade server. See your operating system documentation for information about shutting down the operating system. Improper shutdown of a blade server will prevent that blade server from being restarted using Wake on LAN.

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). This starts an orderly shutdown of the operating system, if this feature is supported by your 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.

Note: After turning off the blade server, wait at least 30 seconds for its hard disk drives to stop spinning before you remove the blade server from the BladeCenter unit.

Controls and LEDs

This section describes the controls and light-emitting diodes (LEDs) on your blade server.

Note: The control panel door is shown in the closed (normal) position in this illustration. You must open the control panel door to access the power-control button.
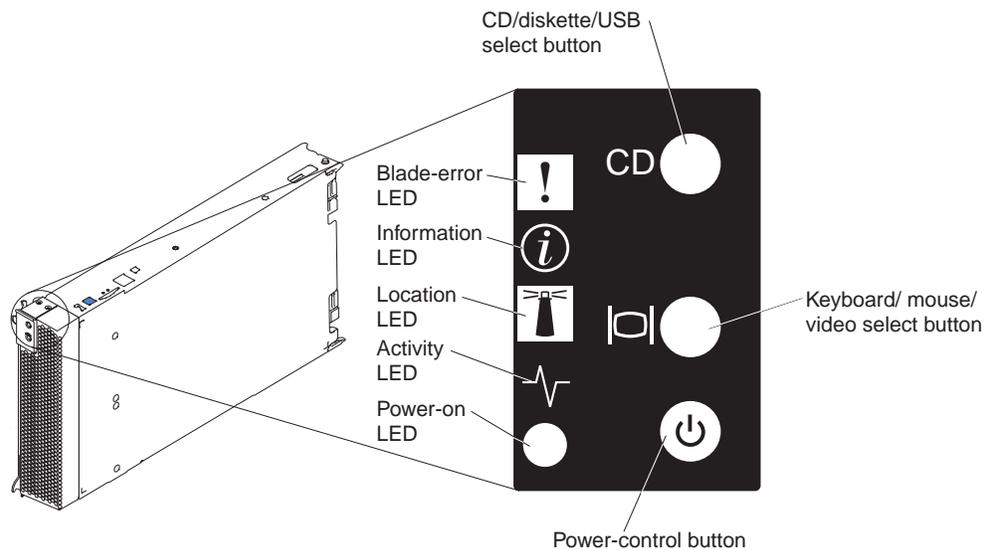
CD/diskette/USB select button: Press this button to associate the CD-ROM drive, diskette drive, and USB port with this blade server. The LED on this button flashes while the request is being processed, then is steady when the ownership of the CD-ROM drive, diskette drive, and USB port has been transferred to this blade server. It can take approximately 20 seconds for the operating system in this blade server to recognize the CD-ROM drive, diskette drive, and USB port.

The operating system in the blade server must provide USB support for the blade server to recognize and use the CD-ROM drive, diskette drive, and USB port. The BladeCenter unit uses USB for internal communication with these devices. If there is no response when you press the CD/diskette/USB select button, you can use the management-module Web interface to see whether local control has been disabled on the blade server.

Keyboard/mouse/video select button: Press this button to associate the keyboard port, mouse port, and video port with this blade server. The LED on this button flashes while the request is being processed, then is steady when the ownership of the keyboard, mouse, and video has been transferred to this blade server. It can take up to 20 seconds to switch the keyboard, video, and mouse control to the blade server.

Although the keyboard that is attached to the BladeCenter unit is a PS/2®-style keyboard, communication with it is through the Universal Serial Bus (USB). The operating system in the blade server must provide USB support for the blade server to recognize and use the keyboard and mouse. The BladeCenter unit uses USB for internal communication with these devices. When you are running an operating system that does not have USB device drivers, such as in the following situations, the keyboard responds very slowly.

- Running the blade server integrated diagnostics
- Running a BIOS update diskette on a blade server
- Updating the diagnostics on a blade server

If there is no response when you press the keyboard/mouse/video select button, you can use the management-module Web interface to see whether local control has been disabled on the blade server.

You can also press keyboard keys in the following sequence to switch keyboard/mouse/video 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 you install the Microsoft Windows 2000 operating system on the blade server while it is not the current owner of the keyboard, video, and mouse, a delay of up to 1 minute occurs the first time you switch the keyboard, video, and mouse 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 keyboard-video-mouse switching time frame (up to 20 seconds).

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

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

Power-on LED: This green LED indicates the power status of the blade server in the following manner:

- Flashing rapidly - The service processor on the blade server is handshaking with the BladeCenter 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.

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

Location LED: When this blue LED is lit, it has been turned on remotely by the system administrator to aid in visually locating the blade server. The location LED on the BladeCenter unit will be lit also. The location LED can be turned off through the BladeCenter management-module Web interface or through the IBM Director Console.

Information LED: When this LED is lit, it indicates that a noncritical event has occurred. The information LED can be turned off through the BladeCenter management-module Web interface or through the 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.

Chapter 3. Installing options

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

Installation guidelines

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

- Read the safety information beginning on page vii and the guidelines in "Handling static-sensitive devices." This information will help you work safely with your blade server and options.
- 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 server, open or close a latch, and so on.
- Orange on a component or an orange label on or near a component indicates that the component can be hot-swapped, which means that if the server and operating system support hot-swap capability, you can remove or install the component while the server is running. (Orange can also indicate touch points on hot-swap components.) See the instructions for removing or installing a specific hot-swap component for any additional procedures that you might have to perform before you remove or install the component.
- For a list of supported options for your blade server, go to http://www.ibm.com/pc/compat/.

System reliability considerations

To help ensure proper cooling and system reliability, make sure that each microprocessor socket always contains either a microprocessor heat-sink filler or a microprocessor and heat sink and that the air baffle is correctly installed.

Handling static-sensitive devices

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

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

- When working on the BladeCenter T unit, use an electrostatic discharge (ESD) wrist strap, especially when you will be handling modules, options, and blade servers. To work properly, 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 printed circuitry.

21

- Do not leave the device where others can handle and possibly damage the device.
- 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 you are installing the device in 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 your blade server without setting it down. If it is necessary to set the device down, place it in its static-protective package. Do not place the device on your blade server cover or on a metal table.
- Take additional care when handling 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 the blade server from the BladeCenter unit.

Notes:

1. The illustrations in this document might differ slightly from your hardware.
2. Unless otherwise stated, references to the BladeCenter unit also apply to the BladeCenter T unit.

Type 8677
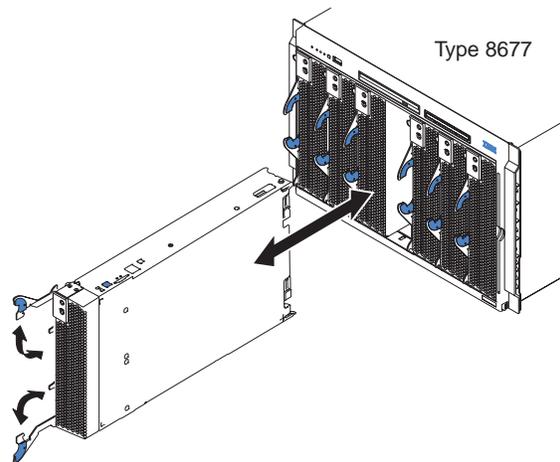
The following illustration shows how to remove the blade server from the BladeCenter T unit.

Attention:

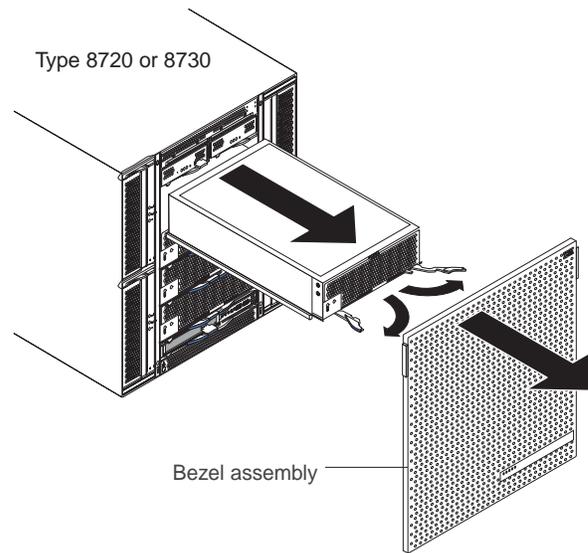- To maintain proper system cooling, do not operate the BladeCenter unit without either a blade server, expansion unit, or filler blade installed in each blade bay for more than 1 minute for the BladeCenter unit and 20 minutes for the BladeCenter T unit.
- Note the bay number. Reinstalling a blade server 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.

Complete the following steps to remove the blade server:

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 "Controls and LEDs" on page 18 for more information about the location of the power-control button.

   Attention: Wait at least 30 seconds, until the drives stop spinning, before proceeding to the next step.

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

   Note: You must remove the bezel assembly from the BladeCenter T unit before you can access the blade server. Firmly grip the blue touch points (at the top-left and top-right sides of the bezel) and forcefully pull forward, lifting the bezel up and away from the BladeCenter T unit. Carefully set the bezel assembly aside in a safe place. (See the *BladeCenter T Types 8720 and 8730 Installation and User's Guide* for detailed instructions about removing the bezel assembly.)

3. Pull the blade server out of the bay. Spring-loaded doors farther back in the bay move into place to cover the bay temporarily.

4. Place either a filler blade or another blade server in the bay within 1 minute for the BladeCenter unit and 20 minutes for the BladeCenter T unit. The recessed spring-loaded doors will move out of the way as you insert the blade server.

Opening the blade server cover

The following illustration shows how to open the cover on the blade server.
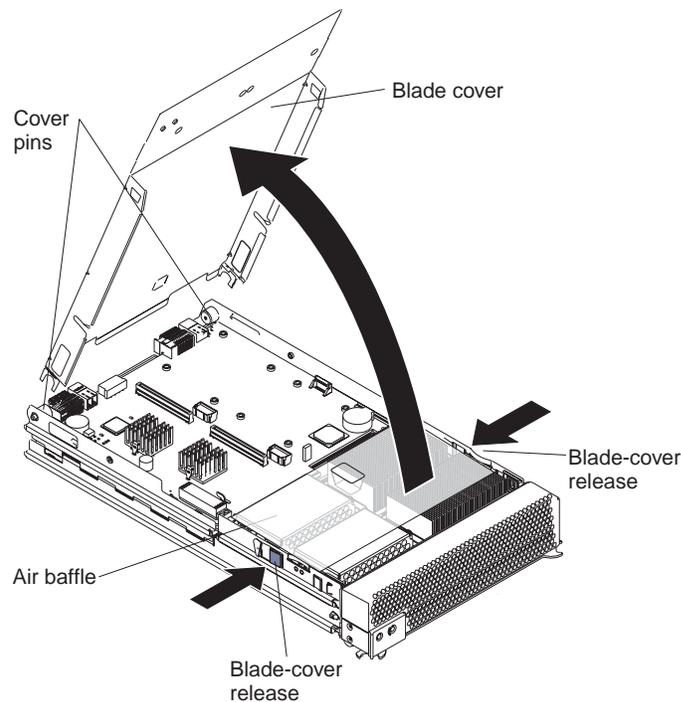
Complete the following steps to open the blade server cover:

1. Read the safety information beginning on page vii and "Installation guidelines" on page 21.
2. Carefully lay the blade server down on a flat, static-protective surface, with the cover side up.
3. Press the blade-cover release on each side of the blade server and lift the cover open, as shown in the illustration.
4. Lay the cover flat, or lift it from the blade server.

Statement 21:

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

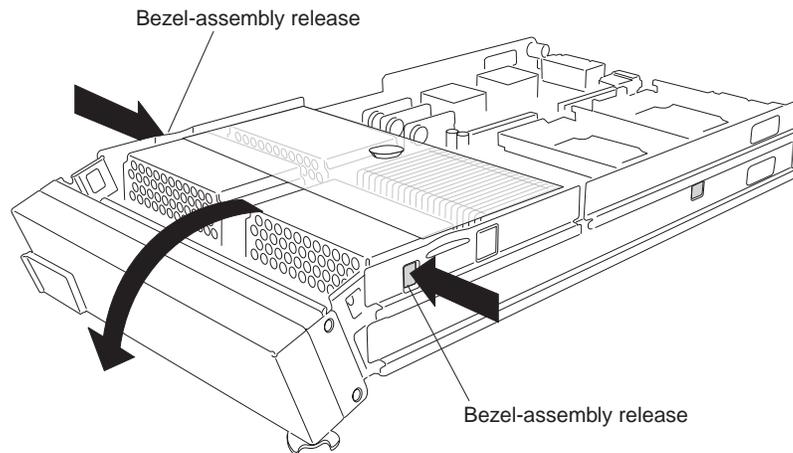# Removing the blade server bezel assembly

To install certain options, you must first remove the blade server bezel assembly.

Complete the following steps to remove the blade server bezel assembly:

1. Read the safety information beginning on page vii and "Installation guidelines" on page 21.
2. Open the blade server cover (see "Opening the blade server cover" for instructions) and lift it off the blade server.

3. Press the bezel-assembly release and rotate the bezel assembly away from the blade server chassis; then, unhook the tabs on the bottom of the bezel from the holes on the server chassis and remove the bezel.

Bezel-assembly release

Bezel-assembly release

4. Disconnect the control-panel cable from the control-panel connector.

Control-panel connector

Control-panel cable
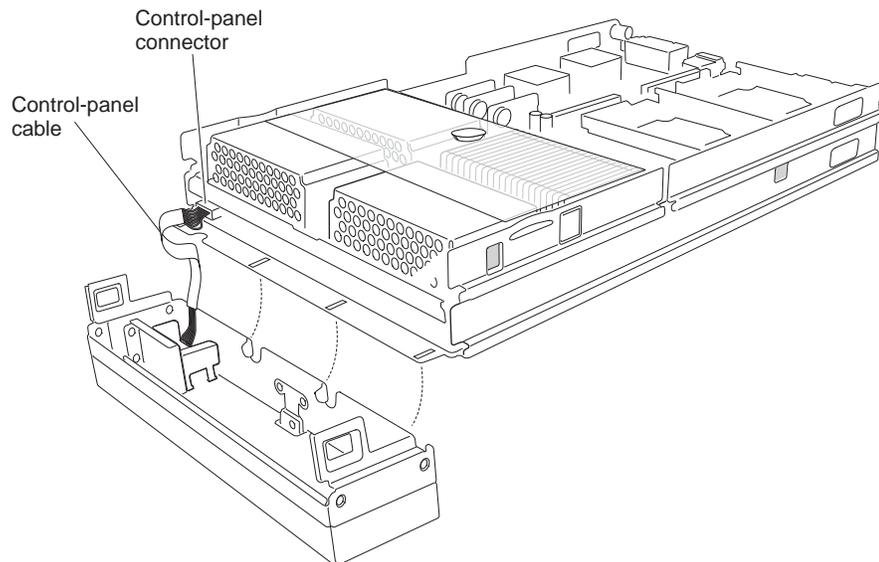
5. Pull the bezel assembly away from the blade server.
6. Store the bezel assembly in a safe place.

Installing an IDE drive

Your blade server has two connectors on the I/O board for installing an optional 2.5-inch HS20 IDE Hard Disk Drive or BladeCenter Flash Disk Drive. Each IDE connector is on a separate bus. Some models might come with at least one hard disk drive or one flash drive already installed.

Note: In this document, both types of drives are referred to as IDE drives.

Each IDE connector is on a separate bus. Depending on your blade server, at least one IDE hard disk drive might already be installed. If your blade server is equipped with one IDE hard disk drive, you can install an additional IDE hard disk drive. These two IDE hard disk drives can be used to implement and manage redundant

array of independent disks (RAID) level-1 under both the Linux and Microsoft Windows 2000 operating systems. See "Configuring an IDE RAID" on page 59 for information about IDE RAID configuration.

Attention: To maintain proper system cooling, do not operate the BladeCenter unit without either a blade server, expansion unit, or filler blade installed in each blade bay for more than 1 minute for the BladeCenter unit and 20 minutes for the BladeCenter T unit.

Important: Ensure that the storage capacities and speeds of the drives are identical when configuring or replacing drives in a mirrored configuration.

Complete the following steps to install a 2.5-inch IDE drive.

Note: Do not install an IDE drive into IDE connector 2 if you intend to also install an optional I/O expansion card. The I/O expansion card occupies the same area as the second IDE drive.
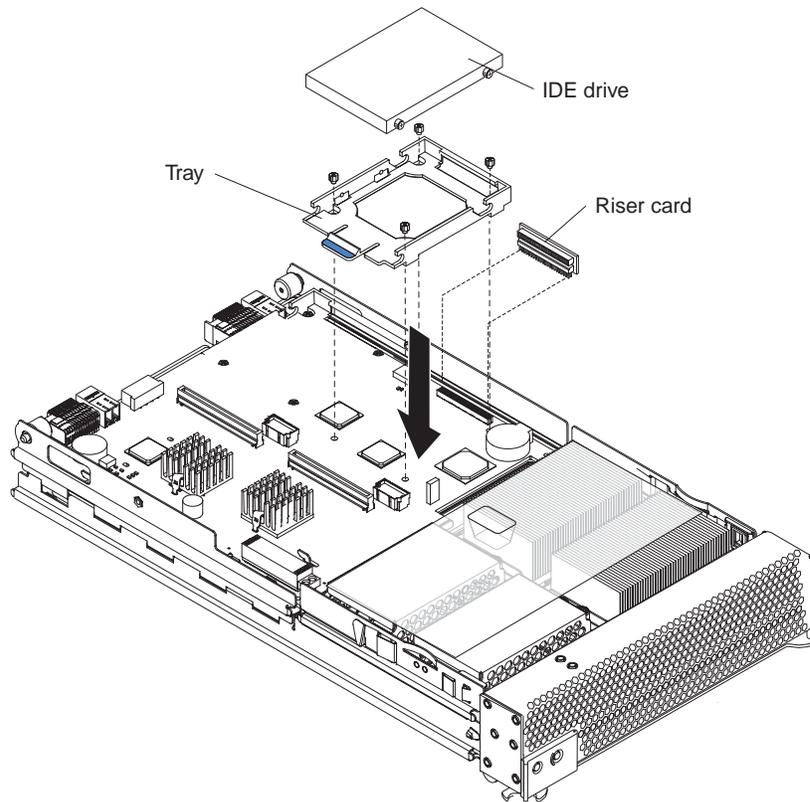
1. Read the safety information beginning on page vii and "Installation guidelines" on page 21.
2. Shut down the operating system, turn off the blade server, and remove the blade server from the BladeCenter unit. See "Removing the blade server from the BladeCenter unit" on page 22 for instructions.
3. 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 24 for instructions).
5. Insert the riser card from the option kit into an IDE connector on the blade server I/O board.

   Important: IDE drives must be installed in the following order: IDE connector 1 first, then IDE connector 2.

6. Place the IDE drive tray from the option kit over the riser card as shown in the illustration, aligning the tray with the screw holes on the I/O board. Two of the screw holes have screws in them.

7. Remove the tray temporarily; then, remove the two screws from the screw holes on the I/O board and replace the tray. Secure the tray to the I/O board with screws from the kit.

8. Set any jumpers or switches on the IDE drive.

   Important: Both IDE drives must be set to Master.

   Attention: Do not press on the top of the IDE drive. Pressing the top could damage the IDE drive.

9. Place the IDE drive into the tray and push it, from the rear edge of the IDE drive, into the connector on the riser card until the IDE drive moves past the lever at the back of the tray. The IDE drive clicks into place.

10. If you have other options to install or remove, do so now; otherwise, go to "Completing the installation" on page 44.

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 processor board contains eight DIMM connectors and supports two-way memory interleaving.
- The DIMM options supported for your blade server are 256 MB, 512 MB, 1 GB, and 2 GB. Your blade server supports a minimum of 512 MB and a maximum of 16 GB.
- You might have to enable large-memory support for your operating system to access all of the memory that is installed in your blade server. See the documentation for your operating system for information.
- Your blade server comes with two or more DIMMs installed, in pairs, starting with the DIMM 4 (J9E1) and DIMM 8 (J9H1) memory connectors. When you install additional DIMMs, be sure to install them as pairs, in the connectors and order shown in the following table.

Pair	DIMM connectors
First	4 (J9E1) and 8 (J9H1)
Second	3 (J9D1) and 7 (J9G1)
Third	2 (J9C2) and 6 (J9F1)
Fourth	1 (J9B3) and 5 (J9E2)

- Both DIMMs in a pair must be the same size, speed, type, and technology. You can mix compatible DIMMs from various manufacturers.
- If you are using the hot-spare memory feature, all DIMMs that are installed in the blade server must be the same size, speed, type, and technology. If you are not using the hot-spare memory feature, the DIMMs of one memory pair do not have to match the DIMMs of the other memory pairs. To use the hot-spare memory feature, at least two DIMM pairs must be installed in the blade server. The hot spare memory feature is enabled using the Configuration/Setup Utility program (see "Configuration/Setup Utility menu choices" on page 52 for information).

- Install only 2.5 V, 184-pin, double-data-rate (DDR), PC2100, registered synchronous dynamic random-access memory (SDRAM) with error correcting code (ECC) DIMMs. These DIMMs must be compatible with the latest PC2100 SDRAM Registered DIMM specification, which is available from http://www.jedec.org/.

The following illustration shows how to install DIMMs on the processor board.
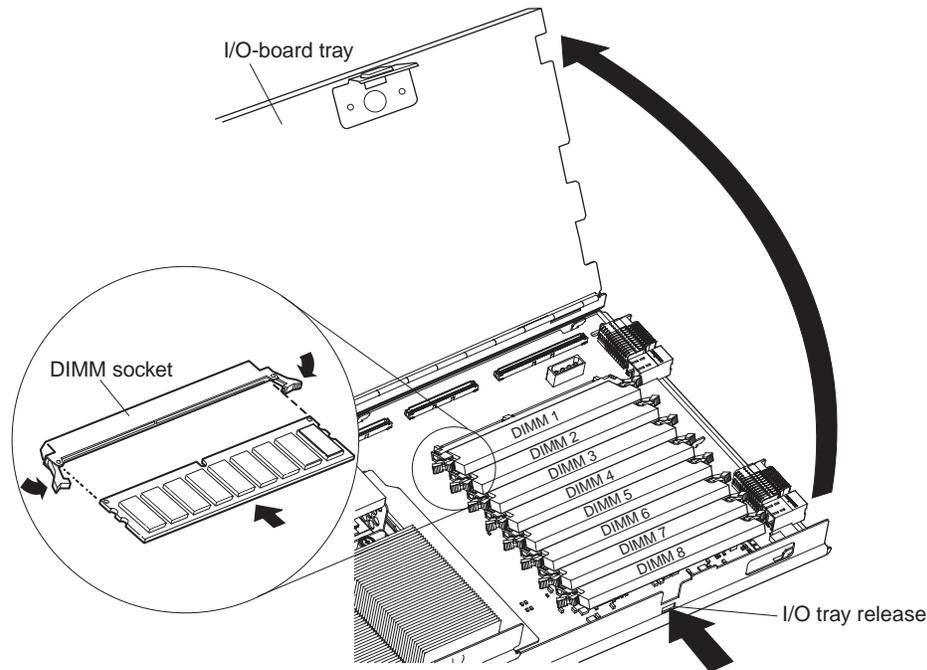
Before you begin, read the documentation that comes with the DIMMs.

Complete the following steps to install a DIMM:

1. Read the safety information beginning on page vii and "Installation guidelines" on page 21.
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 22 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 24 for instructions) and lift it off the blade server.
5. Press the I/O-tray release and rotate the I/O-board tray open, as shown in the illustration. The I/O tray is hinged and will support itself in the open position.
6. Locate the DIMM connectors on the processor board. Determine the connectors into which you will install the DIMMs (see the table on page 27.).
7. Touch the static-protective package that contains the DIMM option to any *unpainted* metal surface on the BladeCenter unit or any *unpainted* surface on any other grounded rack component. Then, remove the DIMM from the package.
8. To install the DIMMs, repeat the following steps for each DIMM that you install:
   a. Turn the DIMM so that the DIMM keys align correctly with the connector on the processor board.

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

b. 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.

9. Before closing the I/O-board tray, check that all components are installed and seated correctly and that you have not left loose tools or parts inside the blade server. Pivot the I/O-board tray to the closed position until it clicks into place.

10. If you have other options to install or remove, do so now; otherwise, go to "Completing the installation" on page 44.
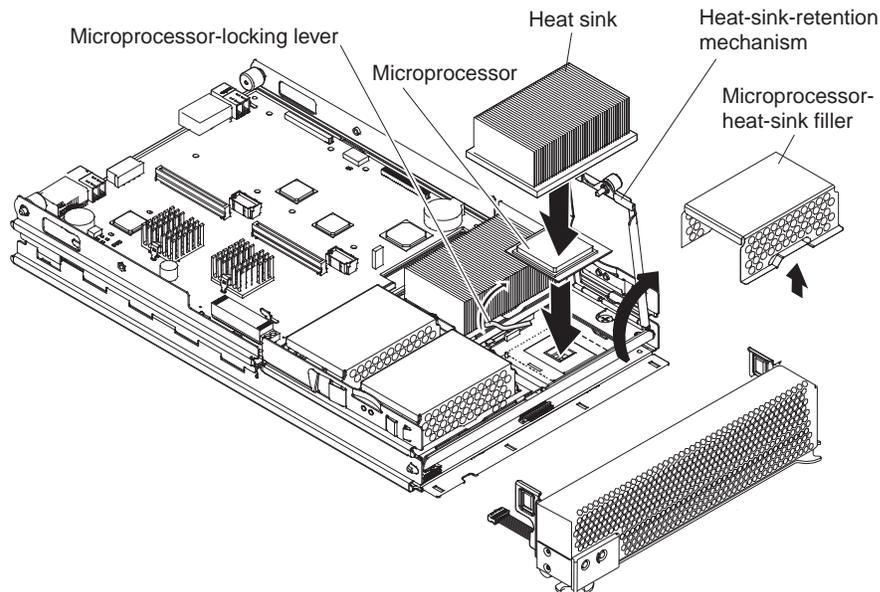
Installing an additional microprocessor

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

- Your blade server supports up to four microprocessors. With two or four microprocessors, your blade server can operate as a symmetric multiprocessing (SMP) server. With one or three microprocessors, the blade server will not operate as an SMP server; however, installing more than one microprocessor will still result in improved server performance, even if the blade server is not configured for SMP operation. With SMP, certain operating systems and application programs can distribute the processing load between the microprocessors. 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/pc/compat/.

  Attention: To ensure proper server operation when you install an additional microprocessor, use microprocessors that have the same cache size and type, and the same clock speed. Internal and external clock frequencies of all microprocessors installed in the server must be identical (including system bus speed).

- For a list of microprocessors supported by your blade server, go to the ServerProven® list at http://www.ibm.com/pc/compat/.

- Thoroughly review the documentation that comes with the microprocessor, so that you can determine whether you need to update the blade server BIOS code. The latest level of BIOS code for your blade server is available from the World Wide Web. See Appendix A, "Getting help and technical assistance," on page 77 for the World Wide Web addresses.

- The microprocessor sockets in this blade server contain built-in termination for the microprocessor bus; therefore, terminator cards are not required for empty microprocessor sockets. However, for proper airflow, an empty microprocessor socket must contain a microprocessor heat-sink filler, sometimes called a microprocessor baffle.

- The microprocessor speeds are automatically set for this blade server; therefore, you do not need to set any microprocessor frequency-selection jumpers or switches.

The following illustration shows how to install the additional microprocessors on the processor board.

Complete the following steps to install an additional microprocessor:

1. Read the safety information beginning on page vii and "Installation guidelines" on page 21.
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 22 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 24 for instructions) and lift it off the blade server.
5. Lift and remove the air baffle covering the microprocessors.
6. Locate the microprocessor socket on the processor board. See "Processor board components" on page 12 for numbering order of processors.

   Note: Processors must be installed in order, starting with microprocessor 1, then microprocessors 2, 3, and 4.
7. Using a #2 Phillips screwdriver, loosen the captive screw on the heat-sink retention mechanism and rotate the mechanism up.
8. Remove the microprocessor heat-sink filler.
9. Install the microprocessor:
   a. Remove the protective cover, tape, or label from the surface of the microprocessor socket, if one is present.
   b. Touch the static-protective package containing the new microprocessor to any *unpainted* metal surface on the BladeCenter unit or any *unpainted* surface on any other grounded rack component; then, remove the microprocessor from the package.

   Attention: Do not use any tools or sharp objects to lift the locking lever on the microprocessor socket. Failure to do so might result in permanent damage to the processor board.

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

Attention: You must make sure that the locking lever on the microprocessor socket is in the fully open position before you insert the microprocessor in the socket. Failure to do so might result in permanent damage to the microprocessor, microprocessor socket, and processor board.

Lever closed

or

Lever fully open

Lever closed

Lever fully open
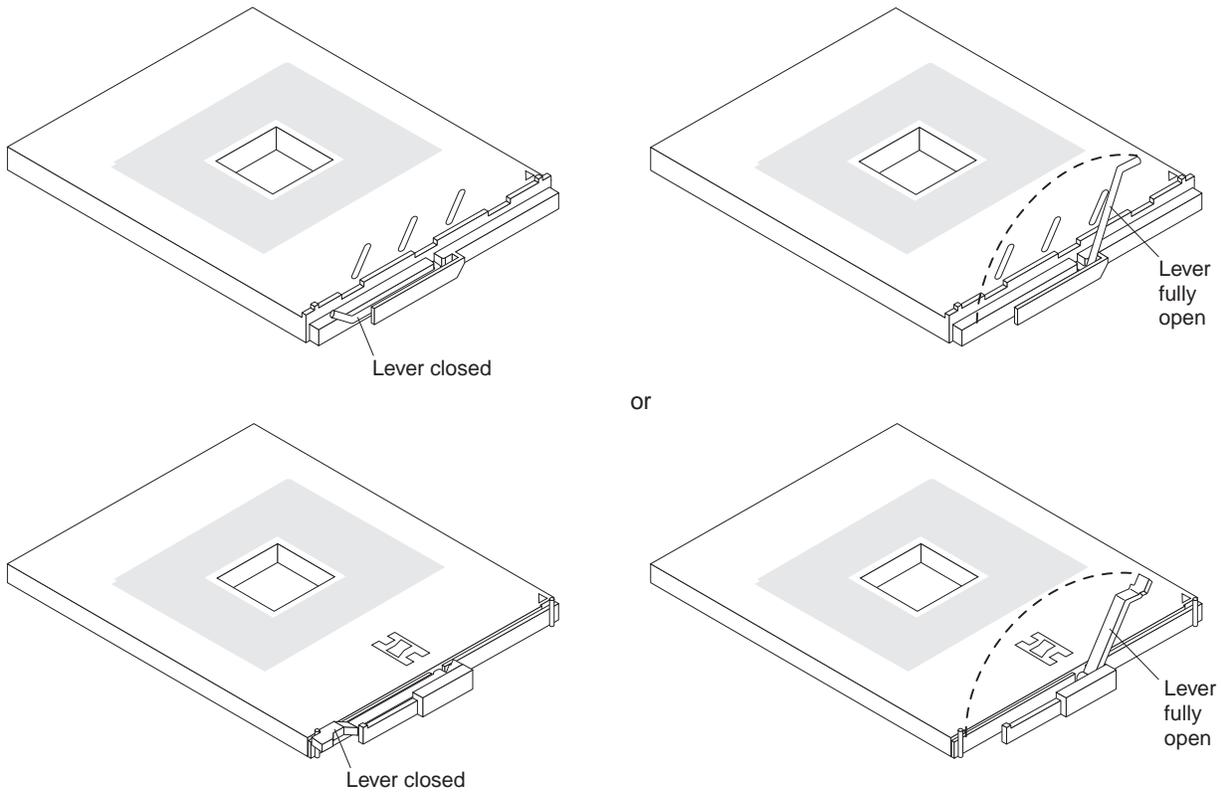
d. Center the microprocessor over the microprocessor socket. Align the triangle on the corner of the microprocessor with the triangle on the corner of the socket and carefully press the microprocessor into the socket.

Microprocessor

Alignment marks

Microprocessor socket
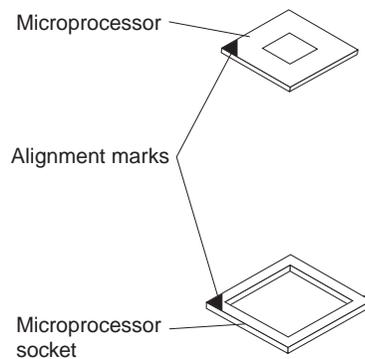
Attention:

- Do not use excessive force when pressing the microprocessor into the socket.
- Make sure that the microprocessor is oriented and aligned correctly in the socket before you try to close the lever.

    e. Carefully close the lever to secure the microprocessor in the socket.

10. Install a heat sink on the microprocessor:

    a. Remove the plastic protective cover from the bottom of the heat sink, if one is present.

Attention:

1) Do not set down the heat sink after you remove the plastic cover.

2) Do not touch the thermal grease on the bottom of the heat sink. Touching the thermal grease will contaminate it. If the thermal grease becomes contaminated, contact your service technician.

    b. Align and place the heat sink on top of the microprocessor. Press firmly on the heat sink.

11. Lower the retention mechanism; then, screw down the captive mounting screw using a #2 Phillips screwdriver. Do not overtighten the screw. If you are using a torque wrench, tighten the screws to 8.5 to 13 Newton-meters (Nm) (6.3 to 9.6 foot-pounds).

Attention: To help ensure proper cooling and system reliability the air baffle must be correctly positioned and fully seated.

12. Install the air baffle covering microprocessor 1 and microprocessor 4, making sure that the air baffle is positioned and pushed down so that both heat sink captive mounting screws are through the holes in the air baffle.

Air baffle

Microprocessor 1 and 4 heat sink captive mounting screws
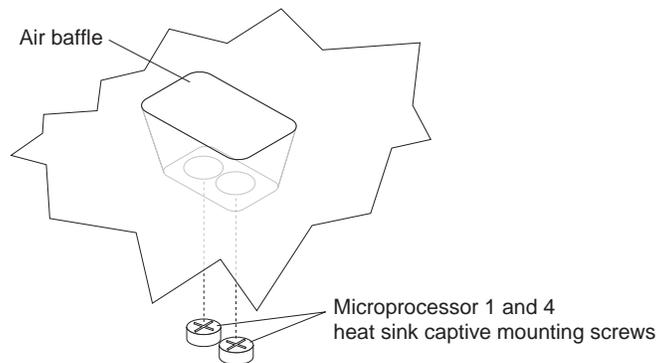
13. If you have other options to install or remove, do so now; otherwise, go to "Completing the installation" on page 44.

Installing an I/O expansion card

You can add one or two optional I/O expansion cards to your blade server to give the blade server up to four additional network connections for communicating on a network. Each I/O expansion card provides two additional network connections that are routed through I/O-module bays 3 and 4 of the BladeCenter unit. If two I/O expansion cards are installed, both expansion cards must be of the same type.

Attention: When you add an I/O expansion card, you must make sure that the switch modules in I/O-module bays 3 and 4 on the BladeCenter unit both support the I/O expansion card network-interface type. For example, if you add an Ethernet expansion card to your blade server, the modules in I/O-module bays 3 and 4 on the BladeCenter unit must both be compatible with the Ethernet expansion card. All other I/O expansion cards that are installed on other blade servers in the BladeCenter unit must also be compatible with these switch 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 allow use of several different types of compatible I/O expansion cards within the same BladeCenter unit.

Important: Installation of an I/O expansion card requires removing the IDE drive installed in IDE connector 2. The I/O expansion card occupies the same space as this IDE drive and replaces it. You cannot install an IDE drive in IDE connector 2 while an I/O expansion card is installed in the blade server.

If the IDE drive that is installed in IDE connector 2 contains any information that you want to keep, back it up to another storage device.

If the IDE hard disk drive that is installed in IDE connector 2 is part of a RAID array, delete this IDE RAID array configuration before removing the hard disk drive. When you delete the RAID array, the array configuration information is removed; no data is deleted. See "Deleting an IDE RAID array configuration" on page 61 for instructions.

The following illustration shows how to install an I/O expansion card on the blade server. The same procedure is used to install an expansion card in either IDE connector location; however, the illustration shows installing an expansion card only in IDE connector 2.
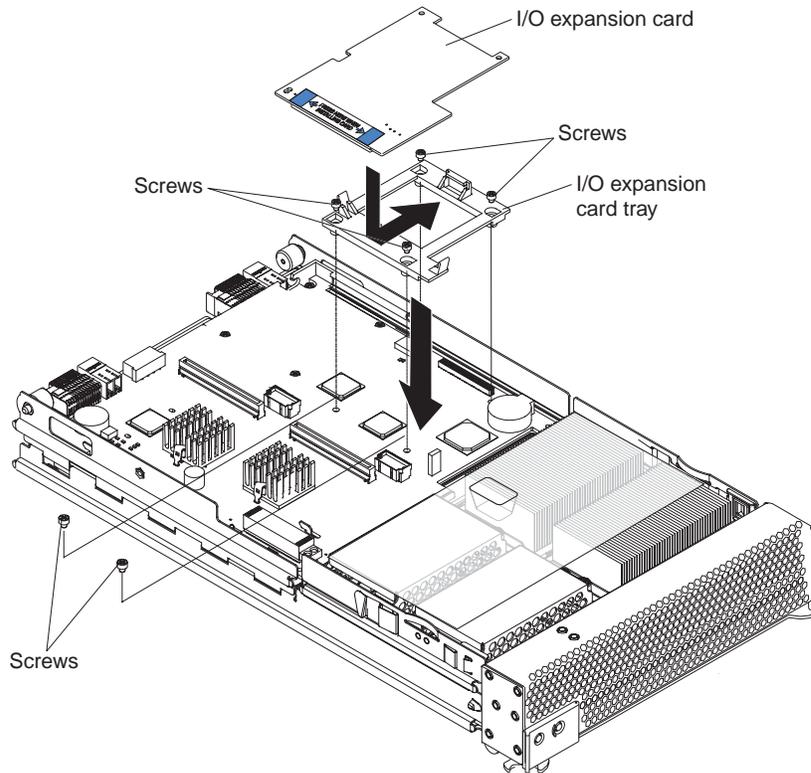
Important: If you are installing only one I/O expansion card in your blade server, it must be installed in connector location 2.

Complete the following steps to install an I/O expansion card:

1. Read the safety information beginning on page vii and "Installation guidelines" on page 21.
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 22 for information).
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 24 for instructions) and lift it off the blade server.
5. Remove the two screws near connector J8H1 (or connector J4H1, if you are installing an I/O expansion card in I/O expansion location 2) that secure the I/O board to the unit, as shown in the illustration.
6. Install the I/O expansion card:
   a. Install the I/O expansion card tray. Secure the tray to the I/O board with the four screws from the option kit, as shown in the illustration.
   b. Orient the I/O expansion card as shown in the illustration.
   c. Slide the notch in the narrow end of the card into the raised hook on the tray; then, gently pivot the wide end of the card into the I/O expansion card connectors, as shown in the illustration.
7. See the documentation that comes with the I/O expansion card for device-driver and configuration information to complete the installation of the I/O expansion card. Some documentation might also be on the IBM *BladeCenter Documentation* CD or the IBM *BladeCenter T Documentation* CD that comes with the blade server.

8. If you have other options to install or remove, do so now; otherwise, go to "Completing the installation" on page 44.

Installing a PCI I/O expansion unit

You can install up to two PCI adapters by installing the Peripheral Card Interface (PCI) I/O Expansion Unit on the blade server.

The following illustration shows how to install a PCI I/O Expansion Unit on a blade server.
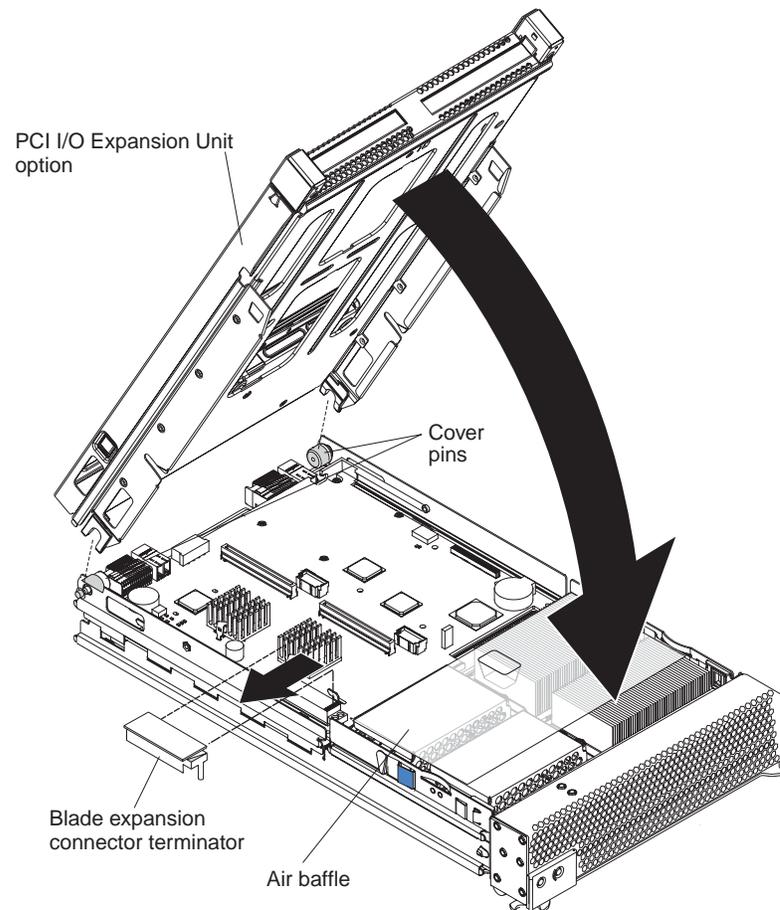
For complete information about installing this expansion unit, see the *Installation Instructions* that comes with the optional expansion unit.

Installing a SCSI storage expansion unit

Attention: You must install a SCSI storage expansion unit that is specified for use with the BladeCenter HS40 Type 8839 blade server. Two types of SCSI storage expansion unit are available for BladeCenter products, only one of which is compatible with the BladeCenter HS40 Type 8839 blade server. See the ServerProven list at http://www.ibm.com/pc/compat/ or the *Hardware Maintenance Manual and Troubleshooting Guide* for your blade server on the IBM *BladeCenter Documentation* CD or the IBM *BladeCenter T Documentation* CD for more information.

To use SCSI hard disk drives with your blade server, install a SCSI storage expansion unit, such as the IBM BladeCenter SCSI Storage Expansion Unit, on the

blade server. You will then be able to install two 3.5-inch, hot-swap, SCSI, 1-inch (26 mm) slim-high hard disk drives in the expansion unit, for use by the blade server. The SCSI controller in the BladeCenter SCSI storage expansion unit supports embedded mirroring, which is similar to RAID level-1.

Important: To avoid potential performance and reliability problems when configuring or replacing drives in a mirrored configuration, make sure that the storage capacities and speeds of the drives are identical.

After you install the SCSI storage expansion unit on your blade server, the blade server and expansion unit are a unit that occupies three blade bays in the BladeCenter unit.

Attention: To ensure proper cooling and system reliability, make sure that each of the SCSI hard disk drive bays on the SCSI storage expansion unit contains either a hot-swap SCSI hard disk drive or a filler panel.

Complete the following steps to install the SCSI storage expansion unit:

Note: The illustrations used in this procedure depict the installation process on a BladeCenter HS40 blade server in a BladeCenter Type 8677 unit. These illustrations might differ slightly from your hardware.

1. Read the safety information beginning on page vii and "Installation guidelines" on page 21.
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 22 for instructions).
3. Carefully lay the blade server on a flat, static-protective surface.
4. Remove the blade server cover (see "Opening the blade server cover" on page 24 for instructions).
5. Locate the blade expansion connector on the processor board and remove the terminator from the connector.

Blade expansion
connector terminator
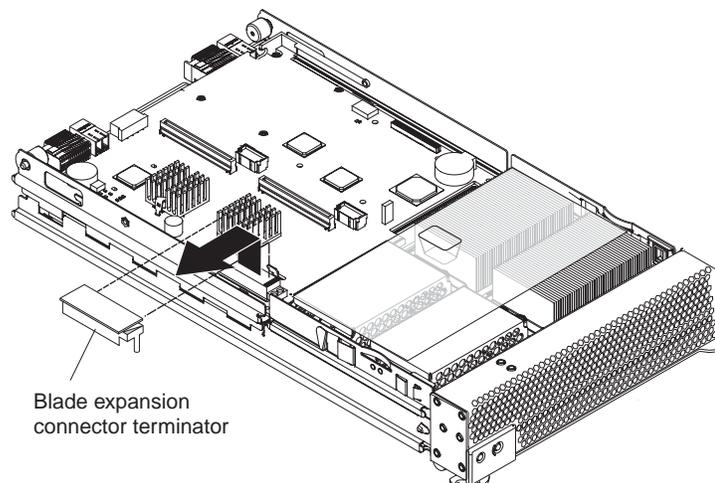
6. Before installing the SCSI storage expansion unit, check that all components are installed and seated correctly and that you have not left loose tools or parts inside the blade server.

   Attention: To help ensure proper cooling and system reliability the air baffle must be correctly positioned and fully seated.

7. Make sure that the air baffle covering microprocessor 1 and microprocessor 2, is positioned and pushed down so that both heat sink captive mounting screws are through the holes in the air baffle.

Air baffle

Microprocessor 1 and 4
heat sink captive mounting screws
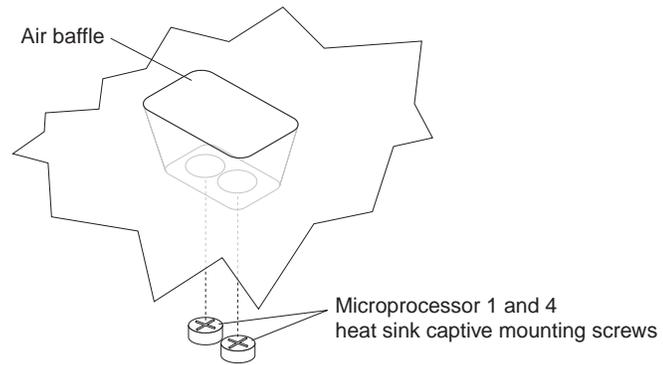
8. Install the SCSI storage expansion unit:

Attention: Install only a SCSI storage expansion unit that is specified for use with the BladeCenter HS40 Type 8839 blade server. Compatible SCSI storage expansion units do not have a shield, as shown in the following illustration.

Use SCSI storage expansion unit with no shield

Do not use SCSI storage expansion with shield

No shield

Shield
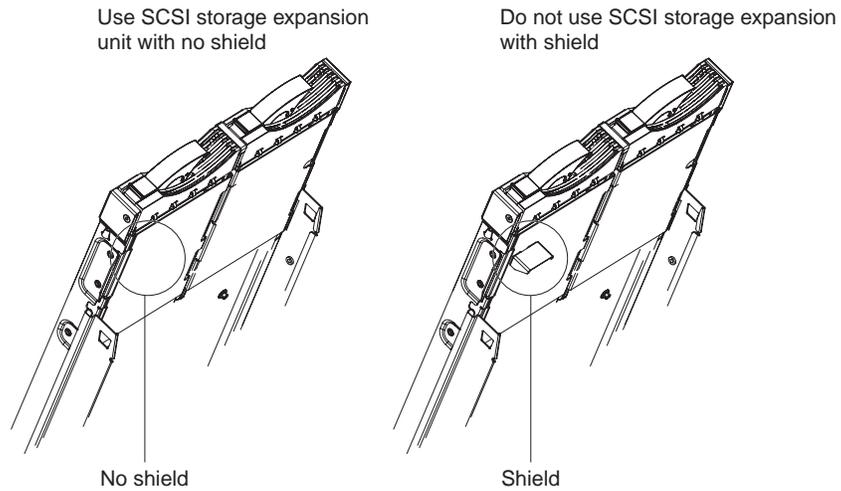
a. Orient the storage expansion unit as shown in the following illustration.

SCSI storage expansion unit

Cover pins

Air baffle
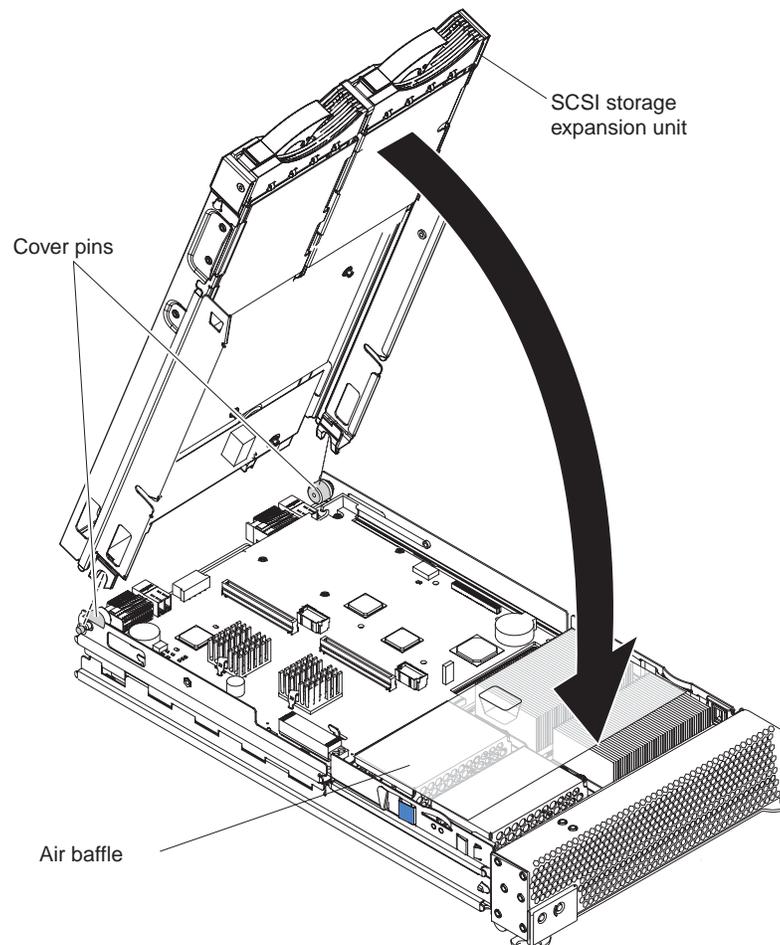
b. Lower the storage expansion unit so that the slots at the rear slide down onto the cover pins at the rear of the blade server.

c. Pivot the storage expansion unit closed and press it firmly into place until the blade-cover releases click. The connector on the expansion unit automatically aligns with and connects to the blade expansion connector (J3A1) on the processor board.
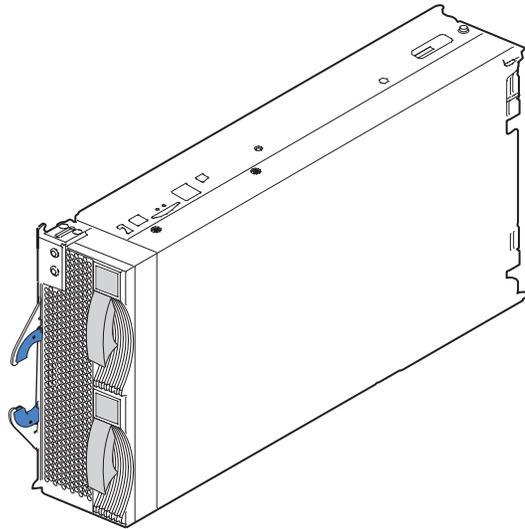
9. Insert the combined blade and expansion unit into three adjacent BladeCenter unit bays.
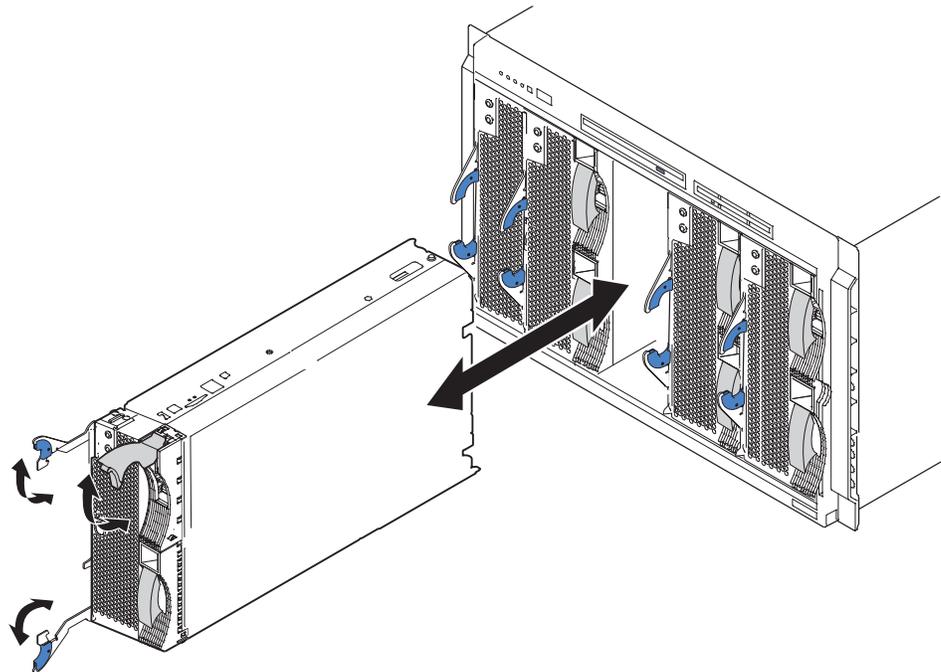
Note: When any blade server or option is in blade bay 7 through 14 (in the BladeCenter unit) or blade bay 5 through 8 (in the BladeCenter T unit), power modules must be present in all four power bays.

10. Turn on the blade server.

11. If you have not already done so, install the LSI SCSI device drivers for your operating system. LSI device drivers are on the *ServerGuide Setup and*

Installation CD that comes with the blade server. You can also get the latest version of the drivers from the IBM Support Web site at http://www.ibm.com/pc/support/.

With the storage expansion unit installed on your blade server, you can install up to two hot-swap SCSI hard disk drives in the expansion unit and configure them for embedded mirroring (RAID level 1). Each SCSI device must have a unique SCSI ID. This ID enables the SCSI controller in the expansion option to identify the device and ensure that different devices on the same SCSI channel do not attempt to transfer data simultaneously. The SCSI IDs for the hard disk drives in the expansion unit are permanent (not configurable). Table 2 lists the SCSI IDs for the hard disk drives that are installed in the expansion unit. See "Installing a SCSI hot-swap hard disk drive" for instructions for installing hard disk drives.

Table 2. SCSI IDs for hot-swap hard disk drives in the expansion unit

Device	SCSI ID
Drive bay 1	0
Drive bay 2	1

Note: SCSI ID 7 is usually reserved for the SCSI controller; however, this SCSI ID is changeable through the ServeRAID™ configuration program or the LSI configuration utility program.

Use the Configuration/Setup Utility program in the blade server to enable or disable the SCSI controller in the storage expansion unit. See the documentation that comes with the storage expansion unit for information about configuring the storage expansion unit and SCSI hard disk drives.

Installing a SCSI hot-swap hard disk drive

If you have installed a SCSI storage expansion unit on the blade server, you can install up to two SCSI hot-swap hard disk drives in the bays in the expansion unit.

If a hot-swap hard disk drive in the expansion unit fails, you can replace it without turning off the blade server. Therefore, you have the advantage of continuing to operate your blade server while a hard disk drive in this unit is removed or installed.

Each hot-swap drive has two indicator LEDs. If the amber hard disk drive status LED for a drive is lit continuously, that drive is faulty and must be replaced.

Each hot-swap drive that you plan to install must be mounted in a hot-swap-drive tray. The drive must have a Single Connector Attachment (SCA) connector. Hot-swap-drive trays come with hot-swap drives.

The following illustration shows how to install a SCSI hot-swap hard disk drive.

Note: The illustrations used in this procedure depict the installation process on a BladeCenter HS40 blade server in a BladeCenter Type 8677 unit. These illustrations might differ slightly from your hardware. However, this installation process is the same regardless of the BladeCenter unit.

Filler panel

Blade

Drive handle
(in open position)

Storage
expansion unit
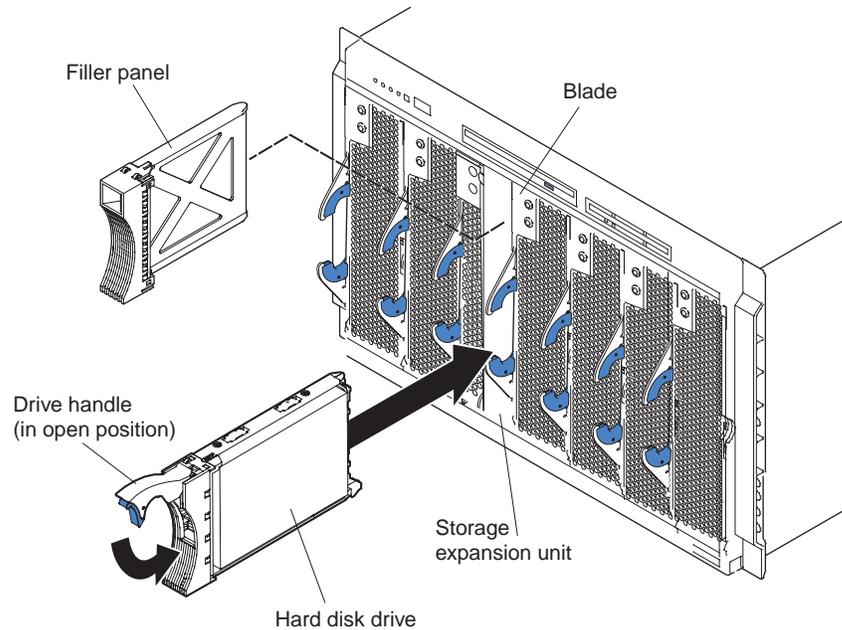
Hard disk drive

Complete the following steps to install a drive in a storage expansion unit.

Attention: To maintain proper system cooling, do not operate the BladeCenter unit for more than 1 minute without either a hot-swap hard disk drive or a filler panel installed in each storage expansion unit bay.

1. Read the safety information beginning on page vii and "Installation guidelines" on page 21.
2. Remove the filler panel from one of the empty hot-swap bays by inserting your finger into the depression at the top of the filler panel and pulling it away from the expansion unit.
3. Install the SCSI hot-swap hard disk drive:
   a. Make sure that the tray handle is open (that is, perpendicular to the hard disk drive).
   b. Align the hard disk drive assembly with the guide rails in the bay.
   c. Gently push the hard disk drive assembly into the bay until the drive stops.
   d. Push the tray handle to the closed (locked) position.
   e. Check the hard disk drive LEDs to make sure that the hard disk drive is operating correctly.
      • If the amber hard disk drive status LED for a hard disk drive is lit continuously, that hard disk drive is faulty and needs to be replaced.
      • If the green hard disk drive activity LED is flashing, the hard disk drive is being accessed.

See the documentation that comes with the expansion unit for information about configuring the expansion unit and SCSI hard disk drives.

Replacing a SCSI hot-swap hard disk drive

If a hard disk drive in the storage expansion unit fails, you can replace it without turning off the blade server.

Complete the following steps to replace a SCSI hot-swap hard disk drive in a storage expansion unit hot-swap bay.

Note: The illustrations used in this procedure depict the installation process on a BladeCenter HS40 blade server in a BladeCenter Type 8677 unit. These illustrations might differ slightly from your hardware. However, this installation process is the same regardless of the BladeCenter unit.
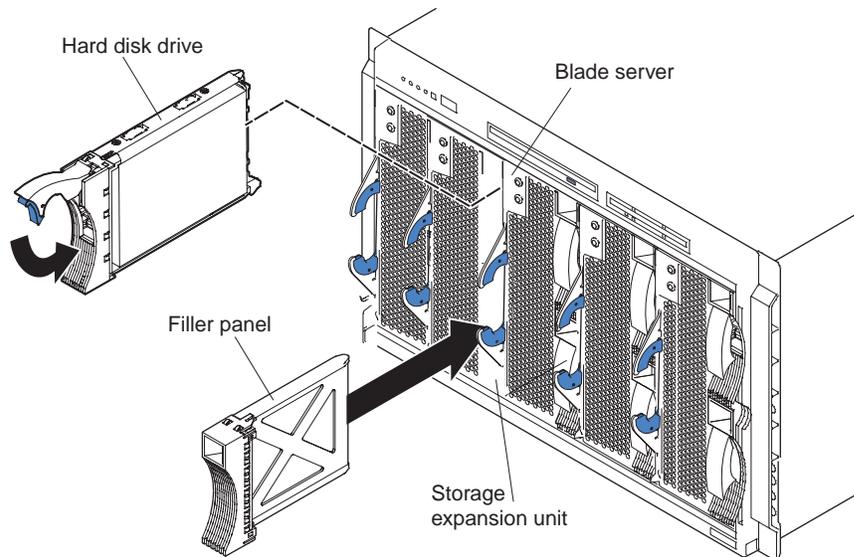
Attention: To maintain proper system cooling, do not operate the BladeCenter unit for more than 1 minute without either a hot-swap hard disk drive or a filler panel installed in each storage expansion unit bay.

1. Read the safety information beginning on page vii and "Installation guidelines" on page 21.
2. Locate the defective hard disk drive (look for an amber status LED on the front of the hard disk drive).
3. Make sure that the hard disk drive has stopped spinning.
4. Move the handle on the hard disk drive to the open position (perpendicular to the hard disk drive), and pull the hot-swap hard disk drive assembly from the bay.
5. Within 1 minute, install the replacement hard disk drive in the hot-swap bay (see "Installing a SCSI hot-swap hard disk drive" on page 40 for instructions).

Replacing the battery

IBM has designed this product with your safety in mind. The lithium battery must be handled correctly to avoid possible danger. If you replace the battery, you must adhere to the following instructions.

Note: In the U. S., call 1-800-IBM-4333 for information about battery disposal.

If you replace the original lithium battery with a heavy-metal battery or a battery with heavy-metal components, be aware of the following environmental consideration. Batteries and accumulators that contain heavy metals must not be disposed of with normal domestic waste. They will be taken back free of charge by the manufacturer, distributor, or representative, to be recycled or disposed of in a proper manner.

To order replacement batteries, call 1-800-426-7378 within the United States, and 1-800-465-7999 or 1-800-465-6666 within Canada. Outside the U.S. and Canada, call your IBM reseller or IBM marketing representative.

Note: After you replace the battery, you must reconfigure your blade server and reset the system date and time.
Statement 2:

CAUTION:
When replacing the lithium battery, use only IBM Part Number 16G8095 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.

Complete the following steps to replace the battery:

1. Read the safety information beginning on page vii and "Installation guidelines" on page 21.
2. Follow any special handling and installation instructions supplied with the battery.
3. Turn off the blade server and remove the blade from the BladeCenter unit (see "Removing the blade server from the BladeCenter unit" on page 22 for instructions).
4. Open the blade server cover (see "Opening the blade server cover" on page 24 for instructions) and lift it off the blade server.
5. Locate the battery on the I/O board.
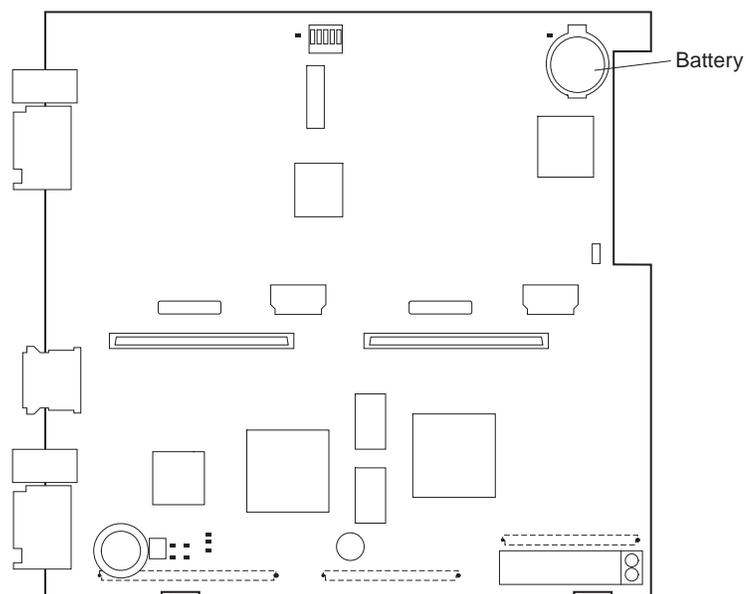
6. Remove the battery:

a. Use your fingers to pinch the battery retainer; then, rotate the battery up and out from its socket.

b. Use your fingernail to slide the battery out from under the battery clip.
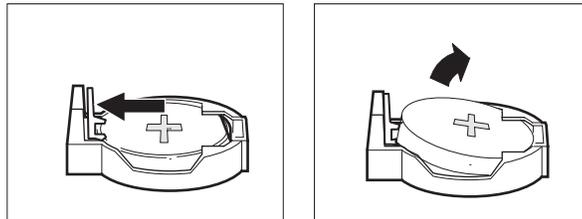
7. Insert the new battery:

a. Tilt the battery so that you can insert it into the socket, under the battery clip.

b. As you slide it under the battery clip, press the battery down into the socket until the battery retainer secures it in place.
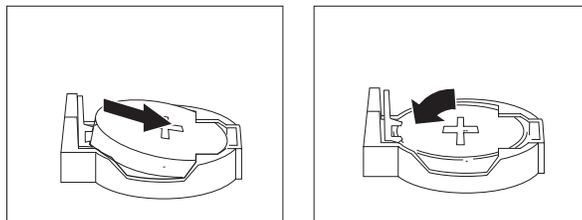
8. Close the blade server cover (see "Closing the blade server cover" on page 46).

   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.

9. Reinsert the blade server into the bay in the BladeCenter unit.

10. Turn on the blade server.

11. Start the blade server Configuration/Setup Utility program and set configuration parameters as needed (see "Using the Configuration/Setup Utility program" on page 51 for information).

Completing the installation

To complete the installation, perform 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 blade server bezel assembly" on page 45).

   Attention: To help ensure proper cooling and system reliability the air baffle must be correctly positioned and fully seated.

2. Close the blade server cover, unless you installed the SCSI storage expansion unit option (see "Closing the blade server cover" on page 46).

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.

3. Reinstall the blade server into the BladeCenter unit (see "Installing the blade server in the BladeCenter unit" on page 47).

4. Turn on the blade server (see "Turning on the blade server" on page 17).

   Note: Reinstall the bezel assembly on the BladeCenter T unit after you have finished installing the blade servers (see the *BladeCenter T Types 8720 and 8730 Installation and User's Guide* for detailed instructions about reinstalling the bezel assembly). However, if you installed an option such as a PCI I/O Expansion Unit with PCI adapters that require cables, you will not be able to install the bezel assembly, which contains an air filter for the BladeCenter T unit. If you require an air filter, a filter must be provided on the rack.

5. For certain options, run the blade server Configuration/Setup Utility program (see "Updating your blade server configuration" on page 50).

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

Installing the blade server bezel assembly

Complete the following steps to install the blade server bezel assembly.

1. Read the safety information beginning on page vii and "Installation guidelines" on page 21.

2. Connect the control-panel cable to the control-panel connector on the processor board.
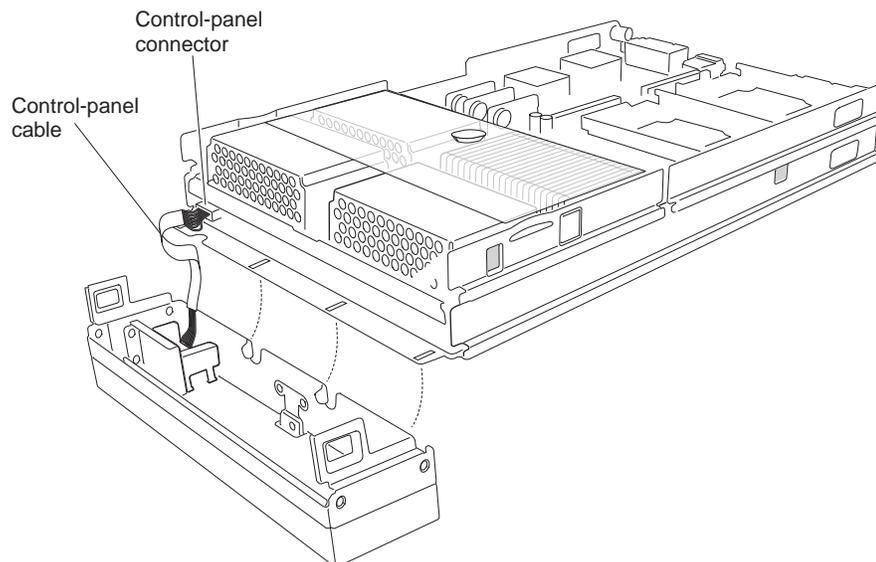
3. Insert the tabs on the bottom of the bezel up into the matching holes on the server chassis; then, rotate the top of the bezel toward the server until the tabs at the top of the bezel snap into place.
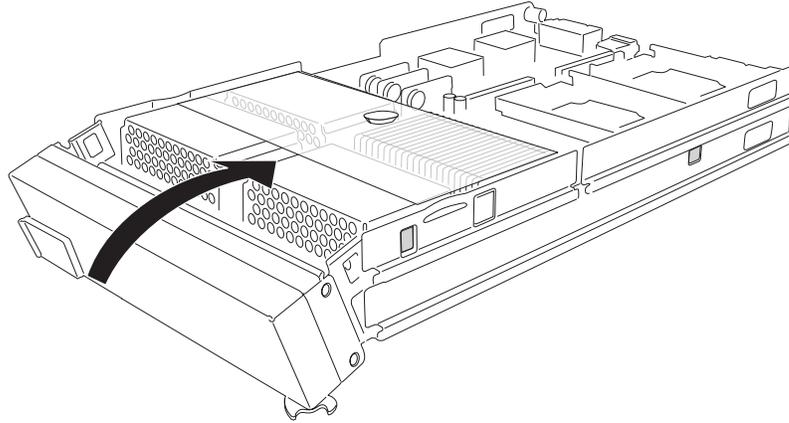
Closing the blade server cover

Important: The blade server cannot be inserted 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.
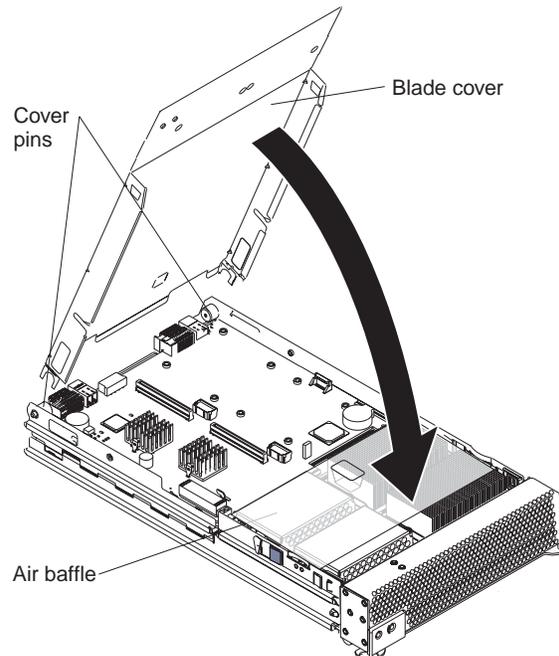
Complete the following steps to close the blade server cover:

1. Read the safety information beginning on page vii and "Installation guidelines" on page 21.
2. If you removed the blade bezel assembly, replace it now. See "Installing the blade server bezel assembly" on page 45 for instructions.
3. Before closing the cover, check that all components are installed and seated correctly and that you have not left loose tools or parts inside the blade server.

Attention: To help ensure proper cooling and system reliability the air baffle must be correctly positioned and fully seated.

4. Make sure that the air baffle covering microprocessor 1 and microprocessor 4, is positioned and pushed down so that both heat sink captive mounting screws are through the holes in the air baffle.

Air baffle

Microprocessor 1 and 4
heat sink captive mounting screws
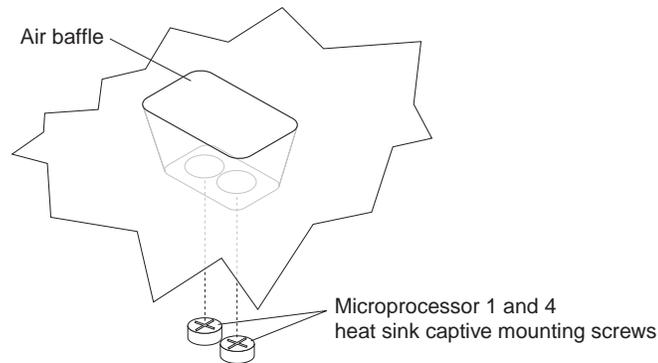
5. Lower the cover so that the slots at the rear slide down onto the cover pins at the rear of the blade server, as shown in the illustration.
6. Pivot the cover to the closed position as shown in the illustration, until it clicks into place.

Installing the blade server in the BladeCenter unit

Note: The illustrations used in this procedure depict the installation process on a BladeCenter HS40 blade server in a BladeCenter Type 8677 unit. These illustrations might differ slightly from your hardware. However, this installation process is the same regardless of the BladeCenter unit.

Blade server

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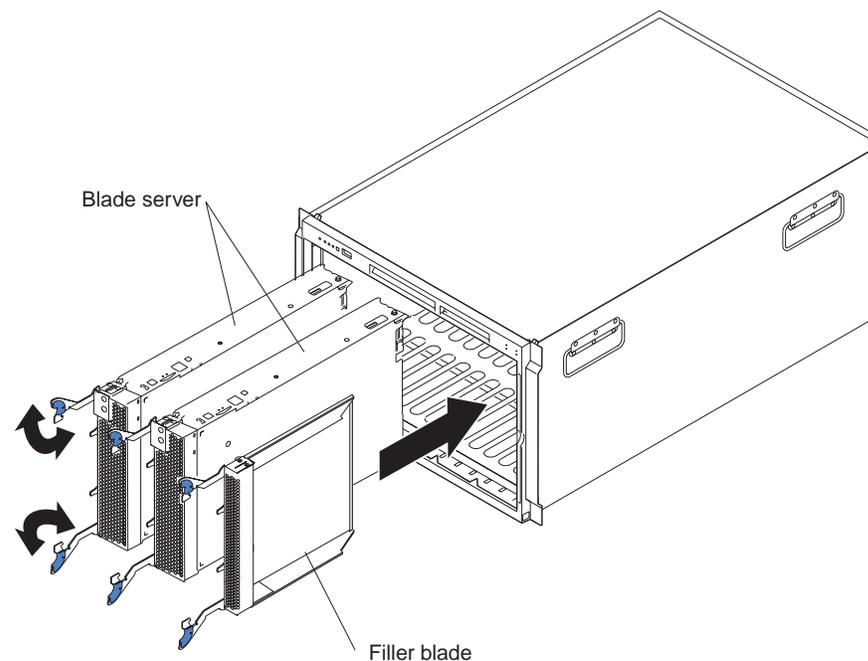
Complete the following steps to install a blade server in the BladeCenter unit.

Statement 21:

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

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

1. Read the safety information beginning on page vii and "Installation guidelines" on page 21 through "Handling static-sensitive devices" on page 21.
2. If you have not done so already, install any required options, such as microprocessors or memory, in the blade server.
3. Select the bays for the blade server.

    Notes:
    a. The HS40 blade server requires two adjacent bays.
    b. If the blade server has a SCSI storage expansion unit installed on it, the blade server and expansion option require three adjacent bays.
    c. When any blade server or option is in blade bay 7 through 14 (in the BladeCenter unit) or blade bay 5 through 8 (in the BladeCenter T unit), power modules must be present in all four power bays.

    Attention: To help ensure proper cooling, performance, and system reliability, make sure that each of the blade bays on the front of the BladeCenter unit has a blade server, expansion unit, or filler blade installed. Do not operate the BladeCenter unit for more than 1 minute or the BladeCenter T unit for more than 20 minutes without either a blade server, expansion unit, or filler blade installed in each blade bay.

4. Make sure that the release levers on the blade server are in the open position (perpendicular to the blade).
5. Slide the blade server into the bay until it stops. The spring-loaded doors further back in the bay that cover the bay opening move out of the way as you insert the blade server.
6. Push the release levers on the front of the blade server closed.
7. Turn on the blade server. See "Turning on the blade server" on page 17 for instructions.
8. Make sure that the power-on LED on the blade control panel is lit continuously, indicating that the blade server is receiving power and is turned on.
9. Write identifying information on one of the user labels that comes with the blade server; then, place the label on the BladeCenter unit bezel just below the blade server, as shown in the following illustration.
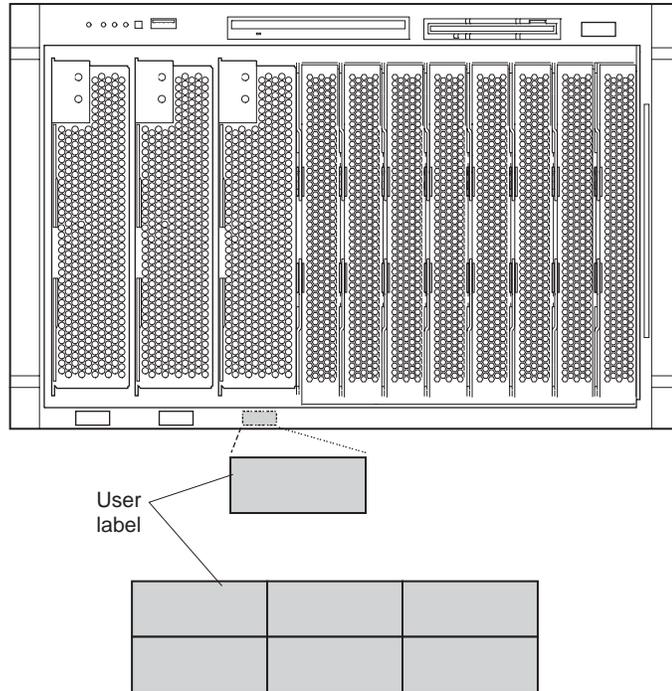
Important: Do not place the label on the blade server itself or in any way block the ventilation holes on the blade server.

The following illustration shows the placement of the label, just to the side of the blade server, on the BladeCenter T unit.
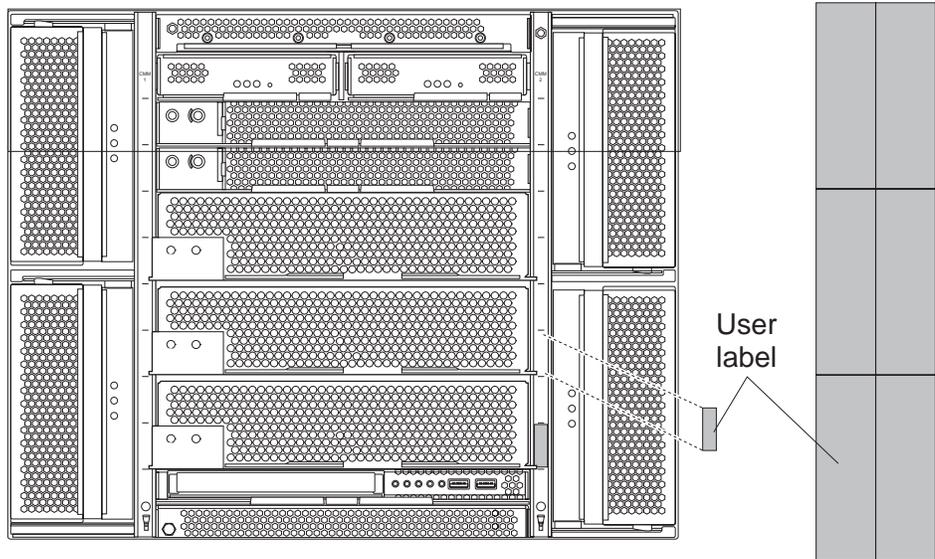
10. If you have other blades to install, do so now.

   Note: Reinstall the bezel assembly on the BladeCenter T unit after you have finished installing the blade servers (see the *BladeCenter T Types 8720 and 8730 Installation and User's Guide* for detailed instructions about reinstalling the bezel assembly). However, if you installed an option such as a PCI I/O Expansion Unit with PCI adapters that require cables, you will not be able to install the bezel assembly, which contains an air filter for the BladeCenter T unit. If you require an air filter, a filter must be provided on the rack.

If this is the initial installation for a blade server in the BladeCenter unit, you must configure the blade server with the blade server Configuration/Setup Utility and install the blade server operating system. See "Updating your blade server configuration" and Chapter 5, "Installing the operating system," on page 63 for details.

Updating your blade server configuration

When you start your blade server for the first time after you add or remove an internal option or external SCSI device (if the storage expansion unit has been installed), you might receive a message that the configuration has changed. The blade server Configuration/Setup Utility program starts automatically so that you can save the new configuration settings. For more information, see "Using the Configuration/Setup Utility program" on page 51.

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

If your blade server comes with more than one microprocessor or if your blade server comes with one microprocessor and you have installed additional microprocessors, your blade server might be able to operate as an SMP server. You might need to upgrade the operating system to support SMP. For more information, see Chapter 5, "Installing the operating system," on page 63 and your operating-system documentation.

Input/output connectors and devices

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

The blade server has two selection buttons on the control panel: the CD/diskette/USB select button and the keyboard/mouse/video select button. See "Controls and LEDs" on page 18 for information about these buttons and their functions.

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

Chapter 4. Configuring your blade server

The following configuration programs come with your blade server:

- **Configuration/Setup Utility program**

  The Configuration/Setup Utility program is part of the basic input/output system (BIOS) code in your blade server. Use it to change interrupt request (IRQ) settings, set the date and time, and set passwords. See "Using the Configuration/Setup Utility program" for more information.

- **IBM ServerGuide Setup and Installation CD**

  The ServerGuide program provides software-setup tools and installation tools that are designed for your blade server. Use this CD during the installation of your blade server to configure basic hardware features, such as a SCSI controller with RAID capabilities, and to simplify the installation of your operating system. For information about using this CD, see "Using the ServerGuide Setup and Installation CD" on page 54.

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

  The PXE boot agent utility program is part of the BIOS code in your server. Use it to change network startup (boot) protocols and startup order and to select operating-system wake-up support. For information about using this utility program, see "Using the PXE boot agent utility program" on page 56.

The following product is available for purchase:

- **IBM Remote Deployment Manager (RDM) Version 4.11 Update 3 or later**

  You can use the IBM RDM Version 4.11 Update 3 or later to install a BIOS code update onto the blade server. For information about using this product, see "Using RDM Version 4.11 Update 3 or later" on page 64.

  To determine if your operating system supports the RDM program or for updated information about RDM and information about purchasing the software, go to http://www.ibm.com/pc/ww/eserver/xseries/systems_management/index.html.

  For information about setting up your network configuration for remote management, such as with the IBM Director products, depending on your blade server, see the *IBM @server BladeCenter Planning and Installation Guide* or the *IBM @server BladeCenter T Planning and Installation Guide*. You can obtain the planning guides from http://www.ibm.com/pc/support/.

Using the Configuration/Setup Utility program

This section provides the instructions to start the Configuration/Setup Utility program and descriptions of the menu choices.

Starting the Configuration/Setup Utility program

Complete the following steps to start the Configuration/Setup Utility program:

1. Turn on the blade server and watch the monitor screen.
2. When the prompt `Press F1 for Configuration/Setup` appears, press F1.
3. Select settings to view or change.

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 your 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.

- **System Information**

  Select this choice to display information about your blade server, such as: the machine type and model of your 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). 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.

- **Devices and I/O Ports**

  Select this choice to enable or disable the Ethernet controllers. **Enable** is the default setting for the Ethernet controller. If you disable a device, it cannot be configured, and the operating system will not be able to detect it (this is equivalent to disconnecting the device). If you disable the Ethernet controller, the blade server will have no Ethernet capability.

  - **Remote Console Redirection**

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

  - **System MAC Addresses**

    Select this choice to set and 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 or change the password (see "Using passwords" on page 54 for more information).

- **Start Options**

  Select this choice to view or change the start options. Start options take effect when you start your blade server. You can set keyboard operating characteristics, such as whether the blade server starts with the keyboard number lock on or off. You can also enable a virus-detection test that checks for changes in the boot record when the blade server starts.

  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 BladeCenter management-module Web interface. You can enable the blade server to run without a diskette drive or keyboard. The Extensible Firmware Interface (EFI) start option should not be selected for any of the startup or boot device fields.

If the EFI is accidentally started, after the boot process is complete type Ctrl+Alt+Delete at the `Shell >` prompt; then, press F1 when the prompt `Press F1 for Configuration/Setup` appears and remove EFI as a startup option in the **Startup Options → Startup Sequence** screen.

- **Advanced Setup**

  Select this choice to change settings for advanced hardware features.

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

  – **Memory Settings**

    Select this choice to check memory status and to adjust other memory settings.

    If a memory error is detected during POST or memory configuration, the blade server automatically disables the failing memory pair and continues operating with reduced memory. After the problem is corrected, you must enable **Retesting of Disabled DIMMs**. This will cause the disabled memory connectors to be retested during POST and enabled if they are operating correctly.

    To maintain optimum system operation in the event of a memory failure, you can enable the **Hot Spare Row** feature. This feature removes the failed memory from the system configuration and activates a Hot Spare Memory pair of DIMMs to replace the failed memory pair of DIMMs. Before you can enable the Hot Spare Memory feature, at least two pairs of DIMMs must be installed in the blade server that adhere to the special requirements described in "Installing memory modules" on page 27.

  – **CPU Options**

    Select this choice to enable or disable hyper-threading and adjust microprocessor performance settings. If enabled, hyper-threading will only be active if it is supported by your operating system.

  – **PCI Bus Control**

    Select this choice to view and configure the master-latency-timer value for the blade server.

  – **USB Configuration**

    Select this choice to enable and configure USB devices. All devices in the BladeCenter media tray and the BladeCenter keyboard and mouse are viewed as USB devices by the blade server.

  – **FRB**

    Select this choice to configure the blade server Integrated System Management Processor (ISMP), including how the ISMP responds to POST errors, the time limit for blade server expansion option detection, and blade server microprocessor detection and activation.

- **Error Logs**

  Select this choice to enable and clear the blade server error and event logs. Error and event logs are viewed using the BladeCenter management-module Web interface. See the *BladeCenter Management Module User's Guide* on the IBM *BladeCenter Documentation* CD or the *BladeCenter T Management Module User's Guide* on the IBM *BladeCenter T Documentation* CD for information and instructions.

- **Save Settings**

  Select this choice to save the changes you have made in the settings and exit from the Configuration/Setup Utility program.

- **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 without saving the changes you might have made in the settings.

Using passwords

From the **System Security** choice, you can set, change, and delete the supervisor password. You can also set when this password needs to be entered. If you set the password to **Power-on**, you must type the password to complete the system startup. Setting the password to **Setup** restricts access to the Configuration/Setup Utility program.

You can use any combination of up to six 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 password, change the position of the power-on password clear switch (switch 2 on switch block S6H1 on the I/O board) to clear the power-on password. Shut down the operating system, turn off the blade server, and remove the blade server from the BladeCenter unit to access the switches. After you change the position of the switch, you can start the Configuration/Setup Utility program and change the power-on password the next time the server is turned on. Move the switch back to the previous position after the password is changed. See "Switches and jumpers" on page 16 for the location of switch block 2.

Using the ServerGuide Setup and Installation CD

The *ServerGuide Setup and Installation* CD includes an easy-to-use setup and installation program that is designed for your 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/pc/coupon/.

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

- ServeRAID Manager program, which configures your SCSI controller with RAID capabilities
- Device drivers that are provided for your 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 your operating-system CD to install your operating system.

The ServerGuide program has the following features:
- Sets system date and time
- Detects the SCSI RAID adapter, controller, or integrated SCSI controller with RAID capabilities and runs the SCSI RAID configuration program (with LSI chip sets for ServeRAID adapters only)
- Checks the microcode (firmware) levels of a ServeRAID adapter and determines whether a later level is available from the CD
- 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 your 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 your blade server model. On a blade server with an optional SCSI storage expansion unit, you can run the SCSI RAID configuration program to create logical drives.

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 your installation time. The ServerGuide program provides the device drivers that are required for your

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 your 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 your operating-system selection and the installed hard disk drives.

4. The ServerGuide program prompts you to insert your 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 your operating system without ServerGuide

If you have already configured the blade server hardware and you decide not to use the ServerGuide program to install your 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/pc/support/.

2. In the **Download** section, click **Downloads & drivers**.

3. On the "Downloads and drivers" page, in the **Brand** field, select **Servers**.

4. In the **Family** field, select **BladeCenter HS40**.

5. Click **Continue**.

6. In the **View by document type** field, select **OS installation**.

7. Select the instructions for your operating system.

Using the PXE boot agent utility program

This program is a built-in, menu-driven configuration utility program that you can use to select the boot protocol and other boot options and select a power management option.

Note: The RPL selection for the boot protocol option is not supported for this server.

Complete the following steps to start the PXE boot agent utility program:

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 enable the Ethernet PXE/DHCP option.

3. Use the arrow keys and 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 will periodically make firmware updates available for your blade server. Use the following table to determine the methods you can use to install these firmware updates.

Firmware	Update diskette	RDM	Update *Xpress*	Management-module Web interface	Switch-module Web interface	Switch-module Telnet interface
Blade server BIOS code	Yes	Yes	Yes	No	No	No
Blade server diagnostic code	Yes	Yes [1]	Yes	No	No	No
Blade server service processor code	Yes	Yes	Yes	Yes	No	No
[1] You must set up a custom task.						

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

The service processor in your blade server provides the following features:
- Continuous health monitoring and control
- Configurable notification and alerts
- Event logs that are timestamped, saved in nonvolatile memory, and can be attached to e-mail alerts
- Remote graphics console redirection
- Point-to-point protocol (PPP) support
- Remote power control
- Remote firmware update and access to critical server settings
- Around-the-clock access to the blade server, even if the server is turned off

At some time, you might need to flash the service processor to apply the latest firmware. Download the latest firmware for your blade server service processor from the IBM Support Web site at http://www.ibm.com/pc/support/. Use the BladeCenter management-module Web interface to flash the service processor. The Web interface is described in the IBM @server *BladeCenter Type 8677 Installation and User's Guide* on the IBM *BladeCenter Documentation* CD and IBM @server *BladeCenter T Types 8720 and 8730 Installation and User's Guide* on the IBM *BladeCenter T Documentation* CD.

Configuring the Gigabit Ethernet controllers

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

that is installed. See "Blade server Ethernet controller enumeration" for information about how to determine the routing from Ethernet controller to I/O-module bay for your 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 this BladeCenter HS40 Type 8839 blade server might have different Ethernet controller routing. See the documentation that comes with the other blade servers for detailed information.

You do not need 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 your Ethernet controllers, see the *Intel Ethernet Software CD* that comes with your blade server. For updated information about configuring the controllers, go to the IBM Support Web site at http://www.ibm.com/pc/support/.

Your Ethernet controllers support failover, which provides automatic redundancy for your Ethernet controllers. Without failover, you can have 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. Any 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, a secondary controller takes over. When the primary link is restored, the Ethernet traffic switches back to the primary Ethernet controller. (See your 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 a blade server uses through your 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 **Switch Tasks → Management → Advanced Switch 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. If you can ping the external computer, the Ethernet controller that you enabled is associated with the switch module in I/O-module bay 1. The other Ethernet controller in the blade server is associated with the switch module in I/O-module bay 2.

If you have installed an I/O expansion card on a blade server, communications from the option are routed to I/O-module bays 3 and 4. You can verify which controller on

the card is routed to which I/O-module bay by performing the same test, using a controller on the I/O expansion card and a compatible switch module or pass-thru module in switch bay 3 or 4.

Command-line interface and serial over LAN

The IBM @server BladeCenter Management Module Command-Line Interface provides direct access to BladeCenter management functions as an alternative to using the management-module Web interface. Using the command-line interface, you can issue commands to control the power and configuration of the blade server and other components installed in the BladeCenter unit. The command-line interface also provides access to the text-console command prompt for your blade server through a serial over LAN (SOL) connection. See the *IBM @server BladeCenter Management Module Command-Line Interface User's Guide* and the *IBM @server BladeCenter Serial Over LAN Setup Guide* for information and instructions.

Configuring an IDE RAID

Note: Configuring an IDE RAID only applies to a blade server that has two IDE hard disk drives installed.

You can configure an IDE redundant array of independent disks (RAID) array for your blade server. Two IDE hard disk drives in the blade server can be used to implement and manage RAID level-0 (stripe) and RAID level-1 (mirror) arrays under operating systems that are listed on the ServerProven list at http://www.ibm.com/pc/compat/. For your blade server, you must configure IDE RAID in the following areas:

- In BIOS, using the Configuration/Setup Utility program, and the MegaRAID IDE Setup Utility program, which is part of the firmware in your server
- In your operating system, using the operating-system configuration tools and the MegaRAID IDEal Software RAID utility

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

Creating an IDE RAID array configuration

Complete the following steps to set up an IDE RAID array on your blade server.

Attention: Information that is stored on the IDE hard disk drives will be affected when the drives become part of a RAID array. If the IDE hard disk drives contain any information that you want to keep, back them up to another storage device.

1. Obtain the IDE RAID documentation and device drivers for your operating system from the IBM Support Web site at http://www.ibm.com/pc/support/.
2. Review your operating-system and MegaRAID IDE documentation for information about IDE hard disk drive RAID configuration. The latest version of the MegaRAID IDEal Software RAID Utility program and documentation are available for download from the IBM Support Web site at http://www.ibm.com/pc/support/.
3. Make sure that the operating system that you plan to install supports IDE RAID. Operating systems that support IDE RAID on your server type are listed on the ServerProven list at http://www.ibm.com/pc/compat/.

4. Make sure that two IDE hard disk drives are installed in the blade server (see the "Installing an IDE drive" on page 25 for instructions).

   Important: To avoid potential performance and reliability problems when configuring or replacing hard disk drives in a mirrored RAID configuration, make sure that the storage capacities and speeds of the hard disk drives are identical.

5. Create a diskette or CD containing the IDE RAID device drivers for your operating system. The latest IDE RAID device drivers for supported operating systems are available for download from the IBM Support Web site at http://www.ibm.com/pc/support/.

6. Complete the following steps to enable IDE RAID in BIOS using the Configuration/Setup Utility program:

   a. Turn on the blade server and watch the monitor screen.

   b. When the message `Press F1 for Configuration/Setup` appears, press F1.

   c. Select **Devices and I/O Ports** from the Configuration/Setup Utility main menu; then, select **IDE Configuration**.

   d. Set the IDE RAID feature to **Enabled** (the default setting is **Disabled**).

   e. Select **Save Settings** from the Configuration/Setup Utility main menu.

   f. Exit the Configuration/Setup Utility program, making sure that you save the settings. The blade server restarts automatically.

7. Complete the following steps to configure IDE RAID in BIOS using the MegaRAID IDE Setup Utility program:

   a. When the message `Press Ctrl+M to run MegaRAID IDE Setup Utility` appears, press Ctrl+M.

   b. From the MegaRAID IDE Setup Utility program, select the automatic configuration option (F1 or F2) for the type of RAID array you are setting up. You can also manually configure the RAID array (F4) using the MegaRAID IDE Setup Utility program; however, your blade server supports only RAID level-0 (stripe) or RAID level-1 (mirror). Attempting to manually configure any other type of RAID array will cause an error.

   c. Select **Initialize Array**; then, press Enter. Using the Spacebar, select the logical drives that will be part of the RAID array.

   d. Press F10 to save the changes and exit the MegaRAID IDE Setup Utility program. The blade server restarts automatically. Status messages that are displayed during restart indicate status of the RAID array.

8. Install the operating system on your blade server, making sure that you install the correct IDE RAID device drivers (see Chapter 5, "Installing the operating system," on page 63 for instructions). The latest IDE RAID device drivers and NOS installation instructions for supported operating systems are available for download from the IBM Support Web site at http://www.ibm.com/pc/support/.

   Note: Some operating systems allow device drivers to be installed only during a short period of time during operating-system setup; make sure you pay attention to all messages that are displayed. Use care when performing an unattended operating-system installation for IDE RAID.

9. Perform additional IDE RAID configuration that is required for your operating system or application, using the operating-system configuration tools and the MegaRAID IDEal Software RAID utility. See your operating-system documentation for information about using the operating-system tools for IDE hard disk drive RAID configuration. The latest version of the MegaRAID IDEal

Software RAID utility and IDE RAID device drivers for supported operating systems are available for download from the IBM Support Web site at http://www.ibm.com/pc/support/.

Deleting an IDE RAID array configuration

Complete the following steps to delete an IDE RAID array configuration on your blade server:

1. Turn on the blade server and watch the monitor screen.

   Note: If the blade server is turned on, restart the blade server.

2. When the message `Press Ctrl+M to run MegaRAID IDE Setup Utility` appears, press Ctrl+M.

3. From the MegaRAID IDE Setup Utility program, press F5 (the Delete Array option) to remove the array configuration.

4. Press F10 to save the changes and exit the MegaRAID IDE Setup Utility program. The blade server restarts automatically. Status messages that are displayed during restart indicate status of the RAID array.

5. Complete the following steps to disable IDE RAID in BIOS using the Configuration/Setup Utility program:

   a. Restart the blade server and watch the monitor screen.

   b. When the message `Press F1 for Configuration/Setup` appears, press F1.

   c. Select **Devices and I/O Ports** from the Configuration/Setup Utility main menu; then, select **IDE Configuration**.

   d. Set the IDE RAID feature to **Disabled**.

   e. Select **Save Settings** from the Configuration/Setup Utility main menu.

   f. Exit the Configuration/Setup Utility program, making sure that you save the settings. The blade server restarts automatically.

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 the Remote Deployment Manager (RDM) Version 4.11 Update 3 (or later) program to install a supported Microsoft Windows operating system or Red Hat Advanced Server 2.1.

  To determine if your operating system supports the RDM program or for updated information about RDM and information about purchasing the software, go to http://www.ibm.com/pc/ww/eserver/xseries/systems_management/index.html.

- Download the latest operating-system installation instructions from the IBM Support Web page at http://www.ibm.com/pc/support/ and install the operating system at the BladeCenter unit (local deployment).

  Note: 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, CD-ROM drive, and diskette drive. The BladeCenter unit uses USB for internal communication with these devices.

   Note: Unless otherwise stated, references to the BladeCenter unit also apply to the BladeCenter T unit.

2. Some operating systems, such as Red Hat Enterprise Linux, allow 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 is a PS/2-style device, communication with the mouse is through an internal USB bus in the BladeCenter chassis; therefore, the operating system in your blade server must recognize the mouse as a USB device.

3. If you are configuring a redundant array of independent disks (RAID) array for your server, you must create the RAID array *before* you install the operating system on your blade server.

Using the ServerGuide Setup and Installation CD

The *ServerGuide Setup and Installation* CD provides state-of-the-art programs to detect the blade server model and installed hardware options, configure the blade server hardware, provide device drivers, and help you install your operating system. For information about the supported operating-system versions, see the label on the CD.

Complete the following steps to start the *ServerGuide Setup and Installation* CD:

1. Press the CD/diskette/USB select button on the front of the blade server to associate the BladeCenter 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 67.

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 Version 4.11 Update 3 or later

You can use the RDM version 4.11 Update 3 (or later) program to install a supported Microsoft Windows operating system or Red Hat Advanced Server 2.1 on a blade server. Follow the instructions in the documentation that comes with the RDM program.

To determine if your operating system supports the RDM program or for updated information about RDM and information about purchasing the software, go to http://www.ibm.com/pc/ww/eserver/xseries/systems_management/index.html.

Downloading installation instructions

Complete the following steps to download the installation instructions:

1. Go to the IBM Support Web page at http://www.ibm.com/pc/support/.
2. From the **Browse by product** list on the IBM Support Web page, select **Servers**.
3. Under **Select your product**, from the **Family** list, select your server model; then, select **Continue**.
4. From the **View by document type** list, select **OS installation**. The available installation instructions are displayed.

Chapter 6. Solving problems

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

If you cannot locate and correct the problem using the information in this section, see the *BladeCenter HS40 Type 8839 Hardware Maintenance Manual and Troubleshooting Guide* on the IBM *BladeCenter Documentation* CD or the IBM *BladeCenter T Documentation* CD that comes with your blade server, and the "Server Support" flowchart in the front of this document.

Note: Unless otherwise stated, references to the BladeCenter unit also apply to the BladeCenter T unit.

Diagnostic tools overview

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

- **Beep codes and error messages**

  The beep codes indicate that the power-on self-test (POST) or the baseboard management controller (BMC) have detected a problem during startup. Error messages also appear during startup if POST detects a hardware-configuration problem. See "Beep code descriptions" on page 66, "POST error messages" on page 67, and the *BladeCenter HS40 Type 8839 Hardware Maintenance Manual and Troubleshooting Guide* on the IBM *BladeCenter Documentation* CD or the IBM *BladeCenter T Documentation* CD that comes with your blade server for more information.

- **Troubleshooting charts**

  These charts list problem symptoms and steps to correct the problems. See the "Troubleshooting charts" on page 68 for more information.

- **Diagnostic programs and error messages**

  Real Time Diagnostics tests the major components of your BladeCenter Unit, including the management modules, switch modules, CD-ROM drive, diskette drive, and your blade server, while the server operating system is running. Real Time Diagnostics can either be plugged into an existing IBM Director environment or installed without IBM Director present. For documentation and download information for the Real Time Diagnostics, go to http://www.ibm.com/servers/eserver/xseries/systems_management/xseries_sm.html.

  Notes:

  1. As of the date of this document, the *IBM Director* CD does not come with the BladeCenter T unit. If you have the BladeCenter T unit, see "IBM Director" on page 10 for more information.

  2. See the blade server *Hardware Maintenance Manual and Troubleshooting Guide* on the IBM *BladeCenter Documentation* CD or the IBM *BladeCenter T Documentation* CD that comes with your blade server for more information.

- **Light path diagnostics**

  Use the light path diagnostics to diagnose system errors quickly. See the "Light path diagnostics" on page 72 for more information.

Beep code descriptions

If POST or the BMC detects a problem during startup, it might emit one or more beep. You can use the following beep code descriptions to help diagnose and solve problems that are detected during startup. Beep codes indicating specific system problems are listed in the following tables. See "Diagnostics" in the *BladeCenter HS40 Type 8839 Hardware Maintenance Manual and Troubleshooting Guide* on the IBM *BladeCenter Documentation* CD or the IBM *BladeCenter T Documentation* CD that comes with your blade server for more information about the beep codes.

Table 3. POST beep code descriptions

Beep code	Descriptions of the POST beep codes
1, 2, or 3	Memory error. Complete the following steps if this problem occurs: 1. Make sure that the memory modules are installed correctly. 2. Turn off the blade server; then, restart the blade server. If the problem remains, call for service.
6 and 7	System error. Call for service.
5 short and 1 long	Memory error. Complete the following steps if this problem occurs: 1. Make sure that the memory modules are installed correctly. 2. Turn off the blade server; then, restart the blade server. If the problem remains, call for service.
6 short and 1 long	Memory error. Complete the following steps if this problem occurs: 1. Make sure that the memory modules are of the correct type and that they are installed correctly. 2. Turn off the blade server; then, restart the blade server. If the problem remains, call for service.
7 short and 1 long	System memory error. Call for service.

Table 4. BMC beep code descriptions

Beep code	Descriptions of the BMC beep codes
1-5-1-1	Microprocessor error. Complete the following steps if this problem occurs: 1. Make sure that the microprocessors are installed correctly. 2. Turn off the blade server; then, restart the blade server. If the problem remains, call for service.
1-5-2-2	No microprocessor detected. Complete the following steps if this problem occurs: 1. Make sure that the microprocessors are installed correctly. 2. Turn off the blade server; then, restart the blade server. If the problem remains, call for service.
1-5-2-3	Microprocessor error. Complete the following steps if this problem occurs: 1. Make sure that the microprocessors are of identical type and that they are installed correctly. 2. Turn off the blade server; then, restart the blade server. If the problem remains, call for service.
1-5-4-2	Power error. Complete the following steps if this problem occurs: 1. Remove the blade server from the BladeCenter unit; then, reinstall it and restart the blade server. 2. If the problem remains, call for service.
1-5-4-4	Power error. Complete the following steps if this problem occurs: 1. Remove the blade server from the BladeCenter unit; then, reinstall it and restart the blade server. 2. If the problem remains, call for service.

POST error messages

The following table provides an abbreviated list of the error messages that might appear during POST. See the "Diagnostics" in the *BladeCenter HS40 Type 8839 Hardware Maintenance Manual and Troubleshooting Guide* on the IBM *BladeCenter Documentation* CD or the IBM *BladeCenter T Documentation* CD that comes with your blade server for more information about the POST error messages.

Table 5. Abbreviated list of POST error messages

POST message	Failing device or problem found	Suggested action
Timer error (0000)	The real-time clock battery has failed.	Replace the battery or call for service.
CMOS date/time not set (0012)	The time of day has not been set.	Set the date and time.
Processor cache mismatch error (196) Processor speed mismatch error (198) Processor models are different (8196) CPU speed mismatch (8197)	Microprocessor mismatch	Install microprocessors of identical type.
Non-matching or missing DIMMs, user has not installed DIMMs correctly, or DIMM disabled by POST or user (289)	A failing DIMM was disabled.	Make sure that the DIMMs are supported by your blade server and that they are installed correctly.
Keyboard/interface error (004C)	Keyboard and keyboard controller	• Make sure that the keyboard/mouse/video select button LED on the front of the blade server is lit, indicating that the blade server is connected to the shared BladeCenter keyboard. • Make sure that the keyboard cable is connected to the BladeCenter unit and that nothing is resting on the keyboard keys.

ServerGuide problems

The following table lists problem symptoms and suggested solutions.

Table 6. ServerGuide Setup and Installation CD

Symptom	Suggested action
The *ServerGuide Setup and Installation* CD will not start.	• Make sure that the BladeCenter 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 SCSI RAID program cannot view all installed drives, or the operating system cannot be installed.	• Make sure that there are no duplicate SCSI IDs or IRQ assignments. • Make sure that the hard disk drive is connected correctly.

Table 6. ServerGuide Setup and Installation CD (continued)

Symptom	Suggested action
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.

Troubleshooting charts

The following tables list problem symptoms and suggested solutions. See the *BladeCenter HS40 Type 8839 Hardware Maintenance Manual and Troubleshooting Guide* on the IBM *BladeCenter Documentation* CD or the IBM *BladeCenter T Documentation* CD for more detailed troubleshooting charts. If you cannot find the problem in the troubleshooting charts, run the diagnostic programs. If you have run the diagnostic test programs, or if running the tests does not reveal the problem, call for service.

Memory problems

Symptom	Suggested action
The amount of system memory displayed is less than the amount of physical memory installed.	Make sure that: • The memory modules are seated correctly. • You have installed the correct type of memory. • If you changed the memory, you updated the memory configuration in the Configuration/Setup Utility program. • All banks of memory are enabled. The server might have automatically disabled a memory bank when it detected a problem, or a memory bank might have been manually disabled. Check in the POST error log for error message 289: • If the DIMM was disabled by a system-management interrupt (SMI), replace the DIMM. • If the DIMM was disabled by the user or by POST, run the Configuration/Setup Utility program and enable the DIMM. • If this error remains, replace the DIMM. If the problem remains, call for service.

Microprocessor problems

Symptom	Suggested action
The blade server emits a continuous tone during POST.	The startup (boot) microprocessor is not working correctly. Make sure that the startup microprocessor is seated correctly. If it is, replace the startup microprocessor. If the problem remains, call for service.

Monitor problems

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

Symptom	Suggested action
The monitor goes blank when you direct it to a working blade server, or it goes blank when you start some application programs in the blade servers.	Make sure that the monitor cable is connected to the video connector on the BladeCenter management module. Some IBM monitors have their own self-tests. If you suspect a problem with your monitor, see the information that comes with the monitor for adjusting and testing instructions. If you still cannot find the problem, try using the monitor with another blade server. If the problem remains, see the IBM *BladeCenter Type 8677 Hardware Maintenance Manual and Troubleshooting Guide* on the IBM *BladeCenter Documentation* CD or the IBM *BladeCenter T Types 8720 and 8730 Hardware Maintenance Manual and Troubleshooting Guide* on the IBM *BladeCenter T Documentation* CD.
The screen is blank.	Make sure that: • The keyboard/mouse/video select button LED on the front of the blade server is lit, indicating that the blade server is connected to the shared BladeCenter monitor. • The power cord is connected to the BladeCenter power module and a working electrical outlet. • The monitor cables are connected correctly. • The monitor is turned on and the brightness and contrast controls are adjusted correctly. **Important**: In some memory configurations, the 3-3-3 beep code might sound during POST, followed by a blank monitor screen. If this occurs and the **Boot Fail Count** feature in the **Start Options** of the Configuration/Setup Utility program is enabled (its default setting), you must restart the server three times to force the BIOS to reset the configuration settings to the default configuration (the memory connector or bank of connectors enabled). If the problem remains, call for service.
Only the cursor appears.	Make sure that the keyboard, video, and mouse on the BladeCenter unit have not been switched to another blade server. If the problem remains, call for service.
The monitor has screen jitter, or the screen image is wavy, unreadable, rolling, or distorted.	If the monitor self-tests show the monitor is working correctly, consider the location of the monitor. Magnetic fields around other devices (such as transformers, appliances, fluorescent lights, and other monitors) can cause screen jitter or wavy, unreadable, rolling, or distorted screen images. If this happens, turn off the monitor. Move the device and the monitor at least 300 mm (12 in.) apart and turn on the monitor. **Attention:** Moving a color monitor while it is turned on might cause screen discoloration. **Notes:** 1. To prevent diskette drive read/write errors, make sure that the distance between the monitor and diskette drives is at least 75 mm (3 in.). 2. Non-IBM monitor cables might cause unpredictable problems. 3. An enhanced monitor cable with additional shielding is available for the 9521 and 9527 monitors. For information about the enhanced monitor cable, see your IBM marketing representative or authorized reseller. If the problem remains, call for service.

Symptom	Suggested action
Wrong characters appear on the screen.	If the wrong language is displayed, update the firmware or operating system with the correct language in the blade server that has ownership of the monitor. If the problem remains, call for service.

Mouse problems

Symptom	Suggested action
The mouse does not work.	• Make sure that the keyboard/mouse/video select button LED on the front of the blade server is lit, indicating that the blade server is connected to the shared BladeCenter mouse. • Make sure that the mouse cable is securely connected to the BladeCenter management module and that the keyboard and mouse cables are not reversed. • Make sure that the mouse works correctly with other blade servers. • Make sure that the mouse is recognized as a USB device, not PS/2, by your blade server. Although the mouse is a PS/2-style device, communication with the mouse is through an internal USB bus in the BladeCenter unit. Some operating systems allow you to select the type of mouse during installation of the operating system. Select USB. If the problem remains, call for service.

Network connection problems

Symptom	Suggested action
One or more blade servers are unable to communicate with the network.	Make sure that: • The switch modules for the network interface being used are installed in the correct BladeCenter bays and are configured and operating correctly. See the IBM @server *BladeCenter Type 8677 Hardware Maintenance Manual and Troubleshooting Guide* on the IBM *BladeCenter Documentation* CD or the IBM *BladeCenter T Types 8720 and 8730 Hardware Maintenance Manual and Troubleshooting Guide* on the IBM *BladeCenter T Documentation* CD for details. • The settings in the switch module are appropriate for the blade server (settings in the switch module are blade server specific). If you installed an optional I/O expansion card, make sure that: • The option is designed for the blade server. See the "Server Support" flowchart on the cover for information about obtaining ServerProven™ compatibility information from the World Wide Web. • You followed the installation instructions that came with the option. • The option is installed correctly. • You have not loosened any other installed options or cables. • You updated the configuration information in the Configuration/Setup Utility program. Whenever memory or an option is changed, you must update the configuration. If the problem remains, call for service.

Option problems

Symptom	Suggested action
An IBM option that was just installed does not work.	Make sure that: • The option is designed for the blade server. See the "Server Support" flowchart on the cover for information about obtaining ServerProven compatibility information from the World Wide Web. • You followed the installation instructions that came with the option. • The option is installed correctly. • You have not loosened any other installed options or cables. If the problem remains, call for service.
An IBM option that used to work does not work now.	Make sure that all of the option hardware and cable connections are secure. If the option comes with its own test instructions, use those instructions to test the option. If the problem remains, call for service.

Power problems

Symptom	Suggested action

The blade server does not turn on.	1. Make sure that:
	
	  a. The power LED on the front of the BladeCenter unit is lit.
	
	  b. The LEDs on all the BladeCenter power modules are lit.
	
	  c. If the blade server or attached storage expansion unit is in blade bay 7 through 14 (in the BladeCenter unit) and blade bay 5 through 8 (in the BladeCenter T unit), power modules are in all four power bays.
	
	  d. The power-on LED on the blade server control panel is flashing slowly.
	    • If the power LED is flashing rapidly and continues to do so, the blade server is not communicating with the management module; reseat the blade server and go to step 3.
	    • If the power LED is off, either the blade bay is not receiving power, the blade server is defective, or the LED information panel is loose or defective.
	
	  e. Local power control for the blade server is enabled (use the BladeCenter management-module Web interface to verify), or the blade server was instructed through the management module (Web interface or IBM Director) to turn on.
	    Note: For more information about the IBM Director program, see "IBM Director" on page 10.
	
	2. If you just installed an option in the blade server, remove it, and restart the blade server. If the blade server now turns on, troubleshoot the option (see the documentation that comes with the option for information).
	
	3. Try another blade server in the blade bay; if it works, replace the faulty blade server.
	
	4. If the problem remains, call for service.

Service processor problems

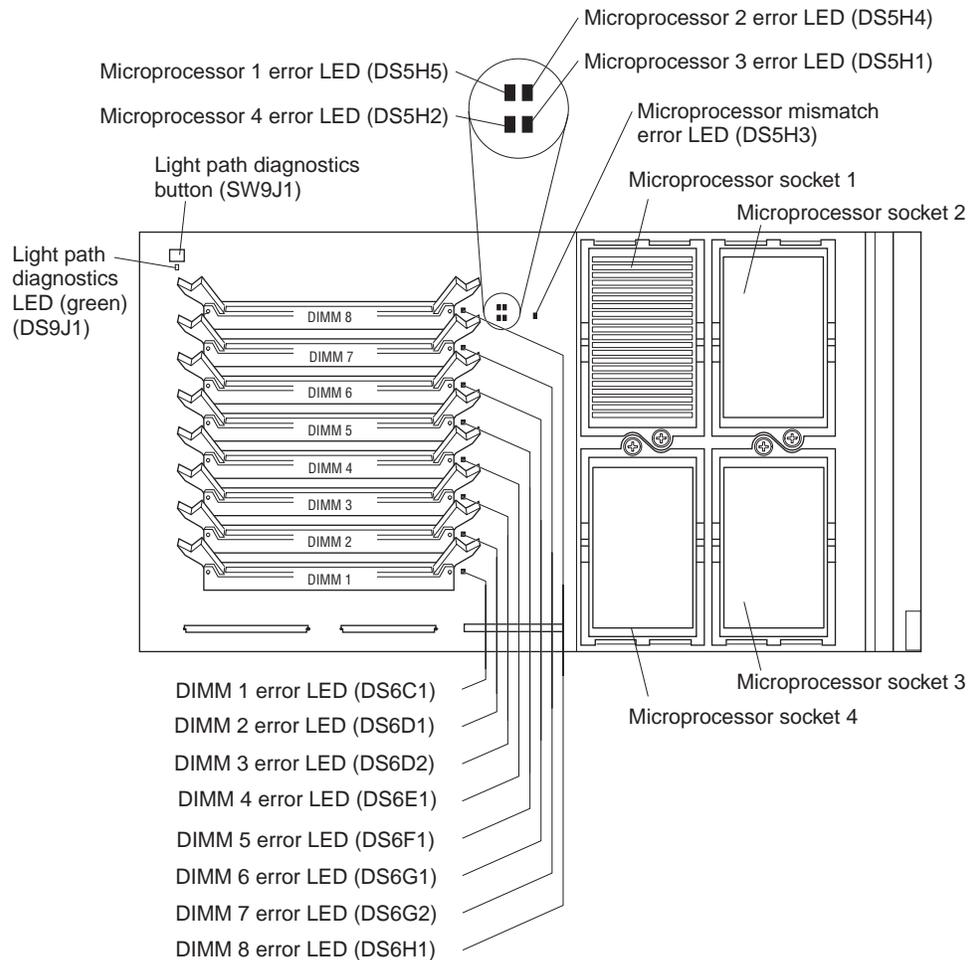| Symptom	Suggested action
The service processor reports a general monitor failure.	Shut down the operating system and turn off the blade server; then, remove the blade server from the BladeCenter unit, wait for 30 seconds, reinstall the blade server in the BladeCenter unit, and restart the blade server. If a problem remains, call for service.

Light path diagnostics

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 I/O board and processor board also might be lit. These LEDs help identify the cause of the problem.
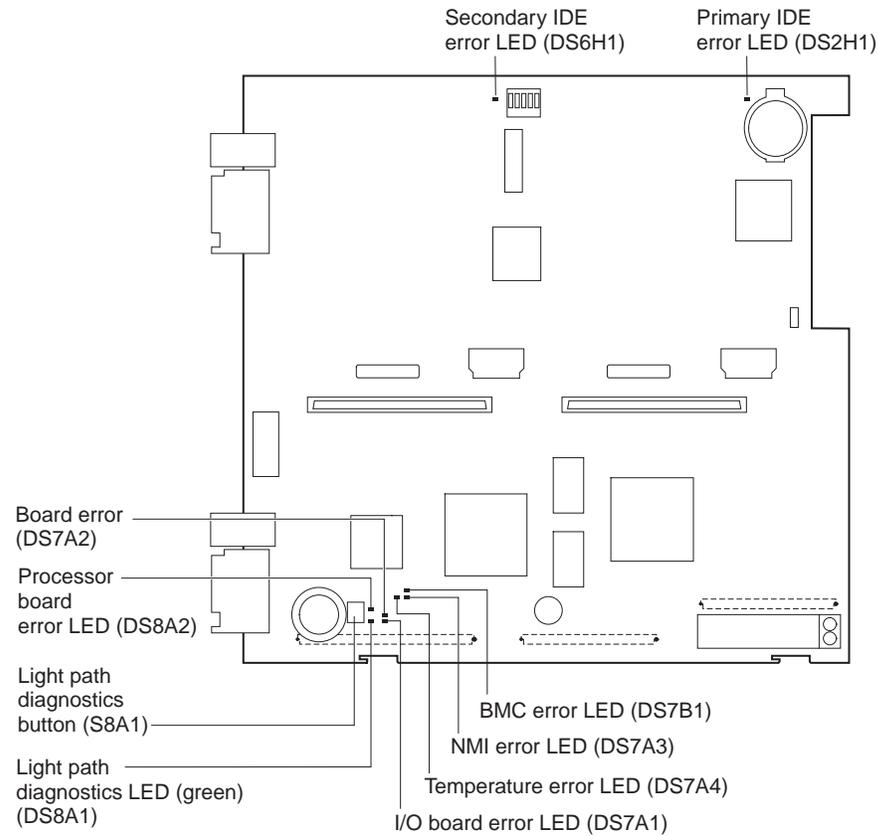
Diagnosing problems using the light path diagnostics

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

The following illustration shows the LEDs on the processor board.

The following illustration shows the LEDs on the I/O board.

Secondary IDE
error LED (DS6H1)

Primary IDE
error LED (DS2H1)

Board error
(DS7A2)

Processor
board
error LED (DS8A2)

Light path
diagnostics
button (S8A1)

Light path
diagnostics LED (green)
(DS8A1)

BMC error LED (DS7B1)

NMI error LED (DS7A3)

Temperature error LED (DS7A4)

I/O board error LED (DS7A1)

The following example illustrates how to use the light path diagnostics to diagnose a system error:

1. Note that the blade-error LED on the control panel is lit.

2. Remove the blade server from the BladeCenter unit (see "Removing the blade server from the BladeCenter unit" on page 22).

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

4. Remove the cover from the blade server (see "Opening the blade server cover" on page 24).

5. Press and hold the light path diagnostics button on the I/O board to relight the I/O board LEDs that were lit before you removed the blade server from the BladeCenter unit. The LEDs will remain lit for as long as you press the button, to a maximum of 25 seconds.

6. Press the I/O-tray release and rotate the I/O-tray open. The I/O tray is hinged and will support itself in the open position.

7. Press and hold the light path diagnostics button on the processor board to relight the processor board LEDs that were lit before you removed the blade server from the BladeCenter unit. The LEDs will remain lit for as long as you press the button, to a maximum of 25 seconds.

Use the information in "Light path diagnostics LEDs" on page 74 to determine the cause of the error and the action you should take.

Light path diagnostics LEDs

Power is available to relight the light path diagnostics LEDs for a short period of time after the blade server is removed from the BladeCenter unit. During that period of time, you can relight the light path diagnostics LEDs for a maximum of 25 seconds (or less, depending on the number of LEDs that are lit and the length of time the blade server is removed from the BladeCenter unit) by pressing the light path diagnostics button on the I/O board or processor board.

The light path diagnostics LEDs on the I/O board and processor board light when the light path diagnostics buttons are pressed if power is available to relight the blade-error LEDs. If the light path diagnostics LEDs are not lit when the light path diagnostics buttons are pressed, no power is available to light the blade-error LEDs, and they will be unable to provide any diagnostic information.

Table 7 describes the light path diagnostic LEDs on the I/O board. Table 8 on page 75 describes the light path diagnostic LEDs on the processor board. See the illustrations on page 72 and page 73 for LED locations.

If an error has occurred, power is available to light the LEDs, and no light path diagnostic LEDs are lit, the error cannot be diagnosed, or the service processor has failed. The error is not represented by a light path diagnostic LED and you should check the system error log in the BladeCenter management module for information about the error.

Table 7. I/O board light path diagnostics LEDs

LED	Problem	Action
Light path diagnostics LED (green)	If this green LED does *not* light when you press and hold the light path diagnostics button on the I/O board, there might be no power available to light the LED.	Replace the blade server cover and reinsert the blade server in a powered BladeCenter unit; then, after the blade server has been in the BladeCenter unit for several minutes, remove it and try to light the light path diagnostics LED. If the problem remains, have the blade server serviced.
Primary IDE error or secondary IDE error	The IDE bus indicated by the error LED has failed.	No action required. IDE is not supported for this blade server model.
Processor board error	The processor board has failed.	Replace the blade server cover, reinsert the blade server in the BladeCenter unit, and then restart the server. If the problem remains, have the blade server serviced.
Board error	An I/O board connector has failed.	Check all interconnecting cables between the blade server I/O board and the blade server processor board for proper seating. If the problem remains, have the blade server serviced.
I/O board error	The I/O board has failed.	Replace the blade server cover, reinsert the blade server in the BladeCenter unit, and then restart the server. If the problem remains, have the blade server serviced.

Table 7. I/O board light path diagnostics LEDs (continued)

LED	Problem	Action
Temperature error	The system temperature has exceeded a threshold level.	• Check to see whether a blower on the BladeCenter unit has failed. If it has, replace the fan. • Make sure the room temperature is not too high. (See "Features and specifications" on page 5 for temperature information.) If the problem remains, have the blade server serviced.
BMC error (baseboard management controller error)	The service processor has failed.	Replace the blade server cover, reinsert the blade server in the BladeCenter unit, and then restart the server. If the problem remains, have the blade server serviced.
NMI error (nonmaskable interrupt error)	A system board has failed.	1. Replace the blade server cover, reinsert the blade server in the BladeCenter unit, and then restart the server. 2. Check the system error log in the BladeCenter management module for information about the error. If the problem remains, have the blade server serviced.

Table 8. Processor board light path diagnostics LEDs

LED	Problem	Action
Light path diagnostics LED (green)	If this green LED does *not* light when you press and hold the light path diagnostics button on the processor board, there might be no power available to light the LED.	Replace the blade server cover and reinsert the blade server in a powered BladeCenter unit; then, after the blade server has been in the BladeCenter unit for several minutes, remove it and try to light the light path diagnostics LED. If the problem remains, have the blade server serviced.
Processor *x* error where *x* is the number of the microprocessor that has an error	The microprocessor has failed.	Make sure that the microprocessor indicated by the lit LED is installed correctly. (See "Installing an additional microprocessor" on page 29 for installation instructions.) If the problem remains, have the microprocessor replaced.
Processor mismatch error	The microprocessors do not match.	Make sure that all of the microprocessors (1 through 4) have the same cache size and type and the same clock speed. Internal and external clock frequencies must be identical. If the problem remains, have the blade server serviced.
DIMM *x* error where *x* is the number of the DIMM that might have an error	A memory error has occurred.	Replace the DIMM indicated by the lit DIMM error LED. **Note:** Multiple DIMM LEDs do not necessarily indicate multiple DIMM failures. If more than one DIMM LED is lit, reseat or replace one DIMM at a time until error is corrected. Check the system error log in the BladeCenter management module for information about the error. If the problem remains, have the blade server serviced.

Appendix A. Getting help and technical assistance

If you need help, service, or technical assistance or just want more information about IBM products, you will find a wide variety of sources available from IBM to assist you. This appendix contains information about where to go for additional information about IBM and IBM products, what to do if you experience a problem with your @server system, and whom to call for service, if it is necessary.

Before you call

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

- Check all cables to make sure that they are connected.
- Check the power switches to make sure that the system is turned on.
- Use the troubleshooting information in your system documentation, and use the diagnostic tools that come with your system. Information about diagnostic tools is in the *Hardware Maintenance Manual and Troubleshooting Guide* on the IBM *xSeries Documentation* CD or in the IntelliStation *Hardware Maintenance Manual* at the IBM Support Web site.
- Go to the IBM Support Web site at http://www.ibm.com/pc/support/ to check for technical information, hints, tips, and new device drivers.

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

Using the documentation

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

Getting help and information from the World Wide Web

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

You can find service information for your IBM products, including supported options, at http://www.ibm.com/pc/support/.

Software service and support

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

For more information about Support Line and other IBM services, go to http://www.ibm.com/services/, or go to http://www.ibm.com/planetwide/ for support telephone numbers. 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 Integrated Technology Services or through your IBM reseller, if your reseller is authorized by IBM to provide warranty service. Go to http://www.ibm.com/planetwide/ for support telephone numbers, 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. IBM Statement of Limited Warranty Z125-4753-07 11/2002

Part 1 - General Terms

Part 1 - General Terms

This Statement of Limited Warranty includes Part 1 - General Terms, Part 2 - Country-unique Terms, and Part 3 - Warranty Information. The terms of Part 2 replace or modify those of Part 1. The warranties provided by IBM in this Statement of Limited Warranty apply only to Machines you purchase for your use, and not for resale. The term "Machine" means an IBM machine, its features, conversions, upgrades, elements, or accessories, or any combination of them. The term "Machine" does not include any software programs, whether pre-loaded with the Machine, installed subsequently or otherwise. **Nothing in this Statement of Limited Warranty affects any statutory rights of consumers that cannot be waived or limited by contract.**

What this Warranty Covers

IBM warrants that each Machine 1) is free from defects in materials and workmanship and 2) conforms to IBM's Official Published Specifications ("Specifications") which are available on request. The warranty period for the Machine starts on the original Date of Installation and is specified in Part 3 - Warranty Information. The date on your invoice or sales receipt is the Date of Installation unless IBM or your reseller informs you otherwise. Many features, conversions, or upgrades involve the removal of parts and their return to IBM. A part that replaces a removed part will assume the warranty service status of the removed part. Unless IBM specifies otherwise, these warranties apply only in the country or region in which you purchased the Machine.

THESE WARRANTIES ARE YOUR EXCLUSIVE WARRANTIES AND REPLACE ALL OTHER WARRANTIES OR CONDITIONS, EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OR CONDITIONS OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. SOME STATES OR JURISDICTIONS DO NOT ALLOW THE EXCLUSION OF EXPRESS OR IMPLIED WARRANTIES, SO THE ABOVE EXCLUSION MAY NOT APPLY TO YOU. IN THAT EVENT, SUCH WARRANTIES ARE LIMITED IN DURATION TO THE WARRANTY PERIOD. NO WARRANTIES APPLY AFTER THAT PERIOD. SOME STATES OR JURISDICTIONS DO NOT ALLOW LIMITATIONS ON HOW LONG AN IMPLIED WARRANTY LASTS, SO THE ABOVE LIMITATION MAY NOT APPLY TO YOU.

What this Warranty Does not Cover

This warranty does not cover the following:
* any software programs, whether pre-loaded or shipped with the Machine, or installed subsequently;
* failure resulting from misuse (including but not limited to use of any Machine capacity or capability, other than that authorized by IBM in writing), accident, modification, unsuitable physical or operating environment, or improper maintenance by you;
* failure caused by a product for which IBM is not responsible; and
* any non-IBM products, including those that IBM may procure and provide with or integrate into an IBM Machine at your request.

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The warranty is voided by removal or alteration of identification labels on the Machine or its parts.

IBM does not warrant uninterrupted or error-free operation of a Machine.

Any technical or other support provided for a Machine under warranty, such as assistance via telephone with "how-to" questions and those regarding Machine set-up and installation, is provided **WITHOUT WARRANTIES OF ANY KIND**.

How to Obtain Warranty Service

If the Machine does not function as warranted during the warranty period, contact IBM or your reseller to obtain warranty service. If you do not register the Machine with IBM, you may be required to present proof of purchase as evidence of your entitlement to warranty service.

What IBM Will Do to Correct Problems

When you call for service, you must follow the problem determination and resolution procedures that IBM specifies. A technician will attempt to make an initial diagnosis of your problem and help you resolve it over the telephone.

The type of warranty service applicable to your Machine is specified in Part 3 - Warranty Information.

You are responsible for downloading and installing designated Machine Code (microcode, basic input/output system code (called "BIOS"), utility programs, device drivers, and diagnostics delivered with an IBM Machine) and other software updates from an IBM Internet Web site or from other electronic media, and following the instructions that IBM provides.

If your problem can be resolved with a Customer Replaceable Unit ("CRU") (e.g., keyboard, mouse, speaker, memory, hard disk drive and other easily replaceable parts), IBM will ship these parts to you for replacement by you.

If the Machine does not function as warranted during the warranty period and your problem cannot be resolved over the telephone, through your application of Machine Code or software updates, or with a CRU, IBM or your reseller, if approved by IBM to provide warranty service, will either, at its discretion, 1) repair it to make it function as warranted, or 2) replace it with one that is at least functionally equivalent. If IBM is unable to do either, you may return the Machine to your place of purchase and your money will be refunded.

IBM or your reseller will also manage and install selected engineering changes that apply to the Machine.

Exchange of a Machine or Part

When the warranty service involves the exchange of a Machine or part, the item IBM or your reseller replaces becomes its property and the replacement becomes yours. You represent that all removed items are genuine and unaltered. The replacement may not be new, but will be in good working order and at least functionally equivalent to the item replaced. The replacement assumes the warranty service status of the replaced item.

Your Additional Responsibilities

Before IBM or your reseller exchanges a Machine or part, you agree to remove all features, parts, options, alterations, and attachments not under warranty service.

You also agree to:
1.   ensure that the Machine is free of any legal obligations or restrictions that prevent its exchange;
2.   obtain authorization from the owner to have IBM or your reseller service a Machine that you do not own; and
3.   where applicable, before service is provided:
    a.   follow the service request procedures that IBM or your reseller provides;
    b.   backup or secure all programs, data, and funds contained in the Machine;
    c. provide IBM or your reseller with sufficient, free, and safe access to your facilities to permit IBM to fulfill its obligations; and
    d.   inform IBM or your reseller of changes in the Machine's location.
4. (a) ensure all information about identified or identifiable individuals (Personal Data) is deleted from the Machine (to the extent technically possible), (b) allow IBM, your reseller or an IBM supplier to process on your behalf any remaining Personal Data as IBM or your reseller considers necessary to fulfill its obligations under this Statement of Limited Warranty (which may include shipping the Machine for such processing to other IBM service locations around the world), and (c) ensure that such processing complies with any laws applicable to such Personal Data.

Limitation of Liability

IBM is responsible for loss of, or damage to, your Machine only while it is 1) in IBM's possession or 2) in transit in those cases where IBM is responsible for the transportation charges.

Neither IBM nor your reseller are responsible for any of your confidential, proprietary or personal information contained in a Machine which you return to IBM for any reason. You should remove all such information from the Machine prior to its return.

Circumstances may arise where, because of a default on IBM's part or other liability, you are entitled to recover damages from IBM. In each such instance, regardless of the basis on which you are entitled to claim damages from IBM (including fundamental breach, negligence, misrepresentation, or other contract or tort claim), except for any liability that cannot be waived or limited by applicable laws, IBM is liable for no more than
1.   damages for bodily injury (including death) and damage to real property and tangible personal property; and
2.   the amount of any other actual direct damages, up to the charges (if recurring, 12 months' charges apply) for the Machine that is subject of the claim. For purposes of this item, the term "Machine" includes Machine Code and Licensed Internal Code ("LIC").

This limit also applies to IBM's suppliers and your reseller. It is the maximum for which IBM, its suppliers, and your reseller are collectively responsible.

UNDER NO CIRCUMSTANCES IS IBM, ITS SUPPLIERS OR RESELLERS LIABLE FOR ANY OF THE FOLLOWING EVEN IF INFORMED OF THEIR POSSIBILITY: 1) THIRD PARTY CLAIMS AGAINST YOU FOR DAMAGES (OTHER THAN THOSE UNDER THE FIRST ITEM LISTED ABOVE); 2) LOSS OF, OR DAMAGE TO, DATA; 3) SPECIAL, INCIDENTAL, OR INDIRECT DAMAGES OR FOR ANY ECONOMIC CONSEQUENTIAL DAMAGES; OR 4) LOST

PROFITS, BUSINESS REVENUE, GOODWILL OR ANTICIPATED SAVINGS. SOME STATES OR JURISDICTIONS DO NOT ALLOW THE EXCLUSION OR LIMITATION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES, SO THE ABOVE LIMITATION OR EXCLUSION MAY NOT APPLY TO YOU. SOME STATES OR JURISDICTIONS DO NOT ALLOW LIMITATIONS ON HOW LONG AN IMPLIED WARRANTY LASTS, SO THE ABOVE LIMITATION MAY NOT APPLY TO YOU.

Governing Law

Both you and IBM consent to the application of the laws of the country in which you acquired the Machine to govern, interpret, and enforce all of your and IBM's rights, duties, and obligations arising from, or relating in any manner to, the subject matter of this Statement of Limited Warranty, without regard to conflict of law principles.

THESE WARRANTIES GIVE YOU SPECIFIC LEGAL RIGHTS AND YOU MAY ALSO HAVE OTHER RIGHTS WHICH VARY FROM STATE TO STATE OR JURISDICTION TO JURISDICTION.

Jurisdiction

All of our rights, duties, and obligations are subject to the courts of the country in which you acquired the Machine.

Part 2 - Country-unique Terms

AMERICAS

ARGENTINA

Governing Law: *The following is added after the first sentence:*

Any litigation arising from this Statement of Limited Warranty will be settled exclusively by the Ordinary Commercial Court of the city of Buenos Aires.

BRAZIL

Governing Law: *The following is added after the first sentence:*
Any litigation arising from this Statement of Limited Warranty will be settled exclusively by the court of Rio de Janeiro, RJ.

PERU

Limitation of Liability: *The following is added at the end of this section:*

In accordance with Article 1328 of the Peruvian Civil Code the limitations and exclusions specified in this section will not apply to damages caused by IBM's willful misconduct ("dolo") or gross negligence ("culpa inexcusable").

NORTH AMERICA

How to Obtain Warranty Service: *The following is added to this Section:*
To obtain warranty service from IBM in Canada or the United States, call 1-800-IBM-SERV (426-7378).

CANADA

Limitation of Liability: *The following replaces item 1 of this section:*

1. damages for bodily injury (including death) or physical harm to real property and tangible personal property caused by IBM's negligence; and

Governing Law: *The following replaces "laws of the country in which you acquired the Machine" in the first sentence:*
laws in the Province of Ontario.

UNITED STATES

Governing Law: *The following replaces "laws of the country in which you acquired the Machine" in the first sentence:*
laws of the State of New York.

ASIA PACIFIC

AUSTRALIA

What this Warranty Covers: *The following paragraph is added to this section:*
The warranties specified in this Section are in addition to any rights you may have under the Trade Practices Act 1974 or other similar legislation and are only limited to the extent permitted by the applicable legislation.

Limitation of Liability: *The following is added to this section:*
Where IBM is in breach of a condition or warranty implied by the Trade Practices Act 1974 or other similar legislation, IBM's liability is limited to the repair or replacement of the goods or the supply of equivalent goods. Where that condition or warranty relates to right to sell, quiet possession or clear title, or the goods are of a kind ordinarily acquired for personal, domestic or household use or consumption, then none of the limitations in this paragraph apply.

Governing Law: *The following replaces "laws of the country in which you acquired the Machine" in the first sentence:*
laws of the State or Territory.

CAMBODIA, LAOS, AND VIETNAM

Governing Law: *The following replaces "laws of the country in which you acquired the Machine" in the first sentence:*
laws of the State of New York, United States of America.

CAMBODIA, INDONESIA, LAOS, AND VIETNAM

Arbitration: *The following is added under this heading:*
Disputes arising out of or in connection with this Statement of Limited Warranty shall be finally settled by arbitration which shall be held in Singapore in accordance with the Arbitration Rules of Singapore International Arbitration Center ("SIAC Rules") then in effect. The arbitration award shall be final and binding for the parties without appeal and shall be in writing and set forth the findings of fact and the conclusions of law.

The number of arbitrators shall be three, with each side to the dispute being entitled to appoint one arbitrator. The two arbitrators appointed by the parties shall appoint a third arbitrator who shall act as chairman of the proceedings. Vacancies in the post of chairman shall be filled by the president of the SIAC. Other vacancies shall

be filled by the respective nominating party. Proceedings shall continue from the stage they were at when the vacancy occurred.

If one of the parties refuses or otherwise fails to appoint an arbitrator within 30 days of the date the other party appoints its, the first appointed arbitrator shall be the sole arbitrator, provided that the arbitrator was validly and properly appointed.

All proceedings shall be conducted, including all documents presented in such proceedings, in the English language. The English language version of this Statement of Limited Warranty prevails over any other language version.

HONG KONG S.A.R. OF CHINA AND MACAU S.A.R. OF CHINA

Governing Law: *The following replaces "laws of the country in which you acquired the Machine" in the first sentence:*
laws of Hong Kong Special Administrative Region of China.

INDIA

Limitation of Liability: *The following replaces items 1 and 2 of this section:*
1. liability for bodily injury (including death) or damage to real property and tangible personal property will be limited to that caused by IBM's negligence; and
2. as to any other actual damage arising in any situation involving nonperformance by IBM pursuant to, or in any way related to the subject of this Statement of Limited Warranty, the charge paid by you for the individual Machine that is the subject of the claim. For purposes of this item, the term "Machine" includes Machine Code and Licensed Internal Code ("LIC").

Arbitration: *The following is added under this heading:*

Disputes arising out of or in connection with this Statement of Limited Warranty shall be finally settled by arbitration which shall be held in Bangalore, India in accordance with the laws of India then in effect. The arbitration award shall be final and binding for the parties without appeal and shall be in writing and set forth the findings of fact and the conclusions of law.

The number of arbitrators shall be three, with each side to the dispute being entitled to appoint one arbitrator. The two arbitrators appointed by the parties shall appoint a third arbitrator who shall act as chairman of the proceedings. Vacancies in the post of chairman shall be filled by the president of the Bar Council of India. Other vacancies shall be filled by the respective nominating party. Proceedings shall continue from the stage they were at when the vacancy occurred.

If one of the parties refuses or otherwise fails to appoint an arbitrator within 30 days of the date the other party appoints its, the first appointed arbitrator shall be the sole arbitrator, provided that the arbitrator was validly and properly appointed.

All proceedings shall be conducted, including all documents presented in such proceedings, in the English language. The English language version of this Statement of Limited Warranty prevails over any other language version.

JAPAN

Governing Law: *The following sentence is added to this section:*
Any doubts concerning this Statement of Limited Warranty will be initially resolved between us in good faith and in accordance with the principle of mutual trust.

MALAYSIA

Limitation of Liability: *The word "**SPECIAL**" in item 3 of the fifth paragraph is deleted.*

NEW ZEALAND

What this Warranty Covers: *The following paragraph is added to this section:*
The warranties specified in this section are in addition to any rights you may have under the Consumer Guarantees Act 1993 or other legislation which cannot be excluded or limited. The Consumer Guarantees Act 1993 will not apply in respect of any goods which IBM provides, if you require the goods for the purposes of a business as defined in that Act.

Limitation of Liability: *The following is added to this section:*
Where Machines are not acquired for the purposes of a business as defined in the Consumer Guarantees Act 1993, the limitations in this section are subject to the limitations in that Act.

PEOPLE'S REPUBLIC OF CHINA (PRC)

Governing Law: *The following replaces "laws of the country in which you acquired the Machine" in the first sentence:*

laws of the State of New York, United States of America (except when local law requires otherwise).

PHILIPPINES

Limitation of Liability: *Item 3 in the fifth paragraph is replaced by the following:*

SPECIAL (INCLUDING NOMINAL AND EXEMPLARY DAMAGES), MORAL, INCIDENTAL, OR INDIRECT DAMAGES FOR ANY ECONOMIC CONSEQUENTIAL DAMAGES; OR

Arbitration: *The following is added under this heading:*

Disputes arising out of or in connection with this Statement of Limited Warranty shall be finally settled by arbitration which shall be held in Metro Manila, Philippines in accordance with the laws of the Philippines then in effect. The arbitration award shall be final and binding for the parties without appeal and shall be in writing and set forth the findings of fact and the conclusions of law.

The number of arbitrators shall be three, with each side to the dispute being entitled to appoint one arbitrator. The two arbitrators appointed by the parties shall appoint a third arbitrator who shall act as chairman of the proceedings. Vacancies in the post of chairman shall be filled by the president of the Philippine Dispute Resolution Center, Inc. Other vacancies shall be filled by the respective nominating party. Proceedings shall continue from the stage they were at when the vacancy occurred.

If one of the parties refuses or otherwise fails to appoint an arbitrator within 30 days of the date the other party appoints its, the first appointed arbitrator shall be the sole arbitrator, provided that the arbitrator was validly and properly appointed.

All proceedings shall be conducted, including all documents presented in such proceedings, in the English language. The English language version of this Statement of Limited Warranty prevails over any other language version.

SINGAPORE

Limitation of Liability: *The words* "**SPECIAL**" *and* "**ECONOMIC**" *in item 3 in the fifth paragraph are deleted.*

<u>**EUROPE, MIDDLE EAST, AFRICA (EMEA)**</u>

THE FOLLOWING TERMS APPLY TO ALL EMEA COUNTRIES:
The terms of this Statement of Limited Warranty apply to Machines purchased from IBM or an IBM reseller.

Hot to Obtain Warranty Service: If you purchase a Machine in Austria, Belgium, Cyprus, Denmark, Estonia, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Latvia, Liechtenstein, Lithuania, Luxembourg, Monaco, Netherlands, Norway, Portugal, Spain, San Marino, Sweden, Switzerland, United Kingdom or Vatican State, you may obtain warranty service for that Machine in any of those countries from either (1) an IBM reseller approved to perform warranty service or (2) from IBM, provided the Machine has been announced and made available by IBM in the country in which you wish to obtain service. If you purchased a Personal Computer Machine in Albania, Armenia, Belarus, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Georgia, Hungary, Kazakhstan, Kyrgyzstan, Federal Republic of Yugoslavia, Former Yugoslav Republic of Macedonia (FYROM), Moldova, Poland, Romania, Russia, Slovak Republic, Slovenia, or Ukraine, you may obtain warranty service for that Machine in any of those countries from either (1) an IBM reseller approved to perform warranty service or (2) from IBM.

If you purchase a Machine in a Middle Eastern or African country, you may obtain warranty service for that Machine from the IBM entity within the country of purchase, if that IBM entity provides warranty service in that country, or from an IBM reseller, approved by IBM to perform warranty service on that Machine in that country. Warranty service in Africa is available within 50 kilometers of an IBM approved service provider. You are responsible for transportation costs for Machines located outside 50 kilometers of an IBM approved service provider.

*Add the following paragraph in **Western Europe** (Austria, Belgium, Cyprus, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Liechtenstein, Luxembourg, Monaco, Netherlands, Norway, Portugal, Spain, San Marino, Sweden, Switzerland, United Kingdom, Vatican State):*

The warranty for Machines acquired in Western Europe shall be valid and applicable in all Western Europe countries provided the Machines have been announced and made available in such countries.

Governing Law:

The phrase "the laws of the country in which you acquired the Machine" is replaced by:

1) "the laws of Austria" **in Albania, Armenia, Azerbaijan, Belarus, Bosnia-Herzegovina, Bulgaria, Croatia, Georgia, Hungary, Kazakhstan, Kyrgyzstan, FYR Macedonia, Moldova, Poland, Romania, Russia, Slovakia, Slovenia, Tajikistan, Turkmenistan, Ukraine, Uzbekistan, and FR Yugoslavia;** 2)

"the laws of France" **in Algeria, Benin, Burkina Faso, Cameroon, Cape Verde, Central African Republic, Chad, Comoros, Congo Republic, Djibouti, Democratic Republic of Congo, Equatorial Guinea, French Guiana, French Polynesia, Gabon, Gambia, Guinea, Guinea-Bissau, Ivory Coast, Lebanon, Madagascar, Mali, Mauritania, Mauritius, Mayotte, Morocco, New Caledonia, Niger, Reunion, Senegal, Seychelles, Togo, Tunisia, Vanuatu, and Wallis & Futuna;** 3) "the laws of Finland" **in Estonia, Latvia, and Lithuania;** 4) "the laws of England" **in Angola, Bahrain, Botswana, Burundi, Egypt, Eritrea, Ethiopia, Ghana, Jordan, Kenya, Kuwait, Liberia, Malawi, Malta, Mozambique, Nigeria, Oman, Pakistan, Qatar, Rwanda, Sao Tome, Saudi Arabia, Sierra Leone, Somalia, Tanzania, Uganda, United Arab Emirates, the United Kingdom, West Bank/Gaza, Yemen, Zambia, and Zimbabwe;** and 5) "the laws of South Africa" **in South Africa, Namibia, Lesotho and Swaziland.**

Jurisdiction: *The following exceptions are added to this section:*

1) **In Austria** the choice of jurisdiction for all disputes arising out of this Statement of Limited Warranty and relating thereto, including its existence, will be the competent court of law in Vienna, Austria (Inner-City); 2) **in Angola, Bahrain, Botswana, Burundi, Egypt, Eritrea, Ethiopia, Ghana, Jordan, Kenya, Kuwait, Liberia, Malawi, Malta, Mozambique, Nigeria, Oman, Pakistan, Qatar, Rwanda, Sao Tome, Saudi Arabia, Sierra Leone, Somalia, Tanzania, Uganda, United Arab Emirates, West Bank/Gaza, Yemen, Zambia, and Zimbabwe** all disputes arising out of this Statement of Limited Warranty or related to its execution, including summary proceedings, will be submitted to the exclusive jurisdiction of the English courts; 3) in **Belgium** and **Luxembourg**, all disputes arising out of this Statement of Limited Warranty or related to its interpretation or its execution, the law, and the courts of the capital city, of the country of your registered office and/or commercial site location only are competent; 4) **in France, Algeria, Benin, Burkina Faso, Cameroon, Cape Verde, Central African Republic, Chad, Comoros, Congo Republic, Djibouti, Democratic Republic of Congo, Equatorial Guinea, French Guiana, French Polynesia, Gabon, Gambia, Guinea, Guinea-Bissau, Ivory Coast, Lebanon, Madagascar, Mali, Mauritania, Mauritius, Mayotte, Morocco, New Caledonia, Niger, Reunion, Senegal, Seychelles, Togo, Tunisia, Vanuatu, and Wallis & Futuna** all disputes arising out of this Statement of Limited Warranty or related to its violation or execution, including summary proceedings, will be settled exclusively by the Commercial Court of Paris; 5) **in Russia**, all disputes arising out of or in relation to the interpretation, the violation, the termination, the nullity of the execution of this Statement of Limited Warranty shall be settled by Arbitration Court of Moscow; 6) **in South Africa, Namibia, Lesotho and Swaziland**, both of us agree to submit all disputes relating to this Statement of Limited Warranty to the jurisdiction of the High Court in Johannesburg; 7) **in Turkey** all disputes arising out of or in connection with this Statement of Limited Warranty shall be resolved by the Istanbul Central (Sultanahmet) Courts and Execution Directorates of Istanbul, the Republic of Turkey; 8) in each of the following specified countries, any legal claim arising out of this Statement of Limited Warranty will be brought before, and settled exclusively by, the competent court of a) Athens for **Greece**, b) Tel Aviv-Jaffa for **Israel**, c) Milan for **Italy**, d) Lisbon for **Portugal**, and e) Madrid for **Spain**; and 9) **in the United Kingdom**, both of us agree to submit all disputes relating to this Statement of Limited Warranty to the jurisdiction of the English courts.

Arbitration: *The following is added under this heading:*

In Albania, Armenia, Azerbaijan, Belarus, Bosnia-Herzegovina, Bulgaria, Croatia, Georgia, Hungary, Kazakhstan, Kyrgyzstan, FYR Macedonia, Moldova,

Poland, Romania, Russia, Slovakia, Slovenia, Tajikistan, Turkmenistan, Ukraine, Uzbekistan, and FR Yugoslavia all disputes arising out of this Statement of Limited Warranty or related to its violation, termination or nullity will be finally settled under the Rules of Arbitration and Conciliation of the International Arbitral Center of the Federal Economic Chamber in Vienna (Vienna Rules) by three arbitrators appointed in accordance with these rules. The arbitration will be held in Vienna, Austria, and the official language of the proceedings will be English. The decision of the arbitrators will be final and binding upon both parties. Therefore, pursuant to paragraph 598 (2) of the Austrian Code of Civil Procedure, the parties expressly waive the application of paragraph 595 (1) figure 7 of the Code. IBM may, however, institute proceedings in a competent court in the country of installation.

In Estonia, Latvia and Lithuania all disputes arising in connection with this Statement of Limited Warranty will be finally settled in arbitration that will be held in Helsinki, Finland in accordance with the arbitration laws of Finland then in effect. Each party will appoint one arbitrator. The arbitrators will then jointly appoint the chairman. If arbitrators cannot agree on the chairman, then the Central Chamber of Commerce in Helsinki will appoint the chairman.

EUROPEAN UNION (EU)

THE FOLLOWING TERMS APPLY TO ALL EU COUNTRIES:

Consumers have legal rights under applicable national legislation governing the sale of consumer goods. Such rights are not affected by the warranties provided in this Statement of Limited Warranty.

How to Obtain Warranty Service: *The following is added to this section:*

To obtain warranty service from IBM in EU countries, see the telephone listing in Part 3 - Warranty Information.

You may contact IBM at the following address:
    IBM Warranty & Service Quality Dept.
    PO Box 30
    Spango Valley
    Greenock
    Scotland PA16 0AH

AUSTRIA, DENMARK, FINLAND, GREECE, ITALY, NETHERLANDS, PORTUGAL, SPAIN, SWEDEN AND SWITZERLAND

Limitation of Liability: *The following replaces the terms of this section in its entirety:*

Except as otherwise provided by mandatory law:
1. IBM's liability for any damages and losses that may arise as a consequence of the fulfillment of its obligations under or in connection with this Statement of Limited Warranty or due to any other cause related to this Statement of Limited Warranty is limited to the compensation of only those damages and losses proved and actually arising as an immediate and direct consequence of the non-fulfillment of such obligations (if IBM is at fault) or of such cause, for a maximum amount equal to the charges you paid for the Machine. For purposes of this item, the term "Machine" includes Machine Code and Licensed Internal Code ("LIC").

The above limitation shall not apply to damages for bodily injuries (including death) and damages to real property and tangible personal property for which IBM is legally liable.

2. **UNDER NO CIRCUMSTANCES IS IBM, ITS SUPPLIERS OR RESELLERS LIABLE FOR ANY OF THE FOLLOWING, EVEN IF INFORMED OF THEIR POSSIBILITY: 1) LOSS OF, OR DAMAGE TO, DATA; 2) INCIDENTAL OR INDIRECT DAMAGES, OR FOR ANY ECONOMIC CONSEQUENTIAL DAMAGES; 3) LOST PROFITS, EVEN IF THEY ARISE AS AN IMMEDIATE CONSEQUENCE OF THE EVENT THAT GENERATED THE DAMAGES; OR 4) LOSS OF BUSINESS, REVENUE, GOODWILL, OR ANTICIPATED SAVINGS.**

FRANCE AND BELGIUM

Limitation of Liability: *The following replaces the terms of this section in its entirety:*

Except as otherwise provided by mandatory law:

1. IBM's liability for any damages and losses that may arise as a consequence of the fulfillment of its obligations under or in connection with this Statement of Limited Warranty is limited to the compensation of only those damages and losses proved and actually arising as an immediate and direct consequence of the non-fulfillment of such obligations (if IBM is at fault), for a maximum amount equal to the charges you paid for the Machine that has caused the damages. For purposes of this item, the term "Machine" includes Machine Code and Licensed Internal Code ("LIC").

   The above limitation shall not apply to damages for bodily injuries (including death) and damages to real property and tangible personal property for which IBM is legally liable.

2. **UNDER NO CIRCUMSTANCES IS IBM, ITS SUPPLIERS OR RESELLERS LIABLE FOR ANY OF THE FOLLOWING, EVEN IF INFORMED OF THEIR POSSIBILITY: 1) LOSS OF, OR DAMAGE TO, DATA; 2) INCIDENTAL OR INDIRECT DAMAGES, OR FOR ANY ECONOMIC CONSEQUENTIAL DAMAGES; 3) LOST PROFITS, EVEN IF THEY ARISE AS AN IMMEDIATE CONSEQUENCE OF THE EVENT THAT GENERATED THE DAMAGES; OR 4) LOSS OF BUSINESS, REVENUE, GOODWILL, OR ANTICIPATED SAVINGS.**

THE FOLLOWING TERMS APPLY TO THE COUNTRY SPECIFIED:

AUSTRIA

What this Warranty Covers: *The following replaces the first sentence of the first paragraph of this section:*
The warranty for an IBM Machine covers the functionality of the Machine for its normal use and the Machine's conformity to its Specifications.

The following paragraphs are added to this section:

The warranty period for Machines is 12 months from the date of delivery. The limitation period for consumers in action for breach of warranty is the statutory period as a minimum. In case IBM or your reseller is unable to repair an IBM Machine, you can alternatively ask for a partial refund as far as justified by the reduced value of the unrepaired Machine or ask for a cancellation of the respective agreement for such Machine and get your money refunded.

The second paragraph does not apply.

What IBM Will Do to Correct Problems: *The following is added to this section:*

During the warranty period, transportation for delivery of the failing Machine to IBM will be at IBM's expense.

Limitation of Liability: *The following paragraph is added to this section:*

The limitations and exclusions specified in the Statement of Limited Warranty will not apply to damages caused by IBM with fraud or gross negligence and for express warranty.

The following sentence is added to the end of item 2:

IBM's liability under this item is limited to the violation of essential contractual terms in cases of ordinary negligence.

EGYPT

Limitation of Liability: *The following replaces item 2 in this section:*
as to any other actual direct damages, IBM's liability will be limited to the total amount you paid for the Machine that is the subject of the claim. For purposes of this item, the term "Machine" includes Machine Code and Licensed Internal Code ("LIC").

Applicability of suppliers and resellers (unchanged).

FRANCE

Limitation of Liability: *The following replaces the second sentence of the first paragraph of this section:*
In such instances, regardless of the basis on which you are entitled to claim damages from IBM, IBM is liable for no more than: (items 1 and 2 unchanged).

GERMANY

What this Warranty Covers: *The following replaces the first sentence of the first paragraph of this section:*

The warranty for an IBM Machine covers the functionality of the Machine for its normal use and the Machine's conformity to its Specifications.

The following paragraphs are added to this section:

The minimum warranty period for Machines is twelve months. In case IBM or your reseller is unable to repair an IBM Machine, you can alternatively ask for a partial refund as far as justified by the reduced value of the unrepaired Machine or ask for a cancellation of the respective agreement for such Machine and get your money refunded.

The second paragraph does not apply.

What IBM Will Do to Correct Problems: *The following is added to this section:*

During the warranty period, transportation for delivery of the failing Machine to IBM will be at IBM's expense.

Limitation of Liability: *The following paragraph is added to this section:*

The limitations and exclusions specified in the Statement of Limited Warranty will not apply to damages caused by IBM with fraud or gross negligence and for express warranty.

The following sentence is added to the end of item 2:

IBM's liability under this item is limited to the violation of essential contractual terms in cases of ordinary negligence.

HUNGARY

Limitation of Liability: *The following is added at the end of this section:*

The limitation and exclusion specified herein shall not apply to liability for a breach of contract damaging life, physical well-being, or health that has been caused intentionally, by gross negligence, or by a criminal act.

The parties accept the limitations of liability as valid provisions and state that the Section 314.(2) of the Hungarian Civil Code applies as the acquisition price as well as other advantages arising out of the present Statement of Limited Warranty balance this limitation of liability.

IRELAND

What this Warranty Covers: *The following is added to this section:*
Except as expressly provided in these terms and conditions, all statutory conditions, including all warranties implied, but without prejudice to the generality of the foregoing all warranties implied by the Sale of Goods Act 1893 or the Sale of Goods and Supply of Services Act 1980 are hereby excluded.

Limitation of Liability: *The following replaces the terms of this section in its entirety:*

For the purposes of this section, a "Default" means any act, statement, omission, or negligence on the part of IBM in connection with, or in relation to, the subject matter of this Statement of Limited Warranty in respect of which IBM is legally liable to you, whether in contract or tort. A number of Defaults which together result in, or contribute to, substantially the same loss or damage will be treated as one Default occurring on the date of occurrence of the last such Default.

Circumstances may arise where, because of a Default, you are entitled to recover damages from IBM.

This section sets out the extent of IBM's liability and your sole remedy.
1. IBM will accept unlimited liability for death or personal injury caused by the negligence of IBM.
2. Subject always to the **Items for Which IBM is Not Liable** below, IBM will accept unlimited liability for physical damage to your tangible property resulting from the negligence of IBM.

3. Except as provided in items 1 and 2 above, IBM's entire liability for actual damages for any one Default will not in any event exceed the greater of 1) EUR 125,000, or 2) 125% of the amount you paid for the Machine directly relating to the Default.

Items for Which IBM is Not Liable

Save with respect to any liability referred to in item 1 above, under no circumstances is IBM, its suppliers or resellers liable for any of the following, even if IBM or they were informed of the possibility of such losses:
1. loss of, or damage to, data;
2. special, indirect, or consequential loss; or
3. loss of profits, business, revenue, goodwill, or anticipated savings.

SLOVAKIA

Limitation of Liability: *The following is added to the end of the last paragraph:*

The limitations apply to the extent they are not prohibited under §§ 373-386 of the Slovak Commercial Code.

SOUTH AFRICA, NAMIBIA, BOTSWANA, LESOTHO AND SWAZILAND

Limitation of Liability: *The following is added to this section:*

IBM's entire liability to you for actual damages arising in all situations involving nonperformance by IBM in respect of the subject matter of this Statement of Warranty will be limited to the charge paid by you for the individual Machine that is the subject of your claim from IBM.

UNITED KINGDOM

Limitation of Liability: *The following replaces the terms of this section in its entirety:*

For the purposes of this section, a "Default" means any act, statement, omission, or negligence on the part of IBM in connection with, or in relation to, the subject matter of this Statement of Limited Warranty in respect of which IBM is legally liable to you, whether in contract or tort. A number of Defaults which together result in, or contribute to, substantially the same loss or damage will be treated as one Default.

Circumstances may arise where, because of a Default, you are entitled to recover damages from IBM.

This section sets out the extent of IBM's liability and your sole remedy.
1. IBM will accept unlimited liability for:
   a. death or personal injury caused by the negligence of IBM; and
   b. any breach of its obligations implied by Section 12 of the Sale of Goods Act 1979 or Section 2 of the Supply of Goods and Services Act 1982, or any statutory modification or re-enactment of either such Section.
2. IBM will accept unlimited liability, subject always to the **Items for Which IBM is Not Liable** below, for physical damage to your tangible property resulting from the negligence of IBM.
3. IBM's entire liability for actual damages for any one Default will not in any event, except as provided in items 1 and 2 above, exceed the greater of 1) Pounds

Sterling 75,000, or 2) 125% of the total purchase price payable or the charges for the Machine directly relating to the Default.

These limits also apply to IBM's suppliers and resellers. They state the maximum for which IBM and such suppliers and resellers are collectively responsible.

Items for Which IBM is Not Liable

Save with respect to any liability referred to in item 1 above, under no circumstances is IBM or any of its suppliers or resellers liable for any of the following, even if IBM or they were informed of the possibility of such losses:
1. loss of, or damage to, data;
2. special, indirect, or consequential loss; or
3. loss of profits, business, revenue, goodwill, or anticipated savings.

Part 3 - Warranty Information

This Part 3 provides information regarding the warranty applicable to your Machine, including the warranty period and type of warranty service IBM provides.

Warranty Period

The warranty period may vary by country or region and is specified in the table below.

Note: "Region" means either Hong Kong or Macau Special Administrative Region of China.

Machine - IBM @server **BladeCenter HS40 Type 8839**

Country or Region of Purchase	Warranty Period	Type of Warranty Service*
Worldwide	3 years	1 and 2
* See "Types of Warranty Service" for the legend and explanations of warranty-service types.		

A warranty period of 3 years on parts and 1 year on labor means that IBM provides warranty service without charge for:
1. parts and labor during the first year of the warranty period; and
2. parts only, on an exchange basis, in the second and third years of the warranty period. IBM will charge you for any labor provided in performance of the repair or replacement(s) in the second and third year of the warranty period.

Types of Warranty Service

If required, IBM provides repair or exchange service depending on the type of warranty service specified for your Machine in the above table and as described below. Warranty service may be provided by your reseller if approved by IBM to perform warranty service. Scheduling of service will depend upon the time of your call and is subject to parts availability. Service levels are response time objectives and are not guaranteed. The specified level of warranty service may not be available in all worldwide locations, additional charges may apply outside IBM's normal service area, contact your local IBM representative or your reseller for country and location specific information.
1. **Customer Replaceable Unit ("CRU") Service**

IBM will ship CRU parts to you for your replacement. If IBM instructs you to return the replaced CRU, you are responsible for returning it to IBM in accordance with IBM's instructions. If you do not return the defective CRU, if IBM so instructs, within 30 days of your receipt of the replacement CRU, IBM may charge you for the replacement.

2. **On-site Service**

   IBM or your reseller will either repair or exchange the failing Machine at your location and verify its operation. You must provide suitable working area to allow disassembly and reassembly of the IBM Machine. The area must be clean, well lit and suitable for the purpose. **For some Machines, certain repairs may require sending the Machine to an IBM service center.**

3. **Courier or Depot Service***

   You will disconnect the failing Machine for collection arranged by IBM. IBM will provide you with a shipping container for you to return your Machine to a designated service center. A courier will pick up your Machine and deliver it to the designated service center. Following its repair or exchange, IBM will arrange the return delivery of the Machine to your location. You are responsible for its installation and verification.

4. **Customer Carry-In or Mail-In Service**

   You will deliver or mail as IBM specifies (prepaid unless IBM specifies otherwise) the failing Machine suitably packaged to a location IBM designates. After IBM has repaired or exchanged the Machine, IBM will make it available for your collection or, for Mail-in Service, IBM will return it to you at IBM's expense, unless IBM specifies otherwise. You are responsible for the subsequent installation and verification of the Machine.

* This type of service is called ThinkPad® EasyServ or EasyServ in some countries.

The IBM Machine Warranty World Wide Web site at http://www.ibm.com/servers/support/machine_warranties/ provides a worldwide overview of IBM Limited Warranty for Machines, a Glossary of IBM definitions, Frequently Asked Questions (FAQs) and Support by Product (Machine) with links to Product Support pages. **The IBM Statement of Limited Warranty is also available on this site in 29 languages.**

To obtain warranty service contact IBM or your IBM reseller. In Canada or the United States, call 1-800-IBM-SERV (426-7378). In the EU countries, see the telephone numbers below.

EU Country Telephone List

Phone numbers are subject to change without notice.

Austria -- 43-1-24592-5901	Italy -- 39-02-482-9202
Belgium -- 02-718-4339	Luxembourg -- 352-360385-1
Denmark -- 4520-8200	Netherlands -- 020-514-5770
Finland -- 358-9-4591	Portugal -- 351-21-7915-147
France -- 0238-557-450	Spain -- 34-91-662-4916
Germany -- 07032-15-4920	Sweden -- 46-8-477-4420
Greece -- 30-210-688-1220	United Kingdom -- 01475-555-055
Ireland -- 353-1-815-4000	

Appendix C. Notices

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Important notes

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

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

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

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

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

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

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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 contains materials such as circuit boards, cables, electromagnetic compatibility gaskets, and connectors which may contain lead and copper/beryllium alloys that require special handling and disposal at end of life. Before this unit is disposed of, these materials must be removed and recycled or discarded according to applicable regulations. IBM offers product-return programs in several countries. Information on product recycling offerings can be found on IBM's Internet site at http://www.ibm.com/ibm/environment/products/prp.shtml.

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 collection 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.

Electronic emission notices

Federal Communications Commission (FCC) statement

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

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

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

Industry Canada Class A emission compliance statement

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

Avis de conformité à la réglementation d'Industrie Canada

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

Australia and New Zealand Class A statement

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

United Kingdom telecommunications safety requirement

Notice to Customers

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

European Union EMC Directive conformance statement

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

This product has been tested and found to comply with the limits for Class A Information Technology Equipment according to CISPR 22/European Standard EN 55022. The limits for Class A equipment were derived for commercial and industrial environments to provide reasonable protection against interference with licensed communication equipment.

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

Taiwanese Class A warning statement

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

Chinese Class A warning statement

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

Japanese Voluntary Control Council for Interference (VCCI) statement

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