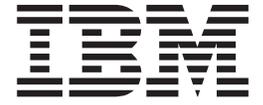


BladeCenter QS20 Type 0200



Problem Determination and Service Guide

BladeCenter QS20 Type 0200



Problem Determination and Service Guide

Note: Before using this information and the product it supports, read the general information in Appendix B, "Notices," on page 65 and the *Warranty and Support Information* on the *IBM BladeCenter Documentation CD*.

First Edition (September 2006)

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Safety

Before installing this product, read the Safety Information.

قبل تركيب هذا المنتج، يجب قراءة الملاحظات الأمنية

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

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

安裝本產品之前，請先閱讀「安全資訊」。

Prije instalacije ovog produkta obavezno pročitajte Sigurnosne Upute.

Před instalací tohoto produktu si přečtěte příručku bezpečnostních instrukcí.

Læs sikkerhedsforskrifterne, før du installerer dette produkt.

Lees voordat u dit product installeert eerst de veiligheidsvoorschriften.

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

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

Vor der Installation dieses Produkts die Sicherheitshinweise lesen.

Πριν εγκαταστήσετε το προϊόν αυτό, διαβάστε τις πληροφορίες 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 pečítajte Bezpečnostné predpisy.

Pred namestitvijo tega proizvoda preberite Varnostne informacije.

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

Läs säkerhetsinformationen innan du installerar den här produkten.

Guidelines for trained service technicians:

This section contains information for trained service technicians.

Inspecting for unsafe conditions:

Use the information in this section to help you identify potential unsafe conditions in an IBM product that you are working on. Each IBM product, as it was designed and manufactured, has required safety items to protect users and service technicians from injury. The information in this section addresses only those items. Use good judgment to identify potential unsafe conditions that might be caused by non-IBM alterations or attachment of non-IBM features or options that are not addressed in this section. If you identify an unsafe condition, you must determine how serious the hazard is and whether you must correct the problem before you work on the product.

Consider the following conditions and the safety hazards that they present:

- Electrical hazards, especially primary power.
- Primary voltage on the frame can cause serious or fatal electrical shock.
- Explosive hazards, such as a damaged CRT face or a bulging capacitor.
- Mechanical hazards, such as loose or missing hardware.

To inspect the product for potential unsafe conditions, complete the following steps:

1. Make sure that the power is off and the power cord is disconnected.
2. Make sure that the exterior cover is not damaged, loose, or broken, and observe any sharp edges.
3. Check the power cord:
 - Make sure that the third-wire ground connector is in good condition. Use a meter to measure third-wire ground continuity for 0.1 ohm or less between the external ground pin and the frame ground.
 - Make sure that the power cord is the correct type, as specified in the documentation for your BladeCenter® unit type.
 - Make sure that the insulation is not frayed or worn.
4. Remove the cover.
5. Check for any obvious non-IBM alterations. Use good judgment as to the safety of any non-IBM alterations.
6. Check inside the blade server for any obvious unsafe conditions, such as metal filings, contamination, water or other liquid, or signs of fire or smoke damage.
7. Check for worn, frayed, or pinched cables.
8. Make sure that the power-supply cover fasteners (screws or rivets) have not been removed or tampered with.

Guidelines for servicing electrical equipment:

Observe the following guidelines when servicing electrical equipment:

- Check the area for electrical hazards such as moist floors, nongrounded power extension cords, and missing safety grounds.

- Use only approved tools and test equipment. Some hand tools have handles that are covered with a soft material that does not provide insulation from live electrical current.
- Regularly inspect and maintain your electrical hand tools for safe operational condition. Do not use worn or broken tools or testers.
- Do not touch the reflective surface of a dental mirror to a live electrical circuit. The surface is conductive and can cause personal injury or equipment damage if it touches a live electrical circuit.
- Some rubber floor mats contain small conductive fibers to decrease electrostatic discharge. Do not use this type of mat to protect yourself from electrical shock.
- Do not work alone under hazardous conditions or near equipment that has hazardous voltages.
- Locate the emergency power-off (EPO) switch, disconnecting switch, or electrical outlet so that you can turn off the power quickly in the event of an electrical accident.
- Disconnect all power before you perform a mechanical inspection, work near power supplies, or remove or install main units.
- Before you work on the equipment, disconnect the power cord. If you cannot disconnect the power cord, have the customer power-off the wall box that supplies power to the equipment and lock the wall box in the off position.
- Never assume that power has been disconnected from a circuit. Check it to make sure that it has been disconnected. v If you have to work on equipment that has exposed electrical circuits, observe the following precautions:
 - Make sure that another person who is familiar with the power-off controls is near you and is available to turn off the power if necessary.
 - When you are working with powered-on electrical equipment, use only one hand. Keep the other hand in your pocket or behind your back to avoid creating a complete circuit that could cause an electrical shock.
 - When using a tester, set the controls correctly and use the approved probe leads and accessories for that tester.
 - Stand on a suitable rubber mat to insulate you from grounds such as metal floor strips and equipment frames.
- Use extreme care when measuring high voltages.
- To ensure proper grounding of components such as power supplies, pumps, blowers, fans, and motor generators, do not service these components outside of their normal operating locations.
- If an electrical accident occurs, use caution, turn off the power, and send another person to get medical aid.

Important:

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

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

Be sure to read all caution and danger statements in this documentation before performing the instructions. Read any additional

safety information that comes with the blade server or optional device before you install the device.

Statement 1:



DANGER

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

To avoid a shock hazard:

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

To Connect:

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

To Disconnect:

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

Statement 2:



CAUTION:

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

Do not:

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

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

Statement 3:



CAUTION:

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

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



DANGER

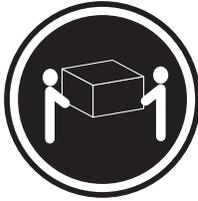
Some laser products contain an embedded Class 3A or Class 3B laser diode. Note the following.

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



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

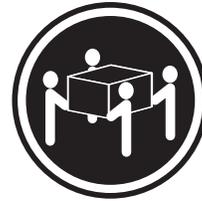
Statement 4:



≥ 18 kg (39.7 lb)



≥ 32 kg (70.5 lb)



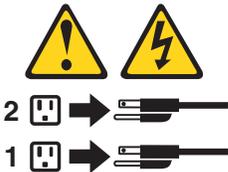
≥ 55 kg (121.2 lb)

CAUTION:
Use safe practices when lifting.

Statement 5:



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



Statement 8:



CAUTION:

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



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

Statement 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.

WARNING: Handling the cord on this product or cords associated with accessories sold with this product, will expose you to lead, a chemical known to the State of California to cause cancer, and birth defects or other reproductive harm. ***Wash hands after handling.***

ADVERTENCIA: El contacto con el cable de este producto o con cables de accesorios que se venden junto con este producto, pueden exponerle al plomo, un elemento químico que en el estado de California de los Estados Unidos está considerado como un causante de cancer y de defectos congénitos, además de otros riesgos reproductivos. ***Lávese las manos después de usar el producto.***

Chapter 1. Introduction

This *Problem Determination and Service Guide* contains information to help you solve problems that might occur when installing and using your BladeCenter QS20. It describes the diagnostic tools that come with the BladeCenter QS20, error codes and suggested actions.

Replaceable components are of three types:

- **Tier 1 customer replaceable unit (CRU):** Replacement of Tier 1 CRUs is your responsibility. If IBM installs a Tier 1 CRU at your request, you will be charged for the installation.
- **Tier 2 CRU:** You may install a Tier 2 CRU yourself or request IBM to install it, at no additional charge, under the type of warranty service that is designated for your server.
- **Field replaceable unit (FRU):** FRUs must be installed only by trained service technicians.

For information about the terms of the warranty and getting service and assistance, see *Warranty and Support Information*.

Prerequisites

Before you start problem determination or servicing, check that:

- The BladeCenter QS20 is inserted correctly into the BladeCenter
- All components are connected correctly
- The BladeCenter QS20 has the latest firmware update

Related documentation

In addition to this document, the following documentation also comes with the server:

- *Installation and User's Guide*

This printed document contains general information about the server, including how to install supported options and how to configure the server.

- *Safety Information*

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

- *Warranty and Support Information*

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

- *BladeCenter QS20 SDK Toolkit Installation and User's Guide*

This document is in PDF and can be downloaded from <http://www.ibm.com/pc/support/>. It contains information about how to install the operating system and how to program applications for the blade server.

Depending on the server model, additional documentation might be included on the IBM *Documentation* CD.

The blade server might have features that are not described in the documentation that comes with the server. The documentation might be updated occasionally to include information about those features, or technical updates might be available to provide additional information that is not included in the blade server documentation. The most recent versions of all BladeCenter documentation are at <http://www.ibm.com/bladecenter/>. In addition to the documentation in this library, be sure to review the *IBM BladeCenter Planning and Installation Guide* for your BladeCenter unit type for information to help you prepare for system installation and configuration. This document is available at <http://www.ibm.com/bladecenter/>.

Notices and statements used in this document

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

The following notices and statements are used in this document:

- **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.

The Documentation CD

The *Documentation CD* contains documentation for the blade server in PDF and includes the IBM Documentation Browser to help you find information quickly.

Hardware and software requirements

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

- Microsoft® Windows NT® 4.0 (with Service Pack 3 or later), Windows 98, Windows 2000, Windows XP, AIX®, UNIX®, SUSE LINUX, 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

Note: 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 books, and view books using Adobe Acrobat Reader or xpdf. The Documentation Browser automatically detects the regional settings in use in

your system and displays the books in the language for that region (if available). If a book 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:
 - 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:

```
x:\win32.bat
```

where *x* is the drive letter of your CD-ROM drive, then click **OK**.

- If you are using a Linux operating system, insert the CD into your CD-ROM drive; then, run the following command from the `/mnt/cdrom` directory:

```
sh runlinux.sh
```

The **Available Topics** list displays all the books for the blade server. Some books might be in folders. A plus sign (+) indicates each folder or book that has additional books under it. Click the plus sign to display the additional books.

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

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

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

Features and specifications

The following table provides a summary of the features and specifications of the BladeCenter QS20.

Through the BladeCenter Management Module, you can view the blade server firmware code and other hardware configuration information.

The BladeCenter QS20 does not support the function of any USB ports, optical drives, or floppy drives native to the BladeCenter.

The BladeCenter QS20 is an accessory for the 8677 BladeCenter chassis only.

You can only have BladeCenter QS20 blades in a chassis, you cannot put other blade server types in the same chassis as a BladeCenter QS20.

Note: Power, cooling, removable-media drives, external ports, and advanced system management are provided by the IBM BladeCenter Type 8677. For more information, see the *IBM BladeCenter (Type 8677) Planning and Installation Guide*.

Table 1. Blade server features and specifications

<p>Microprocessor: Two IBM Cell Broadband Engines PowerPC® 64-bit architecture w/VMX with 8 SPUs, 512 KB L2 cache, 256 KB on each SPE.</p> <p>Memory: 2 x 256 MB or 2 x 512 MB XDR DRAM with ECC. (Only configuration supported.)</p> <p>IDE device: Support for one internal integrated drive electronics (IDE) 2.5 inch hard disk drive.</p>	<p>Size:</p> <ul style="list-style-type: none"> • Height: 24.5 cm (9.7 inches) • Depth: 44.6 cm (17.6 inches) • Width: 5.8 cm (2.28 inches) • Maximum weight: 6 kg (13.2 lb) <p>Integrated functions:</p> <ul style="list-style-type: none"> • Two 1 Gigabit Ethernet controllers • Local service processor • One IDE hard disk drive controller with one channel • RS-485 interface for communication with BladeCenter Management Module 	<p>Environment:</p> <ul style="list-style-type: none"> • Air temperature: <ul style="list-style-type: none"> – Operating temperature: maximum 25°C (77°F). Altitude: 0 to 914 m (0 to 3000 ft) – Operating temperature: maximum 25°C (77°F). Altitude: 914 m to 2133 m (3000 ft to 7000 ft) – Storage temperature: -40° to 60°C (-40° to 140° F) • Humidity: <ul style="list-style-type: none"> – Operating temperature: 8% to 80% – Storage temperature: 5% to 80%
---	---	---

Reliability, availability, and serviceability features

Three important features in server design are reliability, availability, and serviceability (RAS). These RAS features are designed to help you protect the integrity of the data stored on your blade server; help ensure that your blade server is available when you want to use it; and, in the event of a failure, help you easily diagnose and repair the failure with minimal inconvenience.

The following is a list of some of the RAS features that your blade server supports:

- Automatic error retry or recovery
- Automatic server restart
- Built-in monitoring for temperature, voltage, and hard disk drives
- Customer-upgradeable system firmware code
- Diagnostic support of Ethernet controller ports
- Error codes and messages
- Error correcting code (ECC) protection on the Level 2 (L2) cache
- ECC memory
- 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)

System-board components and connectors

The following illustration shows the location of the system-board components, including connectors for user-installable options.

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

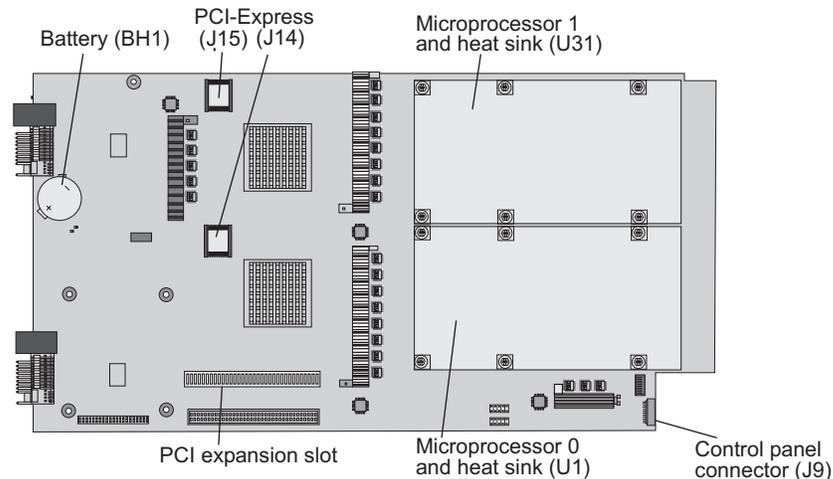


Figure 1. System board components

Blade server power, controls, and indicators

This section 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

Notes:

- After you connect the power cords of the BladeCenter unit to the electrical outlets, wait until the power-on LED on the blade server flashes slowly before pressing the blade server power control button. Before the LED flashes, the service processor in the BladeCenter Management Module is initializing, and the power control button on the blade server does not respond.
- While the blade server is powering up, the power-on LED on the front of the server is lit. See “Blade server controls and LEDs” on page 6 for the power-on LED states.
- Throughout this document, the Management Module Web-based user interface is also known as the BladeCenter Management Module Web interface.

After you connect the BladeCenter unit to power, the blade server can start in any of the following ways:

- You can press the power-control button on the front of the blade server (behind the control panel door) to start the server.
- 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 use the BladeCenter Management Module Web interface to turn on the blade server remotely.

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 avoid loss of data, shut down the Linux operating system before you turn off the blade server. Shut down the operating system by typing the `shutdown -h now` command. See your operating system documentation for additional information about shutting down the operating system.

If the blade server has not been turned off, 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 you have turned 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.
- You can use the BladeCenter Management Module Web interface to turn on the blade server remotely.

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

Blade server controls and LEDs

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

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

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

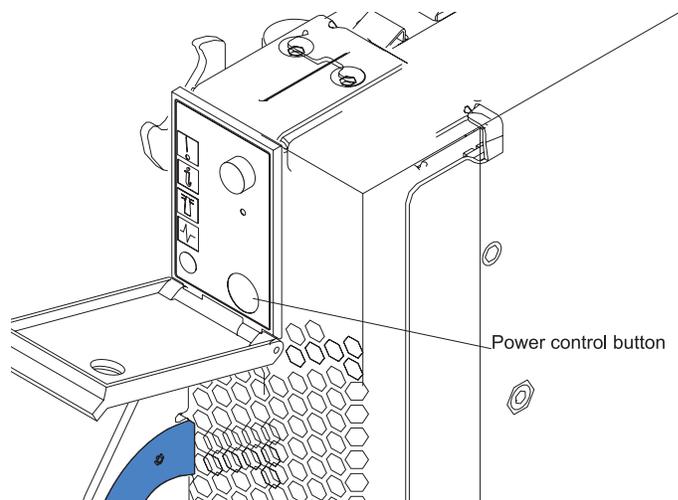


Figure 2. Power control button

Notes:

- The control panel door is shown in the closed (normal) position in this illustration.

- The blade-error LED, information LED, and location LED can be turned off through the BladeCenter Management Module Web interface.
- For additional information about errors, see Chapter 2, “Diagnostics and troubleshooting,” on page 9.
- This blade server does not have a keyboard/mouse/video select button.

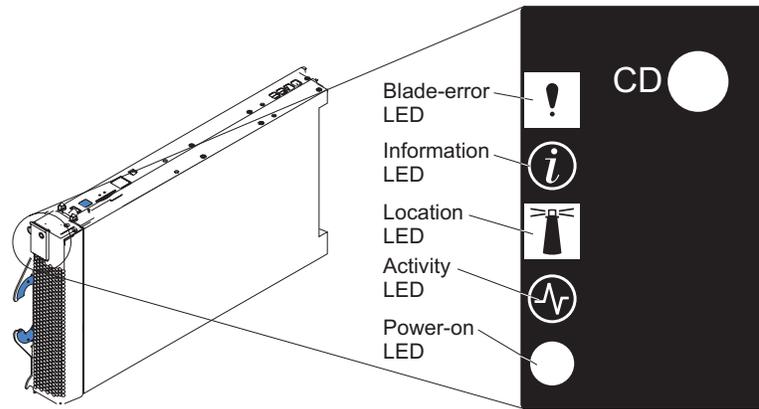


Figure 3. Controls and LEDs

Blade-error LED: When this amber LED is lit, it indicates that a system error has occurred in the blade server.

Information LED: Not supported.

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.

Activity LED: When this green LED is lit, it indicates that there is network activity.

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 communicating with the BladeCenter Management Module.
- Flashing slowly - The blade server has ac power but is not turned on.
- Lit continuously (steady) - The blade server has ac power and is turned on.
- Not lit. Power failure occurred on the blade server

Chapter 2. Diagnostics and troubleshooting

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

A problem with the BladeCenter QS20 can relate to either the BladeCenter QS20 or the BladeCenter unit.

- A blade-server problem exists if the BladeCenter unit contains more than one blade server and only one of the blade servers has the symptom.
- If all of the blade servers have the same symptom, then the problem relates to the BladeCenter unit. For more information, see the *IBM BladeCenter (Type 8677) Hardware Maintenance Manual and Troubleshooting Guide*.

Note:

- The BladeCenter QS20 is supported in the 8677 BladeCenter chassis only.
- You can only have BladeCenter QS20 blades in a chassis, you cannot put other blade server types in the same chassis as a BladeCenter QS20.

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

- Make sure that the BladeCenter unit is correctly connected to a power source.
- Reseat the blade server in the BladeCenter unit.
- If the power-on LED is flashing slowly, turn on the blade server (see “Turning on the blade server” on page 5).
- If you have just added a new optional device or component, make sure that it is correctly installed and compatible with the blade server and its components. If the device or component is not compatible, remove it from the blade server, reinstall the blade server in the BladeCenter unit, and then restart the blade server.

Finding troubleshooting information

Table 2 describes where to find troubleshooting information in this section.

Note: CPU, Ram, Processor, power supplies cannot be exchanged in the field. The only replaceable parts are the hard disk drive, hard disk drive controller, battery, front bezel assembly and InfiniBand card (optional).

Table 2. Where to find troubleshooting information

Component	Where to find information
Hard disk drive Hard disk drive controller Front bezel InfiniBand card	“Solving undetermined problems” on page 29
Battery	“Service processor log message IDs” on page 23
Memory	“Boot errors and handling” on page 20

Table 2. Where to find troubleshooting information (continued)

Component	Where to find information
LEDs Power Network connections Service processor Software problems	"Troubleshooting charts" on page 13

For troubleshooting information about other BladeCenter components, see the *IBM BladeCenter (Type 8677) Hardware Maintenance Manual and Troubleshooting Guide*, product-specific documentation, and other related documentation. For the latest editions of the IBM BladeCenter documentation, go to <http://www.ibm.com/pc/support/> on the World Wide Web. See "Related documentation" on page 1 for additional information.

Communicating with the blade server

You can access the blade server through:

- The management module, either through
 - The Web-based management and configuration program. This is your main access method to the blade server.
- or
- The command-line interface. See "Using the command-line interface" on page 11.
- The serial interface. See "Using the serial interface."

Note: Each server needs its own serial connection.

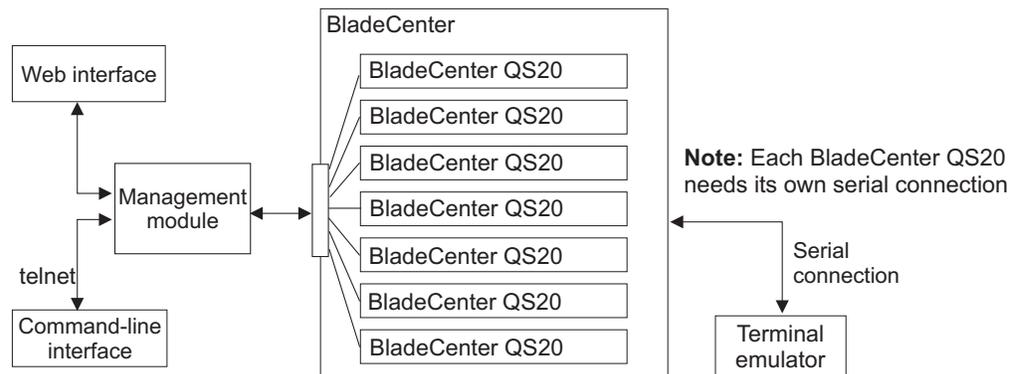


Figure 4. Communication with the blade servers

The next sections describe the management and configuration program in the Management Module in more detail.

Using the serial interface

Use the serial interface to:

- Observe firmware progress.
- Access the Linux terminal in order to configure Linux.

You can connect a PC serially through the front panel using a specific UART cable. To connect to the serial console, plug the serial cable into the front panel and connect the other end to a serial device or computer with a serial port.

Set the following parameters for the serial connection on the Hyperterminal:

- 115200 baud
- 8 data bits
- No parity
- One stop bit
- No flow control

Using the command-line interface

The IBM BladeCenter Management Module command-line interface provides direct access to BladeCenter management functions as an alternative to using the BladeCenter Management Module Web interface.

Through the command-line interface, you can issue commands to control the power and configuration of the blade server and other components in the BladeCenter unit. For information and instructions, see the *IBM BladeCenter Management Module Command-Line Interface Reference Guide*.

Note: Serial-over-LAN (SOL) is not implemented on the BladeCenter QS20, therefore you cannot use the command-line interface to access the BladeCenter QS20's text console command prompts. You must use the serial interface instead.

Starting the management and configuration program in the Management Module

Use the Management Module Web-based management and configuration program to:

- Configure the BladeCenter unit.
- Update and configure BladeCenter components.
- Monitor the current status of the system.
- Check the event log for system and other errors.

Complete the following steps to start the Web-based management and configuration program. (For additional information, see the *IBM BladeCenter (Type 8677) Planning and Installation Guide*.)

1. Open a Web browser. In the address or URL field, type the Internet protocol (IP) address or host name that is assigned for the Management Module remote connection. The default IP address is:

192.168.70.125

The Enter Network Password window opens.

2. Type your user name and password. Before you log onto the Management Module for the first time, contact your system administrator regarding whether your organization has assigned a user name and password to you. Use the initial (default) user name and password the first time that you log onto the Management Module. If you have an assigned user name and password, use them for all subsequent logins. All login attempts are documented in the event log.

The initial user ID and password for the Management Module are:

- User ID: USERID (all capital letters)
 - Password: PASSWORD (note the number zero, not the letter O, in PASSWORD)
3. Follow the instructions that appear on the screen. Be sure to set the timeout value that you want for your Web session.

The BladeCenter management and configuration window opens.

Note: Management Module recognizes the BladeCenter QS20 as a BladeCenter JS20.

Why you should not install the blade server into blade bays 6 and 7

The BladeCenter QS20 is a double-width blade and you should not insert it into blade bay slots 6 and 7 of your BladeCenter. This is because blade bays 1-6 are in power domain one, but blade bays 7-14 are in power domain two, and the BladeCenter QS20 cannot straddle two power domains.

What happens if the blade server is accidentally installed into blade bays 6 and 7

If you accidentally insert a BladeCenter QS20 into blade bay slots 6 and 7, this does not affect the BladeCenter. This is because each power connector of a BladeCenter QS20 is connected via a power switch (PowerFET), which means that as long as the blade is not switched on, the blade does NOT cross-connect the different power domains.

The Management Module does not allow you to power on a double-width blade in slots 6 and 7 (the Management Module Web interface allows you to click through the power on procedure but it does not power on the blade).

The Management Module switches on both the BladeCenters and the blade server's error LED (yellow LED), but does not display an error message, see Figure 5 on page 13.

Note: The Advanced Management Module behaves in the same way as the Management Module.

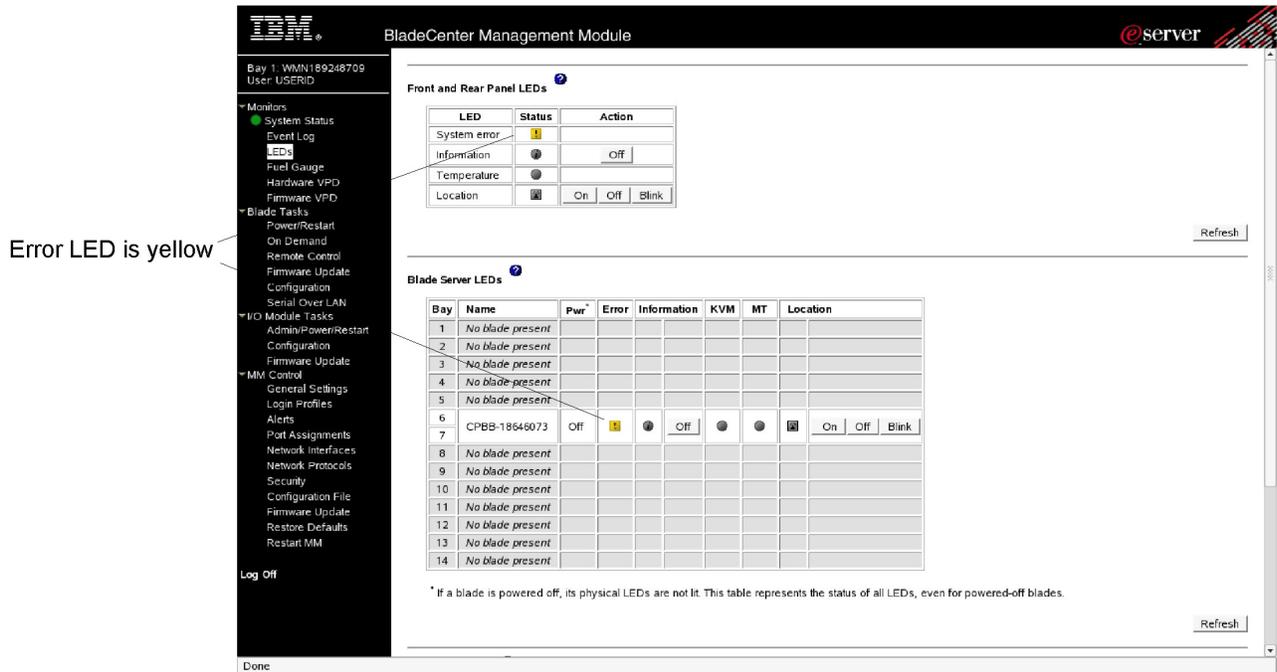


Figure 5. Management Module display when the blade server is inserted into blade bays 6 and 7

Troubleshooting charts

The following tables list problem symptoms and suggested solutions. If you cannot find the problem in the troubleshooting charts, or if performing the suggested actions does not solve the problem, have the blade server serviced.

Notes:

- If you have problems with an adapter, monitor, keyboard, mouse, or power module, see the *BladeCenter (Type 8677) Hardware Maintenance Manual and Troubleshooting Guide* for more information.
- If you have problems with an Ethernet or Fibre Channel switch module, IBM BladeCenter Optical Pass-Thru Module, I/O adapter, or other optional device that can be installed in the BladeCenter unit, see the applicable *Hardware Maintenance Manual and Troubleshooting Guide* or other documentation that comes with the device for more information.

Problems indicated by the LEDs

The state of the LEDs on the front of the blade can help in isolating problems.

Table 3. Explanation of LEDs and their states

LED	State	Explanation	Suggested action
Blade-error LED	Amber	A system error has occurred on the blade server. Information about a system error for this blade server has been placed in the BladeCenter system error log. Or the Blade server has been inserted into blade bays 6 and 7, see "Why you should not install the blade server into blade bays 6 and 7" on page 12.	Check the BladeCenter error log, see "Problem reporting" on page 28.
Information LED	Amber	Not used / supported	Not applicable
Activity LED	Green	There is network activity.	No action required
Power-on LED	Flashing rapidly	The service processor on the blade server is communicating with the BladeCenter Management Module.	No action required
	Flashing slowly	The blade server has power but is not turned on.	Turn on if required
	Lit continuously (steady)	The blade server has power and is turned on.	No action required
	Not lit.	Blade server not powered.	<ol style="list-style-type: none"> 1. Reseat blade server. 2. Check if BladeCenter power supplies numbers 3 and 4 are installed and powered. If they are not, install and power them or use slots 1-5. 3. Go to "Power problems" on page 15

Power problems

Power symptom	Suggested action
The blade server does not turn on.	<ol style="list-style-type: none"> 1. Make sure that: <ol style="list-style-type: none"> a. The power-on 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 is in blade bays 7 through 14, power modules are in power-module bays 1, 2, 3, and 4. d. The power-on LED on the blade-server control panel is flashing slowly. <ul style="list-style-type: none"> • If the power-on LED is flashing rapidly and continues to do so, the blade server is not communicating with the management module; reseal 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 make sure), or the blade server was instructed through the management module (Web interface) to turn on. f. The blade is installed in any two blade bays except 6/7. This is because blade bays 1-6 are in power domain one, but blade bays 7-14 are in power domain two, and the BladeCenter QS20 cannot straddle two power domains. If the blade is accidentally inserted into blade bays 6/7, see “Why you should not install the blade server into blade bays 6 and 7” on page 12. 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, you need to get a trained service technician to replace the system blade assembly.

Network connection problems

Network connection symptom	Suggested action
One or more blade servers are unable to communicate with the network.	<p>Make sure that:</p> <ul style="list-style-type: none"> • The switch modules for the network interface being used are installed in the correct BladeCenter bays and are configured and operating correctly. • The settings in the switch module are correct for the blade server (settings in the switch module are blade server specific). <p>For additional information, see:</p> <ul style="list-style-type: none"> • <i>BladeCenter QS20 Installation and User's Guide</i> • The following documentation: <ul style="list-style-type: none"> – <i>IBM BladeCenter (Type 8677) Hardware Maintenance Manual and Troubleshooting Guide</i> <p>Note: For the latest editions of the IBM BladeCenter documentation, go to http://www.ibm.com/pc/support/ on the World Wide Web.</p> <ul style="list-style-type: none"> • Other product-specific documentation that comes with the switch module <p>If the problem remains, see “Solving undetermined problems” on page 29.</p>

Service processor problems

Service processor symptom	Suggested action
Service processor reports a general monitor failure.	<ol style="list-style-type: none">1. If the blade server is operating, shut down the operating system.2. If the blade server was not turned off, press the power-control button (behind the blade server control-panel door) to turn off the server.3. Remove the blade server from the BladeCenter unit.4. Wait 30 seconds and reinstall the blade server into the BladeCenter unit.5. Restart the blade server. <p>If the problem remains, see “Solving undetermined problems” on page 29</p>

Software problems

Symptom	Suggested action
You suspect a software problem.	<ol style="list-style-type: none">1. To determine whether the problem is caused by the software, make sure that:<ul style="list-style-type: none">• the blade server has the minimum memory that is needed to use the software. For memory requirements, see the information that comes with the software.• The software is designed to operate on the blade server.• Other software works on the blade server.• The software works on another server.2. If you received any error messages when using the software, see the information that comes with the software for a description of the messages and suggested solutions to the problem.3. Contact the software vendor.

Firmware startup process

The firmware displays the progress of the startup process on the serial console from the time that ac power is connected to the system until the operating system login prompt is displayed after a successful operating system startup.

If the firmware encounters an error during the startup process, a message describing the error together with an error code is displayed on the serial console.

There are two types of error, where xxx represents the number of the error code:

- | | |
|-------------|--|
| Cxxx | This is an internal checkpoint. If the system hangs during the startup process and displays this type of error, contact a service support representative. |
| Exxx | This type of error means that there is a failure that does not allow the firmware to continue the startup process. Check the error codes in the section “Boot errors and handling” on page 20. If these do not help resolve the problem, contact a service support representative. |

Recovering the system firmware code

The system firmware is contained in two separate images in the flash memory of the blade server: temporary and permanent. These images are referred to as TEMP and PERM, respectively. The system normally starts from the TEMP image, and the PERM image serves as a backup. If the TEMP image becomes damaged, such as from a power failure during a flash update, you can recover the TEMP image from the PERM image.

If the TEMP image becomes damaged, you can see one of two symptoms:

- The system automatically starts from the PERM image. To check whether the system has started from the PERM image, enter:

```
cat /proc/device-tree/openprom/ibm,fw-bank
```

A P is returned.

- The system hangs or is non-responsive after the system is started with no checkpoints.

Starting the TEMP image

To force the system to start the TEMP image, complete the following steps:

1. Turn off the blade server.
2. Restart the blade system management processor from the management module.
3. Turn on the blade server.

Note: If the blade server does not restart, you must replace the system-board assembly. Contact a service support representative for assistance.

Recovering the TEMP image from the PERM image

To recover the TEMP image from the PERM image, you must perform the reject function. The reject function copies the PERM image into the TEMP image. To perform the reject function, complete the following steps:

1. If you have not installed the ppc64 Linux utilities, perform the installation now. For instructions, go to the Linux on POWER™ Web site at <http://techsupport.services.ibm.com/server/lopdiags/>.
2. Reject the TEMP image. Using the Linux operating system, type the following command:

```
echo 1> /proc/rtas/manage_flash
```
3. Shut down the blade server using the operating system.
4. Restart the blade system management processor from the management module.
5. Turn on the blade server.

You might need to update the firmware code to the latest version. See “Upgrading the system firmware” on page 33 for more information on updating the firmware code.

Booting the system

This section provides an overview on how to interpret the console output of the host firmware. The output is grouped into several parts, which are detailed below.

1. The first part of the boot process displays the system name and build date.

```
*****
CellBlade1 starting. Check Boot ROM...OK, FW is [Feb 14 2006 10:16:17]
```

Note: If the flash image is corrupted, an error is displayed.

2. The memory is initialized. It takes several seconds to initialize the Rambus memory. The screen displays details of the vendor and the speed of memory modules.

```
MEMORY
Modules      = Samsung 256MB, 3200 Mhz
XDRLibrary   = v0.32, Bin A/C, RevB, DualDD
Calibrate    = Done
```

3. The next screen displays system information. It shows revision information about the chipset, SMP size, boot date/time, and the available memory.

```
SYSTEM INFORMATION
Processor    = Cell BE(TM) DD3.1
I/O Bridge  = SB 3.2
Timebase    = 14318 kHz (external)
SMP Size    = 2 (4 threads)
Boot-Date   = Feb 14 2006 11:41
Memory      = 1024MB (BE0: 512MB, BE1: 512MB)
```

4. The open firmware section provides checkpoints and an overview of which adapters are available in the system. The details of the adapter list are not meaningful.

Note: The warning (!) Permanent Boot ROM is only be displayed if host firmware boots from PERM and not TEMP.

```
OPENFIRMWARE
SLOF Setup = (!) Permanent Boot ROM
SLOF Setup = Adapters:
              5000 : 1095 680      Si10680
SLOF Setup = Ready
```

5. The build ref displays the host firmware image version.

```
Build Ref = CB1-FW-6.06.00@release
```

6. The legal information, keystroke and command hints are displayed. After this, the operating system boots.

Welcome to Open Firmware
Copyright International Business Machines Corporation 2004 – 2006
US Government Users Restricted Rights -- Use, duplication or
disclosure restricted by GSA ADP Schedule Contract with IBM Corp.
Cell BE is a trademark of SONY Computer Entertainment Inc.

Type 'boot' and press return to continue booting the system.
Type 'reset-all' and press enter to reboot the system.

Supported boot media

The BladeCenter QS20 can boot either from its local hard disk drive or from the network subject to the following restrictions:

- Locally attached ATA hard disk drive
 - Only yaboot is supported and must be installed on the Master Boot Record
 - Use the Management Module set the boot list to Disk0.
- Standard Bootp/TFTP network boot
 - Only the built-in Gigabit Ethernet Controller of I/O Bridge is supported
 - Only boot through the Ethernet switch on the top side of BladeCenter
 - No fall back or configurable change to the bottom switch is possible
 - Supported switch vendors are: Dlink, Nortel, and Cisco
 - In the Management Module you need to set boot list to “Network”
 - There is no support for a router between the blade and TFTP server. Only local TFTP is supported.

Configure the required boot mode using the Management Module. See *IBM BladeCenter Management Module Installation Guide* for more information.

Boot errors and handling

The following sections describe boot errors and actions you can take to resolve these errors.

Boot list

The following table describes boot list errors.

Table 4. Boot list errors

Message: “It was not possible to boot from any device specified in the VPD”	
Reason	The firmware found a valid VPD but it could not find bootable code on any of the devices listed in it.
Action	Specify at least one device in the BladeCenter Management Module that contains bootable code. You need to access the Management Module through its web interface and direct your browser to Blade Tasks → Configuration → Boot Sequence .
Message: “Boot list successfully read from VPD but no useful information received”	
Reason	The firmware found a valid VPD, but there are no devices listed in it. The VPD has never been initialized.
Action	Specify at least one device in the BladeCenter Management Module that contains bootable code. You need to access the Management Module via its web interface and direct your browser to Blade Tasks → Configuration → Boot Sequence .
Message: “Boot list could not be read from VPD”	
Reason	The firmware can not access the VPD. It is possible that a service processor communication failure occurred.
Action	Remove the Blade server, reinsert and restart it. If the problem persists, replace the system board assembly.

Disk boot (yaboot)

The following table describes disk boot (yaboot) errors.

Table 5. Disk boot (yaboot) errors

Message: “Unable to open file, Invalid device”	
Reason	The boot loader was invoked with the wrong parameters. It could not find a file that contained bootable code at the location specified.
Action	Check that the parameters that you pass to yaboot describe the correct device name, partition number and file system path. For more information, refer to the yaboot documentation distributed with the yaboot source (HOWTO-Booting with yaboot on PowerPC).
Message: “Couldn’t determine boot device”	
Reason	The boot loader was invoked without specifying the location of boot code.
Action	Ensure that correct parameters are passed to yaboot, by either using the firmware environment variables or passing them in the yaboot config file <code>yaboot.conf</code> .

Network boot

The following table describes the network boot errors.

Table 6. Network boot errors

Message: "E3000: Could not read MAC address".	
Reason	The firmware cannot establish a communication socket for booting over network. This is due to an error that occurred when it tried to retrieve the MAC address of the network device.
Action	If the problem persists after power cycling the blade, contact IBM support.
Message: "E3001: Could not get ip address"	
Reason	The BOOTP server is not responding. Another possible reason could be a MAC address conflict in your network.
Action	Check that your BOOTP server is available and IP addresses are correctly assigned. Also check that your MAC address is valid and is unique across your network.
Message: "E3002: ARP request to TFTP server (xx.xx.xx.xx) failed aborting"	
Reason	After having received an IP address from the BOOTP server the Blade tries to resolve the IP address of the TFTP server using ARP. The Blade tries this for 30 seconds and aborts with this error message if it fails.
Action	Make sure that the TFTP server is on the same subnet with no router in between and that the TFTP server is reachable from the Blade.
Message: "E3003: TFTP: Could not load file <filename>"	
Reason	The blade failed to load a file via tftp. The reason for the error is always printed out before this error message. Following error conditions could occur: <ul style="list-style-type: none"> • ERROR: file not found • ERROR: access violation • ERROR: illegal TFTP operation • ERROR: unknown transfer ID • ERROR: no such user • ERROR: unknown error <p>Note: These errors are the default errors defined by the TFTP protocol in RFC 1350.</p>
Action	To resolve these errors make sure the Blade is able to make a TFTP connection to the server, that the file exists and has the correct access rights.
Message: "E3004: TFTP: Buffer too small for <filename>"	
Reason	The file which the blade is trying to download is larger than the maximum supported file size in the Firmware for downloads.
Action	Use a file smaller than 16MB.
Message: "E0005: ICMP ERROR: Destination unreachable"	
Reason	The TFTP server cannot be reached.
Action	Check that your TFTP server is available and set up correctly.
Message: "E0005: ICMP ERROR: Destination unreachable"	
Reason	The TFTP server cannot be reached.
Action	Check that your TFTP server is available and set up correctly.

Message: "ERROR: file not found"	
Reason	The TFTP server received a valid request but is not able to satisfy it.
Action	Check the filename and the permissions of the file that should be downloaded.
Message: "ERROR: access violation"	
Reason	The TFTP server received a valid request but is not able to satisfy it.
Action	Check the filename and the permissions of the file that should be downloaded.
Message: "ERROR: illegal TFTP operation"	
Reason	The TFTP server received a valid request but is not able to satisfy it.
Action	Check the filename and the permissions of the file that should be downloaded.
Message: "ERROR: unknown transfer ID"	
Reason	The TFTP server cannot assign the data to a UDP packet based on its transfer ID. It could be that another client is using the transfer ID for this connection.
Action	Reboot and retry the transfer. If the problem persists check the configuration of your TFTP server with regards to the utilization of UDP ports.
Message: "ERROR: no such user"	
Reason	The TFTP server received a valid request but is not able to satisfy it.
Action	Check the filename and the permissions of the file that should be downloaded.
Message: "ERROR: unknown error"	
Reason	The TFTP server received a valid request but is not able to satisfy it.
Action	Check the filename and the permissions of the file that should be downloaded.
Message: "TFTP: Received block <no>, expected block was <no>"	
Reason	The TFTP client received a packet that is out of order.
Action	Reboot and retry the transfer.

Other error messages

The following table describes other error messages that can be displayed.

Table 7. Other error messages

Message: "E1001 - Boot ROM CRC failure"	
Reason	The firmware image was found to be inconsistent during startup. This inconsistency could be due to image corruption during the flash update or can indicate a hardware problem.
Action	The boot watchdog triggers. Reject the malfunctioning flash image as described "Recovering the TEMP image from the PERM image" on page 17. If the problem persists, you need to get a trained service technician to replace the system board assembly.
Message: "E1002 - Memory could not be initialized"	
Reason	The firmware encountered an error during the memory initialization.
Action	The boot watchdog automatically boots the system from the permanent flash side. The malfunctioning firmware image should be rejected according to "Recovering the TEMP image from the PERM image" on page 17. If the problem persists with the PERM image, you need to get a trained service technician to replace the system board assembly.
Message: "E1003 - Firmware image incomplete"	
Reason	The firmware detected missing components and cannot continue execution.
Action	The boot watchdog automatically boots the PERM firmware image. The malfunctioning firmware image should be rejected according to "Recovering the TEMP image from the PERM image" on page 17. If the problem persists with the PERM image, you need to get a trained service technician to replace the system board assembly.
Message: "E1004 - Unspecified Internal Firmware Error"	
Reason	The firmware encountered an unexpected error condition.
Action	The boot watchdog automatically boots the PERM firmware image. The malfunctioning firmware image should be rejected as described in "Recovering the TEMP image from the PERM image" on page 17. Contact IBM support to report the conditions under which the error occurred, and get a trained service technician to replace the system board assembly.

Service processor log message IDs

The following is a description of the service processor (H8) log message IDs that are sent to the Management Module:

There are three types of log IDs:

- Error log IDs
- Warning log IDs
- Information log IDs

Error log IDs

Note: The following error messages suggest that there is a problem with the **battery**:

D0: No response from clock device XCG0 (BE PLL)
D1: No response from clock device XCG1 (RC)
D2: No response from clock device XCG2 (Y)
DA: No response from an unknown clock device

The following is a list of error log IDs.

AA: BE0 attention line did not get high in step 1
AB: BE1 attention line did not get high in step 1
AC: BE0 attention line did not get high in step 2
AD: BE1 attention line did not get high in step 2
AE: BE0 attention line did not get high in step 3
AF: BE1 attention line did not get high in step 3
AG: BE0 attention line did not get high in step 4
AH: BE1 attention line did not get high in step 4
AI: BE0 attention line did not get high in step 5
AJ: BE1 attention line did not get high in step 5
AK: BE0 Poll 1 did not return expected value
AL: BE1 Poll 1 did not return expected value
AM: BE0 Poll 2 did not return expected value
AN: BE1 Poll 2 did not return expected value
AO: BE0 Poll 3 did not return expected value
AP: BE1 Poll 3 did not return expected value
AQ: BE0 Poll 4 did not return expected value
AR: BE1 Poll 4 did not return expected value
AS: BE0 Poll 5 did not return expected value
AT: BE1 Poll 5 did not return expected value
AU: BE0 VID value that is read out is not valid
AV: BE1 VID value that is read out is not valid
AW: BE0 Poll 7 did not return expected value
AX: Hardware revision read from the VPD is not supported or invalid
AY: SB0 UART request did not return expected value
AZ: SB1 UART request did not return expected value
BA: BE0 does not request configuration data
BB: BE1 does not request configuration data
BC: BE0 does not request RRAC training
BD: BE1 does not request RRAC training
BE: BE0 does not request bus credentials
BF: BE1 does not request bus credentials
BG: BE0 still needs attention after init procedure is is done
BH: BE1 still needs attention after init procedure is is done
BI: BE0 RRAC training failed
BJ: BE1 RRAC training failed
BK: BE0 IOC init failed
BL: BE1 IOC init failed
BM: BE thermal alert from temperature monitor ADT7467
BN: BE0 thermal alert pin goes high
BO: BE1 thermal alert pin goes high
BP: BE0 TX_PLL status not correct during RRAC BE to BE init
BQ: BE1 TX_PLL status not correct during RRAC BE to BE init
BR: BE0 RX_PLL status not correct during RRAC BE to BE init
BS: BE1 RX_PLL status not correct during RRAC BE to BE init
BT: BE0 RX status not correct during RRAC BE to BE cal (bit training)
BU: BE1 RX status not correct during RRAC BE to BE cal (bit training)
BV: BE0 RX status not correct during RRAC BE to BE cal (parallel and slice)
BW: BE1 RX status not correct during RRAC BE to BE cal (parallel and slice)
BX: BE0 RX status not correct during RRAC BE Byte training
BY: BE1 RX status not correct during RRAC BE Byte training
CA: BE0 RX status not correct during cw_rracup_sb_hr RRC0
CB: BE1 RX status not correct during cw_rracup_sb_hr RRC1
CI: BE0 RX status not correct during RRAC SB Byte training
CJ: BE1 RX status not correct during RRAC SB Byte training
CK: BE0 RX4 phase cal status not correct during SB0 bit training
CL: BE1 RX4 phase cal status not correct during SB1 bit training
CM: SB0 RX0 phase cal status not correct during SB0 bit training
CN: SB1 RX0 phase cal status not correct during SB0 bit training
CO: BE0 RX4 parallel and slice cal status not correct during SB0 bit training

CP: BE1 RX4 parallel and slice cal status not correct during SB0 bit training
 CQ: SB0 RX0 parallel and slice cal status not correct during SB0 bit training
 CR: SB1 RX0 parallel and slice cal status not correct during SB0 bit training
 CS: BE0 BX0 status A not correct during RRAC SB bit training
 CT: BE1 BX0 status A not correct during RRAC SB bit training
 CU: BE0 BX1 status A not correct during RRAC SB bit training
 CV: BE1 BX1 status A not correct during RRAC SB bit training
 CW: BE0 BX0 status B not correct during RRAC SB bit training
 CX: BE1 BX0 status B not correct during RRAC SB bit training
 CY: BE0 BX1 status B not correct during RRAC SB bit training
 CZ: BE1 BX1 status B not correct during RRAC SB bit training
 C1: BE0 TX6 PLL status not correct during RRAC SB bit training
 C2: BE1 TX6 PLL status not correct during RRAC SB bit training
 C3: BE0 RX4 PLL status not correct during RRAC SB bit training
 C4: BE1 RX4 PLL status not correct during RRAC SB bit training
 C5: Failed to set BE0 Volterra VID. Possibly core voltage out of allowed limit
 C6: Failed to set BE1 Volterra VID. Possibly core voltage out of allowed limit
 C7: BE0 Poll 6 did not return expected value
 C8: BE1 Poll 6 did not return expected value
 C9: BE0 RX_G1_RX_STATUS not correct during RRAC BE to BE cal
 C0: BE1 RX_G1_RX_STATUS not correct during RRAC BE to BE cal
 D0: No response from clock device XCG0 (BE PLL)
 D1: No response from clock device XCG1 (RC)
 D2: No response from clock device XCG2 (Y)
 DA: No response from an unknown clock device
 DB: No response from at least one of the Volterra power supply devices
 DC: No response from the ADT7467 remote thermal monitor and fan controller
 DD: There are not enough timer available to schedule the H8 program
 DE: H8 program selftest failed with application error
 DF: H8 program selftest failed with ROM error
 DG: H8 program selftest failed with RAM error
 DH: H8 program selftest failed with external reset error. E.g. H8 watchdog triggered reboot.
 DI: No response from the VPD memory chip
 DJ: The VID that is set in the volterra master device does not match to the target VID
 DK: No response from PS1 Volterra master device during VID read/write
 DL: No response from PS2 Volterra master device during VID read/write
 DM: No response from PS3 Volterra master device during VID read/write
 DN: No response from PS4 Volterra master device during VID read/write
 DO: No response from PS1 Volterra master device during junction temperature read
 DP: No response from PS2 Volterra master device during junction temperature read
 DQ: No response from PS3 Volterra master device during junction temperature read
 DR: No response from PS4 Volterra master device during junction temperature read
 E1: Boot from NVRAM permanent side failed. Both sides are broken.
 EA: 12 V controller reported over current after power up of stage 0
 EB: 12 V controller reported over current after power up of stage 1
 EC: 12 V controller reported over current after power up of stage 2
 ED: 12 V controller reported over current after power up of stage 3
 EE: 12 V controller reported over current after power up of stage 4
 EF: 12 V controller reported over current during continuous monitoring
 EG: Power stage 0 did not come up within specified time range
 EH: Power stage 1 did not come up within specified time range
 EI: Power stage 2 did not come up within specified time range
 EJ: Power stage 3 did not come up within specified time range
 EK: Power stage 4 did not come up within specified time range
 EL: Power stage 0 failed during monitoring
 EM: Power stage 1 failed during monitoring
 EN: Power stage 2 failed during monitoring
 EO: Power stage 3 failed during monitoring
 EP: Power stage 4 failed during monitoring
 EQ: Stage 0 can not be powered down
 ER: Stage 1 can not be powered down
 ES: Stage 2 can not be powered down
 ET: Stage 3 can not be powered down
 EU: Stage 4 can not be powered down
 EV: At least one Volterra master supply reported over voltage after power up of stage 0
 EW: At least one Volterra master supply reported over voltage after power up of stage 1
 EX: At least one Volterra master supply reported over voltage after power up of stage 2

EY: At least one Volterra master supply reported over voltage after power up of stage 3
 EZ: At least one Volterra master supply reported over voltage after power up of stage 4
 F1: At least one Volterra master supply reported over voltage during continuous monitoring
 F3: At least one Volterra slave supply reported voltage fault after power up of stage 0
 F4: At least one Volterra slave supply reported voltage fault after power up of stage 1
 F5: At least one Volterra slave supply reported voltage fault after power up of stage 2
 F6: At least one Volterra slave supply reported voltage fault after power up of stage 3
 F7: At least one Volterra slave supply reported voltage fault after power up of stage 4
 F8: At least one Volterra slave supply reported voltage fault during continuous monitoring
 FA: Monitored voltage 1.800 V 1.8V_SB_RAMBUS failed maverick limits
 FB: Monitored voltage 1.200 V 1.2V_VDDIO failed maverick limits
 FC: Monitored voltage 1.120 V BE0_VDDC failed maverick limits
 FD: Monitored voltage 1.120 V BE1_VDDC failed maverick limits
 FE: Monitored voltage 2.500 V failed maverick limits
 FF: Monitored voltage 12.00 V +12V_PCIE failed maverick limits
 FG: Monitored voltage 3.300 V 3.3V_SB_VDD failed maverick limits
 FH: Monitored voltage 1.200 V SB_VDDIO failed maverick limits
 FI: Monitored voltage 1.800 V 1.8V_SB failed maverick limits
 FJ: Monitored voltage 1.500 V SB_VDDA_VTERM failed maverick limits
 FK: Monitored voltage 1.500 V 1.5V_VDDA_BE0 failed maverick limits
 FL: Monitored voltage 1.500 V 1.5V_VDDA_BE1 failed maverick limits
 FM: Monitored voltage 5.000 V +5V_HDD failed maverick limits
 FN: Monitored voltage PC12V1_GATE1 failed maverick limits
 FO: Monitored voltage PC12V1_GATE2 failed maverick limits
 FP: Monitored voltage PC12V1_GATE2 failed maverick limits
 G1: The blade has been inserted into the Blade Center in a forbidden slot.
 G2: BE0 indicates a checkstop condition.
 G3: BE1 indicates a checkstop condition.
 G4: The system info could not be read from VPD
 G5: The BE core voltages can not be read from VPD during device initialization because VPD is constantly busy
 G6: The revision ID of the ICS9214 clock multiplier chip is not supported
 GA: Junction temperature of Volterra master device PS1 exceeded maximum limit
 GB: Junction temperature of Volterra master device PS2 exceeded maximum limit
 GC: Junction temperature of Volterra master device PS3 exceeded maximum limit
 GD: Junction temperature of Volterra master device PS4 exceeded maximum limit

Warning log IDs

W1: NVRAM boot bank is switched to permanent side due to watchdog trigger
 W2: OS surveillance watchdog triggered system reset
 W3: No response from the ADT7467 remote thermal monitor and fan controller. Retry is done.
 W4: It was tried to access the VPD while it was busy
 W5: No valid BE core voltage stored in VPD. Default values are used.
 W6: Tried to set Volterra VID but set process is still busy
 W7: One retry was required to set the Volterra VID
 W8: One retry was required to read the Volterra VID
 W9: Three consecutive readings form VID register do not match
 WA: Monitored voltage 1.800 V 1.8V_SB_RAMBUS failed spec limits
 WB: Monitored voltage 1.200 V 1.2V_VDDIO failed spec limits
 WC: Monitored voltage 1.120 V BE0_VDDC failed spec limits
 WD: Monitored voltage 1.120 V BE1_VDDC failed spec limits
 WE: Monitored voltage 2.500 V failed spec limits
 WF: Monitored voltage 12.00 V +12V_PCIE failed spec limits
 WG: Monitored voltage 3.300 V 3.3V_SB_VDD failed spec limits
 WH: Monitored voltage 1.200 V SB_VDDIO failed spec limits
 WI: Monitored voltage 1.800 V 1.8V_SB failed spec limits
 WJ: Monitored voltage 1.500 V SB_VDDA_VTERM failed spec limits
 WK: Monitored voltage 1.500 V 1.5V_VDDA_BE0 failed spec limits
 WL: Monitored voltage 1.500 V 1.5V_VDDA_BE1 failed spec limits
 WM: Monitored voltage 5.000 V +5V_HDD failed spec limits
 WN: Monitored voltage PC12V1_GATE1 failed spec limits
 WO: Monitored voltage P12V2_GATE2 failed spec limits
 WP: Monitored voltage P12V3_GATE2 failed spec limits
 WX: It has been tried to change power permission on a powered up system. This is illegal. Request is ignored.

- WY: The power permission that has been received from the Management Module is not sufficient to power on the system
- WZ: The slot number has not been read at the time power permission has be tried to be granted.

Information log IDs

- I1: Device initialization successful
- I2: Power permission has been granted by Management Module
- I3: Power on request came in from front panel power switch (white button)
- I4: Power on request came in from Management Module
- I5: Power on request came in from RTAS (Host FW)
- I6: Power on request came in from an unknown source
- I7: Power on request was set after reset request
- I8: Power off request came in from front panel power switch (white button)
- I9: Power off request came in from Management Module
- IA: Power off request came in from RTAS (Host FW)
- IB: Power off request came in from an unknown source
- ID: Power reset request from Management Module
- IE: Power reset request from RTAS (Host FW)
- IF: Power reset request from an unknown source
- IG: Power reset request from front panel reset switch
- IH: Power reset request came in after unsuccessful device initialization
- II: Power reset request came from POST watchdog
- IJ: Power reset request came from OS surveillance watchdog
- J2: 1e2 successful stress cycles completed
- J3: 1e3 successful stress cycles completed
- J4: 1e4 successful stress cycles completed
- J5: 1e5 successful stress cycles completed
- J6: 1e6 successful stress cycles completed

Service processor compliance with BladeCenter Standards

The Integrated System Management processor (ISM) interacts with the BladeCenter Management Module according to the Management Module specification. However, there are hardware restrictions and this means that the following functionality does not comply with the specifications:

- **Number of monitored supply voltages**

The ISM processor sends warning alerts to the Management Module in cases where one or more supply voltages are beyond specified limits. The ISM monitors sixteen supply voltages but the Management Module only monitors eight voltages. In cases where voltages nine to sixteen fail, the alert is not recorded in the Management Module event log.

- **Supply voltage values**

There is a naming mismatch for voltage failures in the event log. The following table matches the expected Management Module with the actual BladeCenter QS20 ISM voltages.

Table 8. Management Module and ISM voltages

Management Module displayed voltage	ISM reported voltage
12.00v	1.80v
5.00v	1.20v
3.30v	1.12v
2.5v	1.12v
1.5v	2.5v
1.25v	12.00v
1.20v	3.3v

Table 8. Management Module and ISM voltages (continued)

Management Module displayed voltage	ISM reported voltage
1.80v	1.20v

- **Supply voltage display**

Only a selection of five measured supply voltages are displayed by the Management Module in the voltage table (rows one to five). Table row entries six and seven have no meaning.

Table 9. Management Module voltage table

Source	Value	Warning
+ 5v	+ 4.98	(+ 4.75, + 5.25)
+ 3.3v	+ 3.35	(+ 3.14, + 3.47)
+ 12v	+ 12.00	(+ 11.40, + 12.60)
+ 2.5v	+ 2.47	(+ 2.38, + 2.63)
+ 1.5v	+ 1.51v	(+ 1.43, + 1.58)
+ 1.25v	N/A	N/A
VRM1	+ 16.55	N/A

- **Restart options**

The following restart options restart the BladeCenter QS20 without the indicated special behavior:

- Restart BladeCenter QS20 and clear NVRAM
- Restart BladeCenter QS20 with Diagnostic Boot
- Restart BladeCenter QS20 with Diagnostic Boot and Default Bootlist
- Restart BladeCenter QS20 with NMI

Problem reporting

Firmware logs and Firmware settings are located in the system's NVRAM. In the case of an error where IBM support is needed, follow this process to provide the BladeCenter QS20 firmware log information:

1. Boot Linux.
2. Log in as root.
3. Extract the log with this command:


```
cat /dev/nvram > /tmp/cb1-fw-nvram.img
```
4. Create a problem description in the /tmp/PROBLEM.txt file.
5. Go to the Management Module Web interface of the blade and save or note the following:
 - Event Log to the text file cb1-event-log.txt
 - Hardware VPD
 - Firmware VPD
 - The slot in which the problem blade is installed
6. Make the package with this command:


```
tar cvfz cb1-error-log-<customer>-<date>.tgz \
/tmp/PROBLEM.txt /tmp/cb1-fw-nvram.img
```

where:

<customer>

Contains a short name of the customer.

<date>

Contains the creation date.

7. Provide IBM support with the `tgz` file.

Problem description

The problem description must be put into `/tmp/PROBLEM.txt` with the addition of the following information:

- Customer name and address
- Name of person who created the log including contact information
- Date, time
- Machine slot position in BladeCenter
- Machine serial number (S/N) (take from Management Module)
- Service Processor Version (take from Management Module)
- Linux Kernel version (make a note if this is a private build)

Solving undetermined problems

Note: When you are diagnosing a problem in the blade server, you must determine whether the problem is in the blade server or in the BladeCenter unit.

- If all of the blade servers have the same symptom, the problem is probably elsewhere in the infrastructure. For more information, see the *Hardware Maintenance Manual and Troubleshooting Guide* or *Problem Determination and Service Guide* for your BladeCenter unit.
- If the BladeCenter unit contains more than one blade server and only one of the blade servers has the problem, troubleshoot the blade server that has the problem.

If the blade server is inoperative, use the information in this section.

If you suspect that a software problem is causing failures (continuous or intermittent), see “Software problems” on page 16.

Check the LEDs on all the power supplies of the BladeCenter unit in which the blade server is installed. If the LEDs indicate that the power supplies are working correctly and reseating the blade server does not correct the problem, complete the following steps:

1. Turn off the blade server.
2. Remove the blade server from the BladeCenter unit and remove the cover.
3. Make sure that the control panel connector is correctly seated on the system board (see “Removing the blade-server bezel assembly” on page 45 for the location of the connector).
4. If no LEDs on the control panel are working, replace the bezel assembly; then, try to turn on the blade server from the management module (see the documentation for the BladeCenter unit and Management Module for more information).
5. Reinstall the blade server and check. If the blade server remains inactive, continue with step 6.
6. Turn off the blade server.
7. Remove the blade server from the BladeCenter unit and remove the cover.

8. Remove or disconnect the following devices one at a time, if installed, until you find the failure:
 - InfiniBand card
 - Hard disk drive
 - PCI-Express card

Reinstall, turn on, and reconfigure the blade server each time.

If the problem is solved when you remove the device from the blade server but the problem recurs when you reinstall the same device, suspect the device; if the problem recurs when you replace the device with a different one, suspect the system board. Have a trained service technician replace the system board assembly.

If you suspect a networking problem and the blade server passes all the system tests, suspect the network switch.

Note: The problem may concern the network and be external to the system.

Calling IBM for service

See Appendix A, “Getting help and technical assistance,” on page 63 for information about calling IBM for service.

When you call for service, have as much of the following information available as possible:

- Machine type and model
- Microprocessor and hard disk drive upgrades
- Failure symptoms
 - Does the blade server fail the diagnostic programs? If so, what are the error codes?
 - What occurs? When? Where?
 - Is the failure repeatable?
 - Has the current server configuration ever worked?
 - What changes, if any, were made before it failed?
 - Is this the original reported failure, or has this failure been reported before?
- Diagnostic program type and version level
- Hardware configuration (print screen of the system summary)
- BIOS code level
- Operating-system type and version level

You can solve some problems by comparing the configuration and software setups between working and nonworking servers. When you compare servers to each other for diagnostic purposes, consider them identical only if all the following factors are exactly the same in all the blade servers:

- Machine type and model
- Firmware level
- Adapters and attachments, in the same locations
- Address jumpers, terminators, and cabling
- Software versions and levels
- Configuration option settings

- Operating system control file setup

Chapter 3. Configuring the blade server

This sections describes how to update the BladeCenter QS20 firmware.

Upgrading the system firmware

The following section describes how to update the firmware.

BladeCenter QS20 firmware contains a proprietary implementation of Cell BE hardware initialization code. The user and operating system interfaces are based on the Open Firmware standard. Detailed system information is provided through the Open Firmware device tree. You can use the client interface and Run-Time Abstraction Services (RTAS) to run management functions.

Firmware package and contents

The firmware consists of :

- A firmware package, which runs on the Cell BE (Host FW)
- A firmware package for the on-board service processor (SP FW)

Both packages follow the same versioning scheme. You must ensure that both versions are the same when you perform an upgrade. Table 10 describes the firmware files.

Table 10. Firmware files

Filename	Description
CB1-FW-<version>-boot_rom.bin	Image for flashing through Linux
CBlade-<version>.pkt	Firmware image to flash the service processor using the BladeCenter Management Module.

Installing the firmware

You only need to install the BladeCenter QS20 firmware if you need to do either of the following:

- Upgrade to a newer version
- Downgrade to an older version if there are problems with the current version

The firmware for the on-board service processor can only be installed using the standard firmware update feature of the BladeCenter Management Module. For more information, see the Management Module documentation or ask your IBM support representative.

Host FW can only be installed using the Linux operating system. If Linux is not installed or cannot be started, then no upgrade or recovery is possible. Call your IBM support representative. Linux needs to have a current version of `rtas_flash` device driver installed. For instructions about how to get this driver and how to install it, read the <http://www.bsc.es/projects/deepcomputing/linuxoncell/users manual>.

This device driver offers a number of different methods for installing and managing a system flash using the `/proc` interface. The script, `update_flash`, simplifies the procedure, and your Linux distributor should provide you with this script. For more information, see the *BladeCenter QS20 SDK Toolkit Installation and Users Guide*.

Installing the firmware manually

Where older versions of the `update_flash` script exist on your system or where it is not installed you can use `rtas_flash` over `/proc`. To install the firmware, do the following:

1. Ensure the `rtas-flash` driver is loaded. To do this, run `lsmod`.
2. If the module is not yet in the kernel, invoke the following to load it:

```
modprobe rtas_flash
```
3. To update your current firmware, copy the image file to `/proc/ppc64/rtas/flash_update` and reboot manually:

```
cp <image-file> /proc/ppc64/rtas/flash_update  
shutdown -r now
```

Updating the host and service processor images

To update the host and service processor images, do the following:

1. Boot the operating system if it is not running already.
2. Update the host firmware image as described in the section above.
3. Restart the blade.
4. Shut down the blade.
5. Update the service processor firmware using the Management Module.

Updating the host firmware on PERM

To update an old image on PERM you must copy the TEMP image to PERM side. The command is:

```
echo 0 > /proc/rtas/manage_flash.
```

Note: The script checks whether the board is booted from the TEMP image. If not, the script does not complete.

System firmware user interface

BladeCenter QS20 system firmware is an Open Firmware implementation. When you enter the system firmware user interface, you see the Open Firmware command prompt. You should only access the user interface if you intend to use one of the supported Open Firmware commands.

Attention: Use the user interface with care. It is possible to damage the system configuration when you use the Open Firmware prompt.

To enter the Open Firmware prompt, press `s` to stop the automatic boot process.

Supported commands

The following commands are supported:

Table 11. Supported commands

Command	Description
setenv	Allows modification of an Open Firmware environment variable. See the Open Firmware Standard for details. Supported variables: <code>boot-file</code> , <code>boot device</code> , <code>boot-command</code> .
nvupdate	Commits changed environment variables to NVRAM.

Table 11. Supported commands (continued)

Command	Description
set-defaults	Writes associated default values into all the environmental variables. Attention: Customization of firmware is removed when you use this command. Use only if the system does not boot anymore. Note: Use nvupdate to commit the changes
boot	Loads the operating system based on setting in Management Module boot sequence. No additional arguments supported.
reset-all	Reboots the blade server.
netboot	Boot from network using BOOTP/TFTP. This is a special implementation of the boot net command, which is not supported with this version of firmware.

After you have modified environment variables, run nvupdate and reboot the operating system with boot or reset-all.

Table 12. Environment variables

Environment variable	Description
boot-file	For disk boot. Contains the yaboot image label and kernel command line for Linux. For example: <code>setenv boot-file linux root=/dev/hda3 console=rtas0</code> Note: Newer kernels can require console=hvc0.
boot-device	Specifies the device for the yaboot loader. Must contain a valid device node from the device tree or a valid device alias. For example: <code>setenv boot-device /pci@24004000000/ata@d/disk@</code> Note: This is the default.
boot-command	Contains the term which is used to boot the operating system. This is boot by default and is not intended to be changed. The variable can be used by system test to execute test cases in the firmware context. Note: You can always bypass the boot-command by pressing s early during the boot process.

System firmware memory map

The BladeCenter QS20 system firmware resides in the memory range between 16MB and 32MB for internal usage. Any secondary boot loader (OF client program) has its own memory map but is required to respect that given range. Further information about the system configuration can be read from the Open firmware device-tree. For information about Cell BE register mappings please refer to the appropriate specifications and data sheets.

System firmware I/O support

BladeCenter QS20 system firmware supports:

- ATA Controller SIL 0680A
- Mellanox InfiniBand MHEA28-1TCSB
- Flash Module

- NVRAM
- UART for serial console
- UART for service processor communication

ATA Controller SIL 0680A

This controller resides on the external PCI interface on Southbridge 0 (BE0). The drive and its associated settings can be found in device-tree. There is no support of any other card in this slot including extender cards.

Mellanox InfiniBand MHEA28-1TCSB

The firmware supports only this PCI-Express card per socket. There are two sockets available, one on each I/O bridge. The card and its settings can be found in device-tree.

Flash Module

The Flash module contains the firmware itself and can be read and written through firmware and Linux.

NVRAM

The NVRAM module contains configuration and logging information of firmware. The NVRAM is mapped into the device tree.

Chapter 4. Parts listing

This parts listing supports BladeCenter QS20 replaceable components. To check for an updated parts list on the Web, do the following:

1. Go to <http://www.ibm.com/support/>.
2. Under **Replace and Upgrade**, select **Parts information**.

Replaceable components

Replaceable components are of three types:

- **Tier 1 customer replaceable unit (CRU):** Replacement of Tier 1 CRUs is your responsibility. If IBM installs a Tier 1 CRU at your request, you will be charged for the installation.
- **Tier 2 CRU:** You may install a Tier 2 CRU yourself or request IBM to install it, at no additional charge, under the type of warranty service that is designated for your server.
- **Field replaceable unit (FRU):** FRUs must be installed only by trained service technicians.

For information about the terms of the warranty and getting service and assistance, see *Warranty and Support Information*.

The following table lists which replaceable components are available for the BladeCenter QS20.

Index	Description	FRU No.	Tier 1 CRU No.	Tier 2 CRU No.
4	Hard disk drive 40GB kit	40M3678		
4	InfiniBand kit	40M3688		
4	Front bezel kit			40M3684
4	Blade kit without InfiniBand card	40M3676		
4	3V lithium battery	40M3682		
4	Disc drive controller kit	40M3680		
4	Serial Cable	40M3686		

Chapter 5. Installing and removing replaceable units

This chapter provides instructions for replacing units on the blade server. Replaceable units are components, such as memory modules, the hard disk drive, and I/O expansion cards. (Some removal instructions are provided in case you need to remove one replaceable unit to install another.)

The following replaceable units are supported:

- Battery
- IDE hard disk (one only)
- The bezel assembly (control panel)
- InfiniBand cards (optional)

Installation guidelines

Before you begin, read the following information:

- Read the safety information beginning on page vii and the guidelines in “Handling static-sensitive devices” on page 40. This information will help you work safely with the blade server and options.
- Read the information in the *BladeCenter QS20 Installation and User's Guide*.
- Back up all important data before you make changes to disk drives.
- Have a small flat-blade screwdriver and a Phillips screwdriver available.
- You do not have to turn off the blade server or disconnect the BladeCenter unit from power to install or replace any of the hot-swap modules on the rear of the BladeCenter unit.
- Before you remove a hot-swap blade server from the BladeCenter unit, you must shut down the operating system by typing the `shutdown -h now` command. If the blade server was not turned off, press the power-control button (behind the blade-server control-panel door) to turn off the blade server. You do not have to shut down the BladeCenter unit itself.
- Blue on a component indicates touch points, where you can grip the component to remove it from or install it in the blade server or BladeCenter unit, 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 blade server or BladeCenter unit and operating system support hot-swap capability, you can remove or install the component while the blade server or BladeCenter unit is running. (Orange can also indicate touch points on hot-swap components.) See the instructions for removing or installing a specific hot-swap component for any additional procedures that you might have to perform before you remove or install the component.

System reliability guidelines

To help ensure proper cooling and system reliability, make sure that:

- The ventilation holes on the blade server are not blocked.
- Each of the blade bays on the front of the BladeCenter unit has a blade server or filler blade installed. Do not operate the BladeCenter unit for more than 1 minute without a blade server or filler blade installed in each blade bay.
- You have followed the reliability guidelines in the documentation that comes with the BladeCenter unit.

- You have not installed any small computer system interface (SCSI) devices. The blade server does not support SCSI devices. If you attach SCSI devices to the blade server, these devices will not be recognized or configured, and they will not operate.

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:

- Limit your movement. Movement can cause static electricity to build up around you.
- Handle the device carefully, holding it by its edges or its frame.
- Do not touch solder joints, pins, or exposed printed circuitry.
- Do not leave the device where others can handle and damage it.
- While the device is still in its static-protective package, touch it to an *unpainted* metal part of the BladeCenter chassis for at least 2 seconds. This drains static electricity from the package and from your body.
- Remove the device from its package and install it directly into the blade server or BladeCenter unit without setting the device down. If it is necessary to set down the device, put it back into its static-protective package. Do not place the device on the blade server cover or on a metal surface.
- Take additional care when handling devices during cold weather. Heating reduces indoor humidity and increases static electricity.
- Wear an electrostatic-discharge wrist strap, if one is available.

Removing the blade server from the BladeCenter unit

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

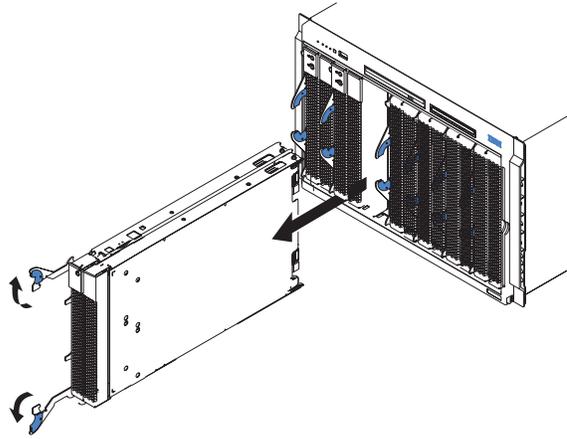


Figure 6. Removing the blade server

Attention:

- To maintain proper system cooling, do not operate the BladeCenter unit for more than 1 minute without a blade server or filler blades installed in each blade bay.
- Note the number of the bay that contains the blade server that you remove. You need this information if you decide to reinstall the blade server in the BladeCenter unit. If you reinstall the blade server, be sure to reinstall it in the same bay from which it was removed. Reinstalling a blade server into a different bay than the one from which it was removed could have unintended consequences, such as incorrectly reconfiguring the blade server. Some blade server configuration information and update options are established according to bay number. If you reinstall the blade server into a different bay, you might have to reconfigure the blade server.

Note: The blade server is a hot-swap device, and the blade bays in the BladeCenter unit are hot-swap bays. Therefore, you can install or remove the blade server without removing power from the BladeCenter unit. However, you must turn off the blade server before removing it from the BladeCenter unit.

Complete the following steps to remove the blade server:

1. Read the safety information beginning on page vii and “Installation guidelines” on page 39.
2. If the blade server is operating, the power-on LED is lit continuously (steady). Shut down the operating system by typing the `shutdown -h now` command. If the blade server was not turned off, press the power-control button (behind the blade-server control-panel door) to turn off the blade server. See “Blade server controls and LEDs” on page 6 for more information about the location of the power-control button.

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

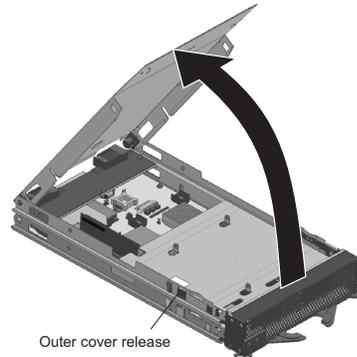
3. Open the two release levers as shown in the illustration. The blade server moves out of the bay approximately 0.6 cm (0.25 inch).

4. Pull the blade server out of the bay.
5. Place either a filler blade or a new blade server in the bay within 1 minute.

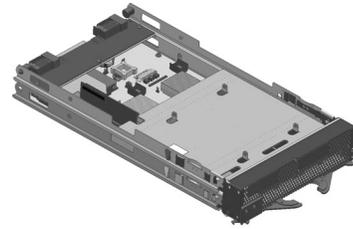
Opening the blade server cover

The following illustration shows how to open the cover on the blade server. The BladeCenter QS20 has an inner cover as well as an outer cover.

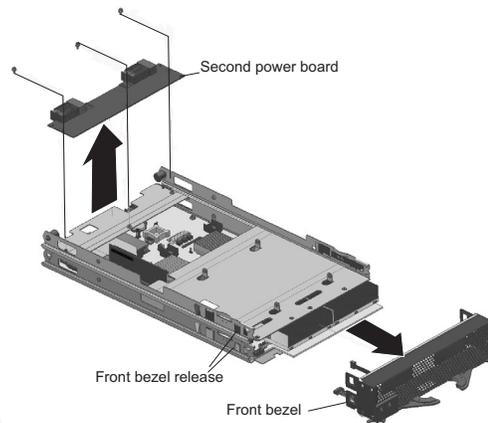
1. Open outer cover



2. Remove outer cover from blade server



3. Remove second power board and front bezel



4. Open inner cover

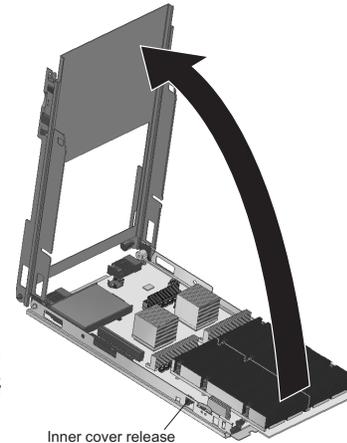


Figure 7. Opening the blade server cover

Complete the following steps to open the blade server cover:

1. Read the safety information beginning on page vii and “Installation guidelines” on page 39.
2. Carefully place the blade server on a flat, static-protective surface, with the cover side up.
3. Press the blue blade-cover release on each side of the blade server and lift the outer cover open (see Figure 7, step 1).
4. Lift the cover from the blade server and set it aside (see Figure 7, step 2).
5. Remove the second power board (see Figure 7, step 3).
6. Disconnect any (optionally) installed PCI-Express cables.
7. Press the two front bezel release buttons on each side of the server and remove the front bezel assembly (see Figure 8 on page 45 and Figure 7, step 3).
8. Press the blue blade-cover release on each side of the blade server and lift the inner cover open (see Figure 7, step 4).

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

Before you can replace a defective system-board assembly or blade-server bezel assembly, you must first remove the blade-server bezel assembly. The following illustration shows how to remove the bezel assembly from a blade server.

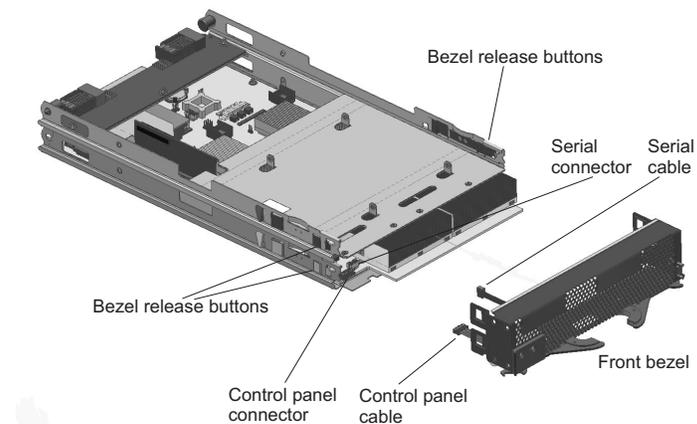


Figure 8. Removing the bezel assembly

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 39.
2. Open the blade server cover.
3. Press the bezel-assembly release and pull the bezel assembly away from the blade server approximately 1.2 cm (0.5 inch).
4. Disconnect the control panel cable from the control panel connector.
5. Disconnect the serial cable from the serial connector.
6. Pull the bezel assembly away from the blade server.
7. Store the bezel assembly in a safe place.

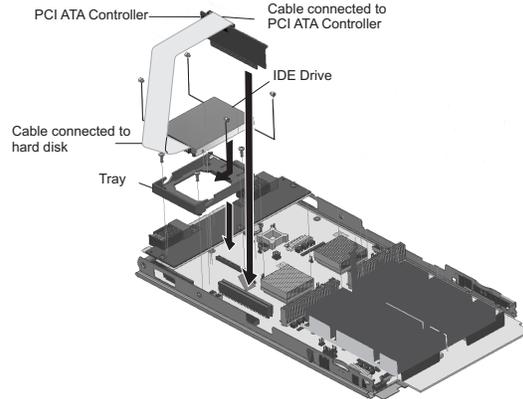
Installing the IDE hard disk drive

The blade server has a connector on the system board for installing a 2.5-inch integrated drive electronics (IDE) hard disk drive. The BladeCenter QS20 model comes with the IDE hard disk drive already installed.

Note: Some hard disk drives have Phillips screws; therefore, make sure that a Phillips screwdriver is available.

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

1. Install the hard disk into the blade server



2. Hard disk and PCI ATA controller installed on the blade server system board

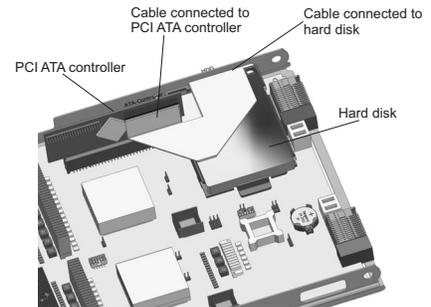


Figure 9. Installing the hard disk

Attention:

- Do not press on the top of the hard disk drive when installing it. Pressing the top could damage the hard disk drive.
- IDE hard disk drives must be set to master.

Complete the following steps to install a 2.5-inch IDE hard disk drive:

1. Read the safety information beginning on page vii and “Installation guidelines” on page 39.
2. If the blade server is operating, shut down the Linux operating system by typing the `shutdown -h now` command. If the blade server was not turned off, press the power-control button (behind the blade-server control-panel door) to turn off the blade server. See “Blade server controls and LEDs” on page 6 for more information about the location of the power-control button.
3. Remove the blade server from the BladeCenter unit. (See “Removing the blade server from the BladeCenter unit” on page 41 for instructions.) Carefully place the blade server on a flat, static-protective surface.
4. Open the blade server cover. See “Opening the blade server cover” on page 43 for instructions.
5. Place the tray from the option kit on the system board, aligning the tray with the screws on the system board. Note the four screws that are under the four screw holes in the tray. Set the tray aside and remove the four screws.
6. Replace the tray and secure the tray to the system board with screws from the hardware kit.
7. Connect the cable to the PCI ATA controller at one end and the hard disk drive at the other end.
8. Insert the PCI ATA controller card into the slot on the system board
9. Place the hard disk drive into the tray and, from the rear edge of the hard disk drive, push it into the tray. The hard disk 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 58.

Installing InfiniBand

This section describes how to install the InfiniBand option.

CAUTION:

Be careful when you fit or remove InfiniBand cables. Make sure you do not pinch the serial connection cable inside the blade.

InfiniBand package content

Each InfiniBand™ option package consists of:

Table 13. InfiniBand package contents

Description	What the item looks like
1 x Mellanox InfiniBand card	
1 x adapter card	
1 x PCI-Express cable	
2 x key headers	
4 x screws	
1 x installation instructions	This document

What you need to install InfiniBand

Make sure you have a small flat screwdriver before you install your InfiniBand card.

Installing InfiniBand

To install an InfiniBand option, do the following:

1. Shut down the BladeCenter QS20.
2. Remove the BladeCenter QS20 from BladeCenter.
3. Open the top cover.
4. Remove the small plastic cover on the front bezel from the slot where the InfiniBand option is to be installed.



Figure 10. Removing the InfiniBand slot cover

Note: If only one InfiniBand option is to be installed, it is recommended that you install it in the upper slot.

5. Unlatch, but do not disconnect the front bezel. Be careful with the cables.
6. Place the first key header on the respective BladeCenter QS20's PCI Express connector so that it covers the two contacts closest to the hard disk drive, see Figure 11 on page 49.

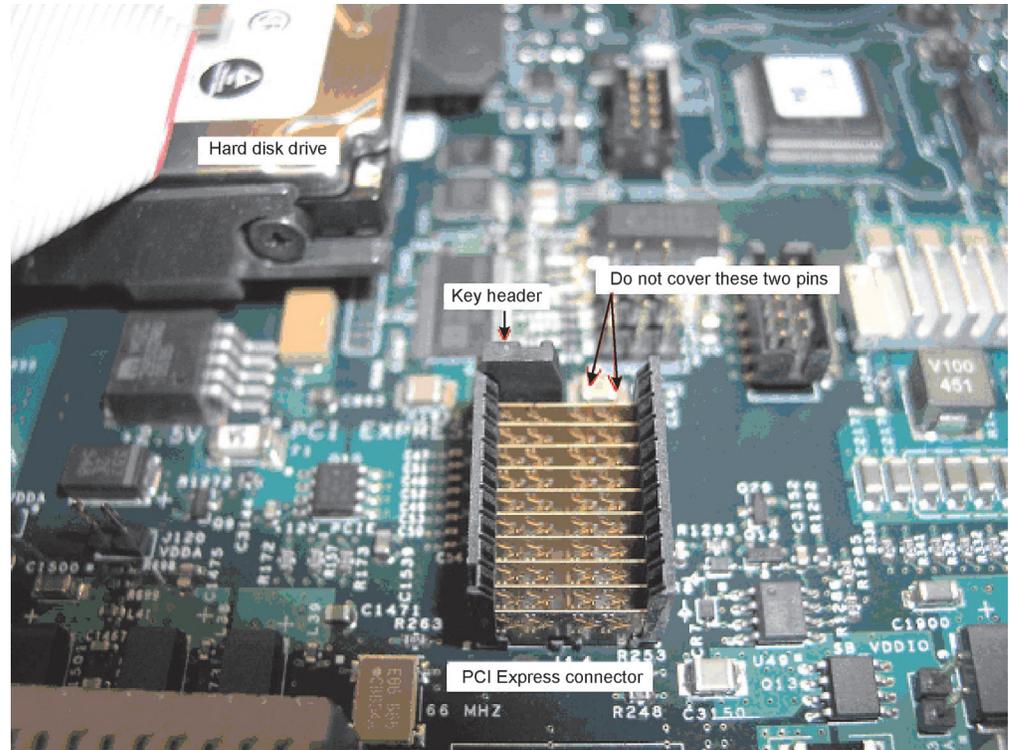


Figure 11. Where to place the key header on the BladeCenter QS20 board

7. Hold the PCI Express adapter card so that you look top down onto the PCI-Express connector J1. Place the second key header so that it covers the two upper rightmost contacts, see Figure 12.

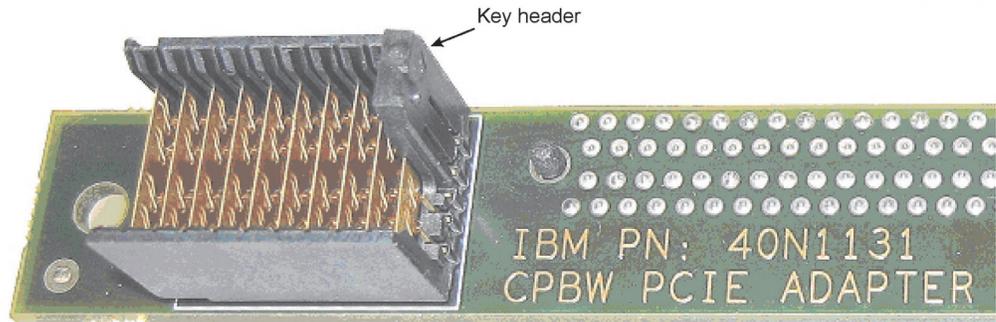


Figure 12. PCI Express adapter card with installed key header

8. Plug the InfiniBand card into the adapter. Make sure the index hole of the InfiniBand card matches the index mark of the adapter, see Figure 13 on page 50.

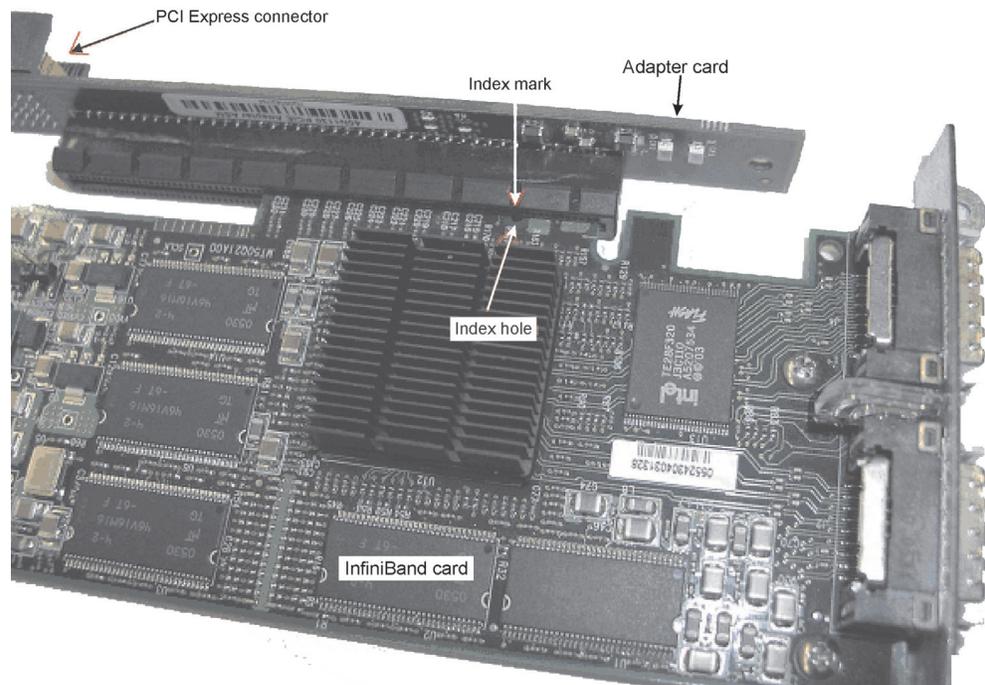


Figure 13. InfiniBand card connected to PCI Express adapter card

9. Mount this assembly into the BladeCenter QS20 so that the InfiniBand ports of the InfiniBand card point to the front bezel and match the respective ports of the front bezel.
10. Secure the assembly with the four screws that were delivered with your InfiniBand card, see Figure 14 on page 51.

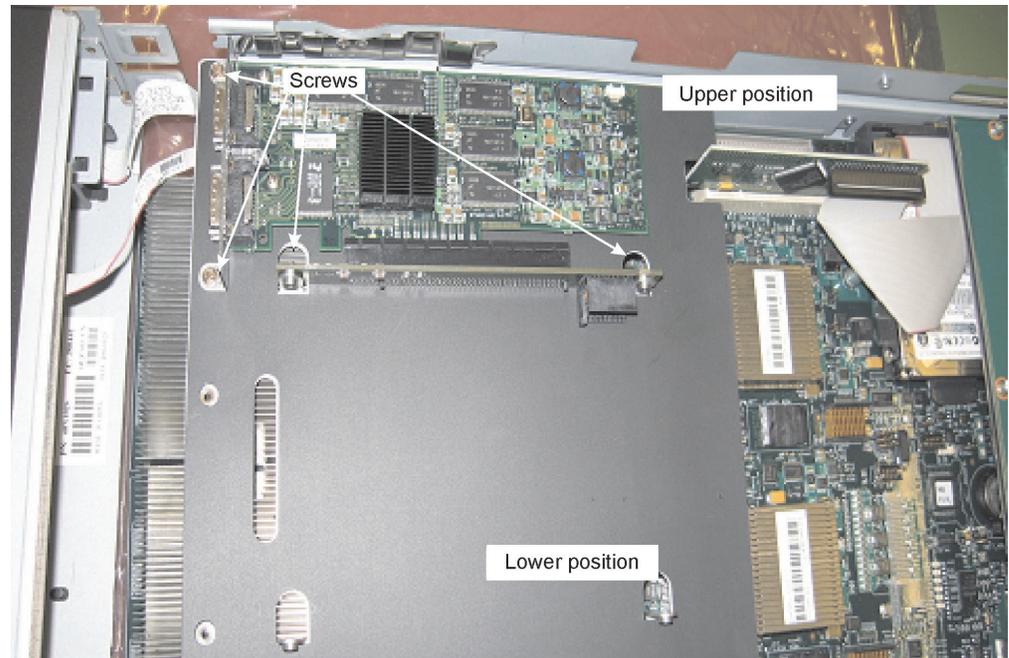


Figure 14. Mounting point and position description

11. Optional: repeat the above steps for the second InfiniBand option.
12. Refit the front bezel.

Note: Make sure that you do not pinch the control-panel or the serial cables when you install the front bezel assembly. Make sure the serial cable is not blocking the upper two InfiniBand ports. Route the cable so that it cannot be damaged when you plug and unplug the InfiniBand connectors, see Figure 15 on page 52 and Figure 16 on page 52.

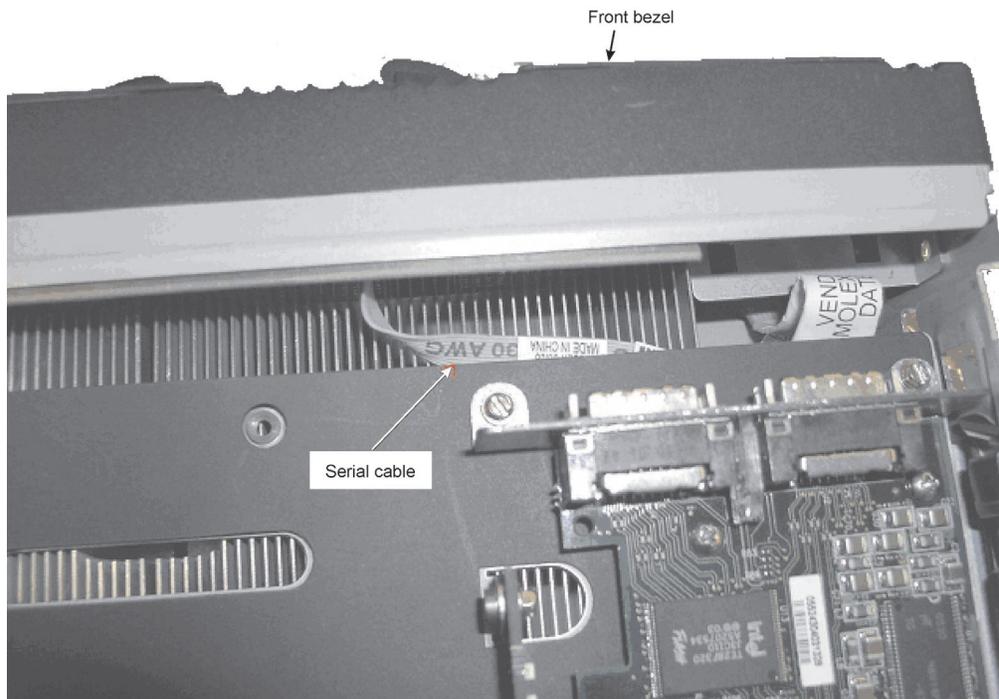


Figure 15. Serial cable position (1)

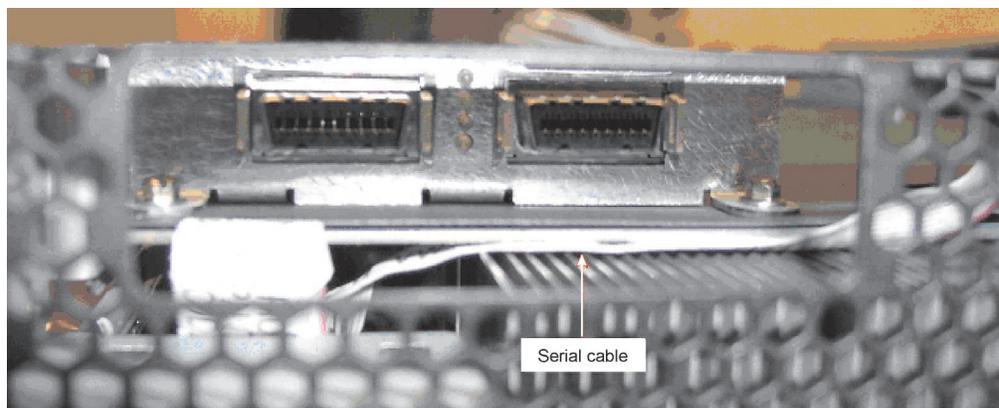


Figure 16. Serial cable position (2)

13. Plug the PCI-Express cable into the BladeCenter QS20's PCI-Express connector closest to the InfiniBand card. Leave the other end unconnected.

Note: The cable is assymetric! You must plug the connector with two clamps into the BladeCenter QS20 and the connector with only one clamp into the adaptor card (with the clamp facing you), see Figure 17 on page 53 and Figure 18 on page 54.

14. Fan out the cables and carefully bend them sideways.
15. Connect the second connector of the PCI-Express cable to the InfiniBand card adaptor. If you have installed the lower (second) InfiniBand option, be careful

not to damage the second card when you install the connector to the upper card.

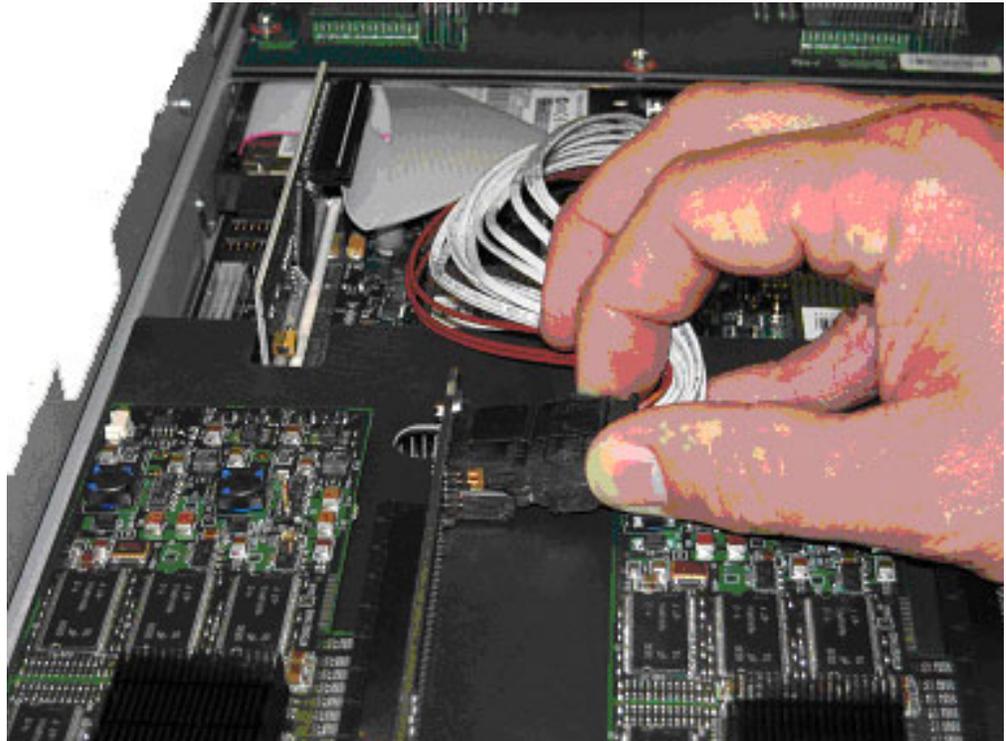


Figure 17. PCI Express connector installation (if you have installed the second InfiniBand option)

16. Optional: repeat the above steps for the second InfiniBand option.

Note: When you install the lower (second) InfiniBand option, make sure that the PCI-Express cable is not blocking the top cover.

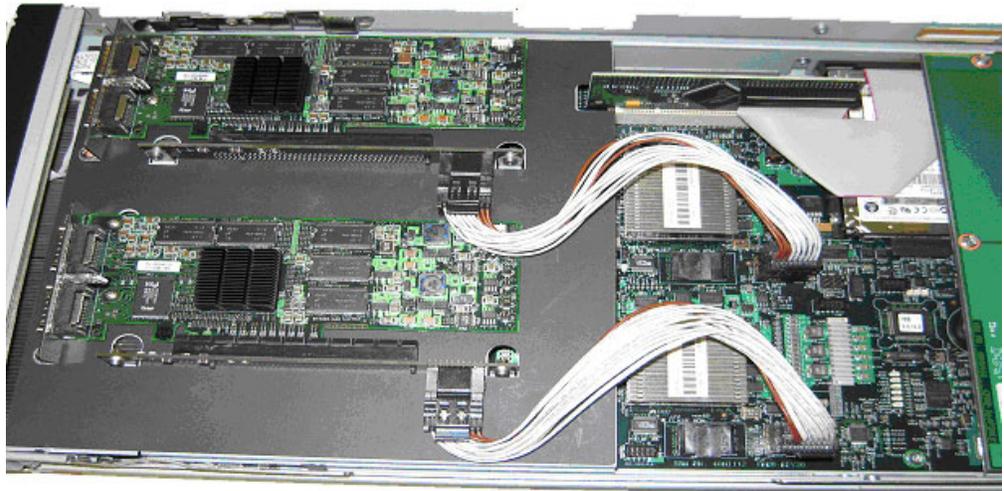


Figure 18. Overview with two InfiniBand options installed

17. Carefully close the cover.

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-IBM-SERV 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 authorized reseller or IBM marketing representative.

Note: After you replace the battery, the blade server is automatically reconfigured; however, you must reset the system date and time through the operating system that you installed.

Statement 2:



CAUTION:

When replacing the lithium battery, use only IBM Part Number 33F8354 or 15F8409 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.

Note: See “Battery return program” on page 70 for more information about battery disposal.

Complete the following steps to replace the battery:

1. Read the safety information beginning on page vii and “Installation guidelines” on page 39.
2. Follow any special handling and installation instructions that come with the battery.
3. If the blade server is operating, shut down the operating system by typing the shutdown -h now command. If the blade server was not turned off, press the power-control button (behind the blade-server control-panel door) to turn off

the blade server. See “Blade server controls and LEDs” on page 6 for more information about the location of the power-control button.

4. Remove the blade server from the BladeCenter unit (see “Removing the blade server from the BladeCenter unit” on page 41 for information).
5. Carefully place the blade server on a flat, static-protective surface.
6. Open the blade server cover (see “Opening the blade server cover” on page 43 for instructions).
7. Locate the battery (connector BH1) on the system board.

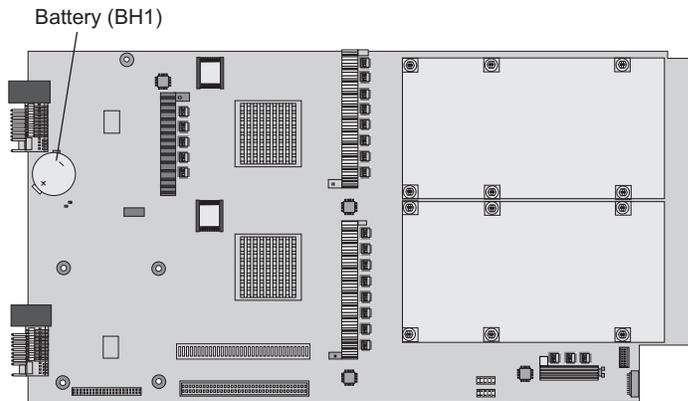


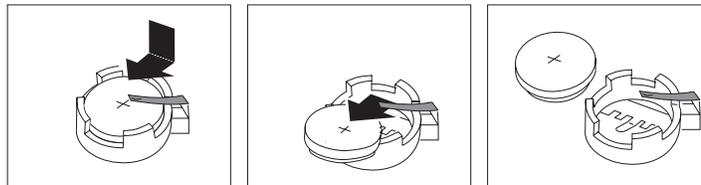
Figure 20. Battery location

8. Remove the battery:
 - a. Use your finger to press down on one side of the battery; then, slide the battery out from its socket. The spring mechanism will push the battery out toward you as you slide it from the socket.

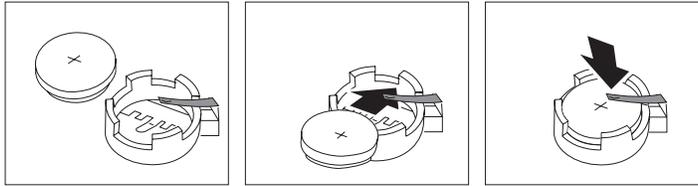
Note: You might need to lift the battery clip slightly with your fingernail to make it easier to slide the battery.

- b. Use your thumb and index finger to pull the battery from under the battery clip.

Note: After you remove the battery, press gently on the clip to make sure that the battery clip is touching the base of the battery socket.



9. Insert the new battery:
 - a. Tilt the battery so that you can insert it into the socket, under the battery clip. Make sure that the side with the positive (+) symbol is facing up.
 - b. As you slide it under the battery clip, press the battery down into the socket.



10. Close the blade server cover (see “Closing the blade server cover” on page 60).

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.

11. Reinstall the blade server into the BladeCenter unit (see *BladeCenter QS20 Installation and User's Guide*).
12. Turn on the blade server (see “Turning on the blade server” on page 5).
13. Reset the system date and time through the operating system that you installed. For additional information, see your operating-system documentation.

Completing the installation

To complete the installation, perform the following tasks, if you have not already done so.

1. Install the blade-server bezel assembly on the blade server (see “Installing the blade server bezel assembly”).
2. Close the blade server cover (see “Closing the blade server cover” on page 60).

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 *BladeCenter QS20 Installation and User's Guide*).
4. Turn on the blade server (see “Turning on the blade server” on page 5).
5. After you replace the battery or the system-board assembly, reset the system date and time through the operating system that you installed. For additional information, see your operating-system documentation.

Note: If you have just connected the power cords of the 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

The following illustration shows how to install the bezel assembly on the blade server.

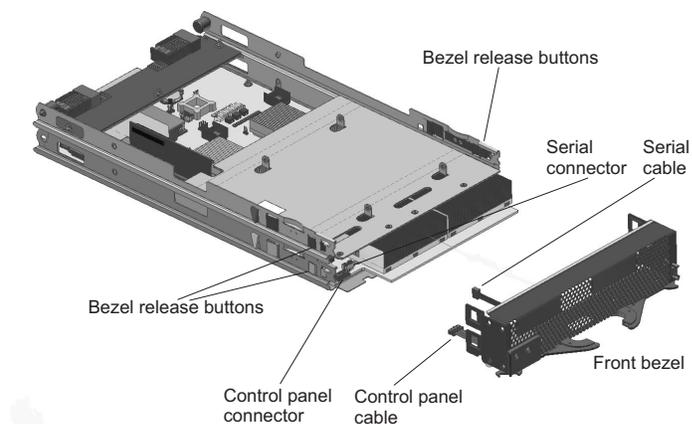


Figure 21. Installing the bezel assembly

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 39.
2. Connect the control-panel cable to the control-panel connector on the system-board assembly.
3. Connect the serial cable from the serial connector to the serial connector on the system-board assembly.
4. Carefully slide the bezel assembly onto the blade server as shown in the illustration, until it clicks into place.

Note:

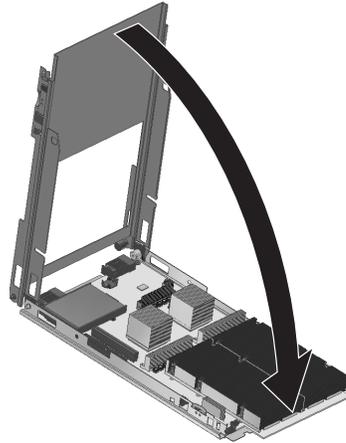
- Make sure that you do not to pinch the control-panel or the serial cables when you install the bezel assembly.
- If you have an InfiniBand option installed make sure the serial cable is not blocking any InfiniBand port.

Closing the blade server cover

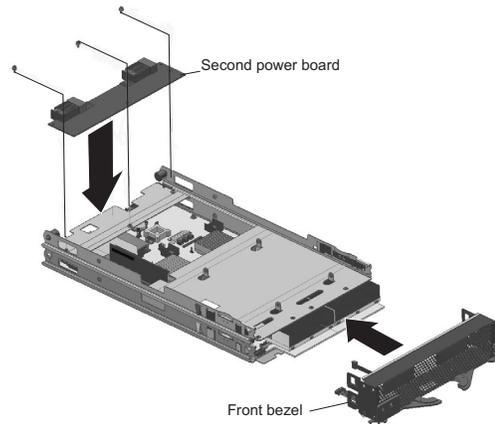
Important: The blade server cannot be inserted into the BladeCenter unit until the cover is installed and closed. Do not attempt to override this protection.

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

1. Close inner cover



2. Replace second power board and front bezel



3. Close outer cover

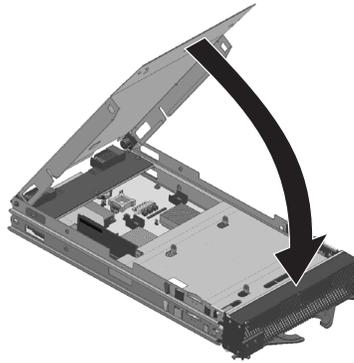


Figure 22. Closing the blade server cover

Complete the following steps to close the blade server cover:

1. Read the safety information beginning on page vii and “Installation guidelines” on page 39.
2. Close the inner cover. It clicks into place when it is closed, see Figure 22, step 1.
3. If you removed the blade bezel assembly, replace it now. See “Installing the blade server bezel assembly” on page 58 for instructions, and Figure 22, step 2.
4. If you removed the second power board, replace it now, see Figure 22, step 2.
5. If you disconnected any PCI-Express cables reconnect them now. See the documentation that comes with the InfiniBand option for detailed installation instructions.
6. Lower the cover so that the slots at the rear slide down onto the pins at the rear of the blade server, as shown in the illustration. Before closing the cover, make sure that all components are installed and seated correctly and that you have not left loose tools or parts inside the blade server.

7. Pivot the cover to the closed position as shown in the illustration, until it clicks into place, see Figure 22 on page 60, step 3.

Note: If you have an InfiniBand option installed, make sure that you do not pinch or bend any PCI-Express cable. Do not use excessive force to close the cover. If it does not close remove the cover and carefully bend the PCI-Express cables so that they no longer block the cover. Take care not to exceed the cable's minimum bending radius.

Input/output connectors and devices

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

The BladeCenter QS20 supports an external UART connection at the front panel. A special cable (part number 83421-9208) is required to connect this UART connection to a standard 9-pin UART connection. See the *BladeCenter QS20 Installation and User's Guide*.

Appendix A. Getting help and technical assistance

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

Before you call

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

- Check all cables to make sure that they are connected.
- Check the power switches to make sure that the system and any optional devices are turned on.
- Use the troubleshooting information in your system documentation, and use the diagnostic tools that come with your system. Information about diagnostic tools is in the *Hardware Maintenance Manual and Troubleshooting Guide* or *Problem Determination and Service Guide* on the IBM Documentation CD that comes with your system.
- Go to <http://www.ibm.com/bladecenter/> and click **Support** to check for information to help you solve the problem.

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

Using the documentation

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

Getting help and information from the World Wide Web

On the World Wide Web, the IBM Web site has up-to-date information about IBM BladeCenter systems, optional devices, services, and support at <http://www.ibm.com/bladecenter/>. For service information, click **Support**.

Software service and support

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

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

Hardware service and support

You can receive hardware service through IBM Services or through your IBM reseller, if your reseller is authorized by IBM to provide warranty service. See <http://www.ibm.com/planetwide/> for support telephone numbers, or in the U.S. and Canada, call 1-800-IBM-SERV (1-800-426-7378).

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

Appendix B. Notices

This information was developed for products and services offered in the U.S.A.

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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.

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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.

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In the Netherlands, the following applies.



For Taiwan: Please recycle batteries.



Electronic emission notices

Federal Communications Commission (FCC) statement

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

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

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

Industry Canada Class A emission compliance statement

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

Avis de conformité à la réglementation d'Industrie Canada

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

Australia and New Zealand Class A statement

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

United Kingdom telecommunications safety requirement

Notice to Customers

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

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Dieses Produkt entspricht den Schutzanforderungen der EU-Richtlinie 89/336/EWG zur Angleichung der Rechtsvorschriften über die elektromagnetische Verträglichkeit in den EU-Mitgliedsstaaten und hält die Grenzwerte der EN 55022 Klasse A ein.

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Zulassungsbescheinigung laut dem Deutschen Gesetz über die elektromagnetische Verträglichkeit von Geräten (EMVG) vom 18. September 1998 (bzw. der EMC EG Richtlinie 89/336) für Geräte der Klasse A

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

Verantwortlich für die Konformitätserklärung nach Paragraf 5 des EMVG ist die IBM Deutschland GmbH, 70548 Stuttgart.

Informationen in Hinsicht EMVG Paragraf 4 Abs. (1) 4:

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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

聲 明
此為 A 級產品。在生活環境中，該產品可能會造成無線電干擾。在這種情況下，可能需要用戶對其干擾採取切实可行的措施。

Japanese Voluntary Control Council for Interference (VCCI) statement

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Power cords

For your safety, IBM provides a power cord with a grounded attachment plug to use with this IBM product. To avoid electrical shock, always use the power cord and plug with a properly grounded outlet.

IBM power cords used in the United States and Canada are listed by Underwriter's Laboratories (UL) and certified by the Canadian Standards Association (CSA).

For units intended to be operated at 115 volts: Use a UL-listed and CSA-certified cord set consisting of a minimum 18 AWG, Type SVT or SJT, three-conductor cord, a maximum of 15 feet in length and a parallel blade, grounding-type attachment plug rated 15 amperes, 125 volts.

For units intended to be operated at 230 volts (U.S. use): Use a UL-listed and CSA-certified cord set consisting of a minimum 18 AWG, Type SVT or SJT, three-conductor cord, a maximum of 15 feet in length and a tandem blade, grounding-type attachment plug rated 15 amperes, 250 volts.

For units intended to be operated at 230 volts (outside the U.S.): Use a cord set with a grounding-type attachment plug. The cord set should have the appropriate safety approvals for the country in which the equipment will be installed.

IBM power cords for a specific country or region are usually available only in that country or region.

IBM power cord part number	Used in these countries and regions
02K0546	China
13F9940	Australia, Fiji, Kiribati, Nauru, New Zealand, Papua New Guinea
13F9979	Afghanistan, Albania, Algeria, Andorra, Angola, Armenia, Austria, Azerbaijan, Belarus, Belgium, Benin, Bosnia and Herzegovina, Bulgaria, Burkina Faso, Burundi, Cambodia, Cameroon, Cape Verde, Central African Republic, Chad, Comoros, Congo (Democratic Republic of), Congo (Republic of), Cote D'Ivoire (Ivory Coast), Croatia (Republic of), Czech Republic, Dahomey, Djibouti, Egypt, Equatorial Guinea, Eritrea, Estonia, Ethiopia, Finland, France, French Guyana, French Polynesia, Germany, Greece, Guadeloupe, Guinea, Guinea Bissau, Hungary, Iceland, Indonesia, Iran, Kazakhstan, Kyrgyzstan, Laos (People's Democratic Republic of), Latvia, Lebanon, Lithuania, Luxembourg, Macedonia (former Yugoslav Republic of), Madagascar, Mali, Martinique, Mauritania, Mauritius, Mayotte, Moldova (Republic of), Monaco, Mongolia, Morocco, Mozambique, Netherlands, New Caledonia, Niger, Norway, Poland, Portugal, Reunion, Romania, Russian Federation, Rwanda, Sao Tome and Principe, Saudi Arabia, Senegal, Serbia, Slovakia, Slovenia (Republic of), Somalia, Spain, Suriname, Sweden, Syrian Arab Republic, Tajikistan, Tahiti, Togo, Tunisia, Turkey, Turkmenistan, Ukraine, Upper Volta, Uzbekistan, Vanuatu, Vietnam, Wallis and Futuna, Yugoslavia (Federal Republic of), Zaire
13F9997	Denmark
14F0015	Bangladesh, Lesotho, Macao, Maldives, Namibia, Nepal, Pakistan, Samoa, South Africa, Sri Lanka, Swaziland, Uganda

IBM power cord part number	Used in these countries and regions
14F0033	Abu Dhabi, Bahrain, Botswana, Brunei Darussalam, Channel Islands, China (Hong Kong S.A.R.), Cyprus, Dominica, Gambia, Ghana, Grenada, Iraq, Ireland, Jordan, Kenya, Kuwait, Liberia, Malawi, Malaysia, Malta, Myanmar (Burma), Nigeria, Oman, Polynesia, Qatar, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, Seychelles, Sierra Leone, Singapore, Sudan, Tanzania (United Republic of), Trinidad and Tobago, United Arab Emirates (Dubai), United Kingdom, Yemen, Zambia, Zimbabwe
14F0051	Liechtenstein, Switzerland
14F0069	Chile, Italy, Libyan Arab Jamahiriya
14F0087	Israel
1838574	Antigua and Barbuda, Aruba, Bahamas, Barbados, Belize, Bermuda, Bolivia, Brazil, Caicos Islands, Canada, Cayman Islands, Costa Rica, Colombia, Cuba, Dominican Republic, Ecuador, El Salvador, Guam, Guatemala, Haiti, Honduras, Jamaica, Japan, Mexico, Micronesia (Federal States of), Netherlands Antilles, Nicaragua, Panama, Peru, Philippines, Taiwan, United States of America, Venezuela
24P6858	Korea (Democratic People's Republic of), Korea (Republic of)
34G0232	Japan
36L8880	Argentina, Paraguay, Uruguay
49P2078	India
49P2110	Brazil
6952300	Antigua and Barbuda, Aruba, Bahamas, Barbados, Belize, Bermuda, Bolivia, Caicos Islands, Canada, Cayman Islands, Colombia, Costa Rica, Cuba, Dominican Republic, Ecuador, El Salvador, Guam, Guatemala, Haiti, Honduras, Jamaica, Mexico, Micronesia (Federal States of), Netherlands Antilles, Nicaragua, Panama, Peru, Philippines, Saudi Arabia, Thailand, Taiwan, United States of America, Venezuela

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