

BladeCenter JS20

Type 8842

Installation and User's Guide

Welcome.

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

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

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

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

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

Before installing the BladeCenter JS20 Type 8842 blade server in a BladeCenter unit, complete the following procedures:

- Install and configure the rack according to the documentation that came with the rack.
- Install the BladeCenter unit into the rack and configure it, according to the documentation provided with the BladeCenter unit.
- Supply 200-240 V ac to the BladeCenter unit.
- Install the latest firmware in all BladeCenter components.

Before you install the blade server into the BladeCenter unit, install options such as drives, memory modules, processor or expansion cards in the blade server, if applicable. Install the blade server in the BladeCenter unit. See Chapter 4 for more information.

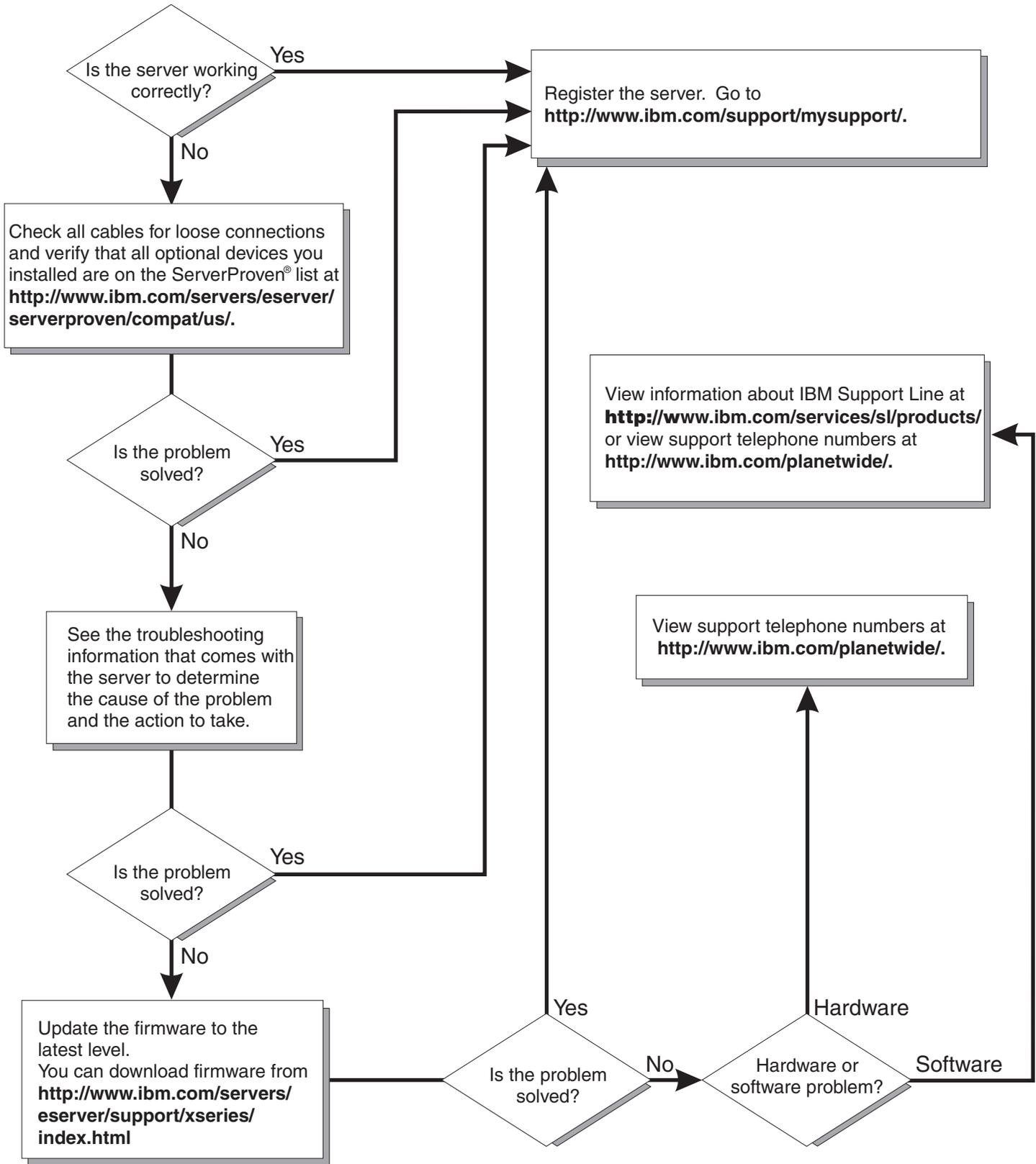
Configure the blade server.
See Chapter 5 for more information.

Install the operating system.
See Chapter 6 for more information.

Install additional applications according to the instructions provided with the applications.

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

Server Support



BladeCenter JS20 Type 8842



Installation and User's Guide

Note: Before using this information and the product it supports, read the general information in Appendix B, "IBM Statement of Limited Warranty Z125-4753-08 04/2004," on page 89 and Appendix C, "Notices," on page 109.

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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.

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.

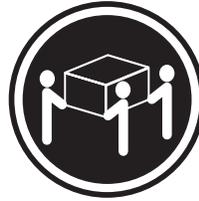
Laser radiation when open. Do not stare into the beam, do not view directly with optical instruments, and avoid direct exposure to the beam.

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

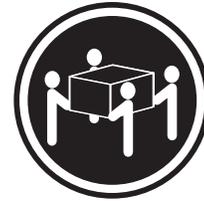
Statement 4:



≥ 18 kg (39.7 lb)



≥ 32 kg (70.5 lb)



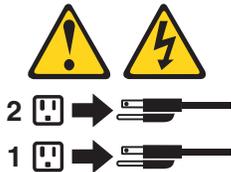
≥ 55 kg (121.2 lb)

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. ***Lávase las manos después de usar el producto.***

Chapter 1. Introduction

The IBM® BladeCenter® JS20 Type 8842, also known as the blade server, is based on the IBM Power Architecture™ technologies.

The BladeCenter JS20 Type 8842 is compatible with IBM BladeCenter units. This high-performance blade server is well-suited for networking environments that require outstanding microprocessor performance, efficient memory management, flexibility, and reliable data storage.

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

This *Installation and User's Guide* provides information about:

- Setting up the blade server
- Starting and configuring the blade server
- Installing hardware options
- Installing the operating system
- Performing basic troubleshooting of the blade server

Packaged with this document are software CDs that help you to configure hardware, install device drivers, and install the operating system. To download the latest device drivers, go to <http://www.ibm.com/support/>.

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

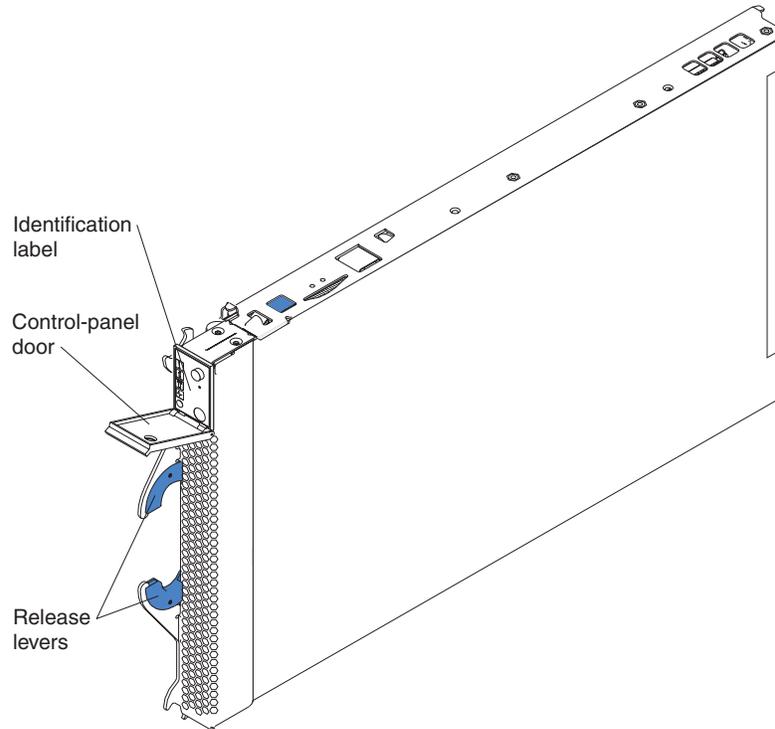
If firmware and documentation updates are available, you can download them from <http://www.ibm.com/support/>. The blade server might have features that are not described in the documentation that comes with the blade server, and the documentation might be updated occasionally to include information about those features, or technical updates might be available to provide additional information that is not included in the blade server documentation. To check for updates, go to <http://www.ibm.com/support/>. For firmware updates, click **Downloads and drivers**. For documentation updates, under **Search technical support**, type 8842 and click **Search**.

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

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

Product name	BladeCenter JS20
Machine type	8842
Model number	_____
Serial number	_____

The machine type, model number, and serial number are on the identification label that is behind the control-panel door on the front of the blade server, and on a label on the side of the blade server that is visible when the blade server is not in the BladeCenter unit. You will need these numbers when you register the blade server with IBM.



Note: Make sure that you review and understand the design of the BladeCenter unit. Use this information to help you determine your system configuration requirements and the bays and connectors where you will install or remove components. For additional information, see the BladeCenter unit *Installation and User's Guide* on the *Documentation CD* for your BladeCenter unit, or go to <http://www.ibm.com/support/> on the World Wide Web.

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

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

Related documentation

In addition to this *Installation and User's Guide*, the following related documentation is available in PDF on the World Wide Web or on the IBM BladeCenter JS20 *Documentation CD* that comes with the IBM BladeCenter JS20 Type 8842:

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

- *BladeCenter JS20 Type 8842 Hardware Maintenance Manual and Troubleshooting Guide*: This document contains the information to help you solve BladeCenter JS20 problems, and contains information for service technicians.

The following related documentation is available in PDF on the World Wide Web or on the IBM BladeCenter unit *Documentation* CD that comes with the BladeCenter unit:

- BladeCenter unit *Installation and User's Guide*: This document contains instructions for setting up and configuring the BladeCenter unit and basic instructions for installing some options in the BladeCenter unit. It also contains general information about the BladeCenter unit.
- BladeCenter unit *Hardware Maintenance Manual and Troubleshooting Guide*: This document contains the information to help you solve BladeCenter unit problems yourself, and it contains information for service technicians.
- BladeCenter unit *Rack Installation Instructions*: This document contains instructions for installing the BladeCenter unit in a rack.
- *BladeCenter and BladeCenter T Management Module User's Guide*: This document contains instructions for installing, starting, configuring, and using the BladeCenter management module. This document also provides general information about the management module and contains a description of the management module features.
- *BladeCenter and BladeCenter T Management Module Command-Line Interface Reference Guide*: This document contains instructions for installing, starting, configuring, and using the IBM BladeCenter management-module command-line interface. This document also provides general information about the BladeCenter management-module command-line interface and contains a description of its features.
- BladeCenter unit *Management Module Installation Guide*: This document contains instructions for installing, setting up, starting, and configuring the BladeCenter management module.
- *BladeCenter and BladeCenter T Serial Over LAN Setup Guide*: This document contains instructions for establishing a Serial Over LAN (SOL) connection, enabling the SOL feature, and configuring the blade server so that you can run SOL sessions and use the IBM BladeCenter management-module command-line interface. This document also contains instructions for updating and configuring BladeCenter components for SOL operation using the management-module Web-based management and configuration program.
- *IBM 4-Port Gb Ethernet Switch Module for BladeCenter Installation and User's Guide*: This document contains instructions for setting up, installing, and configuring the IBM 4-Port Gb Ethernet Switch Module for BladeCenter and a description of the switch-module features.
- *Nortel Networks Layer 2-7 GbE Switch Module for IBM BladeCenter Installation Guide*: This document contains instructions for setting up, installing, and configuring the Nortel Networks Layer 2-7 GbE Switch Module for IBM BladeCenter and a description of the switch-module features.
- Cisco Systems Gigabit Ethernet Switch Module for IBM BladeCenter Installation Guide: This document contains instructions for setting up, installing, and configuring the Cisco Systems Gigabit Ethernet Switch Module for IBM BladeCenter and a description of the switch-module features.
- *Installing AIX 5L 5.2 - IBM BladeCenter JS20*: This document contains instructions for installing AIX 5L 5.2 on an IBM BladeCenter JS20.

- *Installing SUSE Linux enterprise server 8 sp3 on an IBM BladeCenter JS20*: This document contains instructions for installing SUSE Linux enterprise server 8 sp3 on an IBM BladeCenter JS20.
- *Installing Red Hat Enterprise Linux 3 Advanced Server on an IBM BladeCenter JS20*: This document contains instructions for installing Red Hat Enterprise Linux 3 Advanced Server on an IBM BladeCenter JS20.

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

To check for updated documentation and technical updates, complete the following steps.

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

1. Go to <http://www.ibm.com/support/>.
2. Under **Search technical support**, type 8842, and click **Search**.

The Documentation CD

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

Hardware and software requirements

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

- Microsoft® Windows® NT 4.0 (with Service Pack 3 or later), Windows 2000, or Red Hat® Linux™.
- 100 MHz microprocessor.
- 32 MB of RAM.
- Adobe Acrobat Reader 3.0 (or later) or xpdf, which comes with Linux operating systems. Acrobat Reader software is included on the CD, and you can install it when you run the Documentation Browser.

Using the Documentation Browser

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

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

- If Autostart is enabled, insert the CD into your CD drive. The Documentation Browser starts automatically.
- If Autostart is disabled or is not enabled for all users, use one of the following procedures:

- If you are using a Windows operating system, insert the CD into the CD drive and click **Start --> Run**. In the **Open** field, type
`e:\win32.bat`

where *e* is the drive letter of the CD drive, and click **OK**.

- If you are using Red Hat Linux, insert the CD into the CD drive; then, run the following command from the `/mnt/cdrom` directory:
`sh runlinux.sh`

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

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

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

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

Notices and statements used in this document

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

The following notices and statements are used in this document:

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

Features and specifications

This section provides a summary of the features and specifications of your blade server. Through the BladeCenter unit management module, you can view the blade server firmware code and other hardware configuration information.

Note: Power, cooling, removable-media drives, external ports, and advanced system management are provided by the IBM BladeCenter unit. For more information, see the *Installation and User's Guide* for your BladeCenter unit.

BladeCenter JS20 specifications for non-NEBS/ETSI environments

The following table provides a summary of the features and specifications of the BladeCenter JS20 Type 8842 in a non-NEBS/ETSI environment. This includes model-specific information.

<p>Microprocessor:</p> <p>Two IBM PowerPC® microprocessors with 512 KB ECC L2 cache</p> <p>Memory:</p> <ul style="list-style-type: none"> Four double-data rate (DDR) PC2700 sockets Minimum: 512 MB Maximum: 4 or 8 GB (depends on the blade server model) * <p>IDE devices:</p> <ul style="list-style-type: none"> Support for up to two internal integrated drive electronics (IDE) 2.5-inch hard disk drives or Support for one internal IDE 2.5-inch hard disk drive in IDE connector 1 and one optional I/O expansion card in IDE connector 2 <p>Note: Installing an I/O expansion card increases network connections.</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: 2.9 cm (1.14 inches) Maximum weight: 5.4 kg (12 lb) <p>Integrated functions:</p> <ul style="list-style-type: none"> One dual-port Gigabit Ethernet controller Light path diagnostics Local service processor One IDE hard disk drive controller with two channels RS-485 interface for communication with BladeCenter management module Serial Over LAN (SOL) 	<p>Predictive Failure Analysis® (PFA) alerts:</p> <ul style="list-style-type: none"> Microprocessors Memory Hard disk drives <p>Environment:</p> <ul style="list-style-type: none"> Air temperature: <ul style="list-style-type: none"> Blade server on: 10° to 35°C (50° to 95°F). Altitude: 0 to 914 m (0 to 3000 ft) Blade server on: 10° to 32°C (50° to 90°F). Altitude: 914 m to 2133 m (3000 ft to 7000 ft) Blade server off: -40° to 60°C (40° to 140°F) Humidity: <ul style="list-style-type: none"> Blade server on: 8% to 80% Blade server off: 5% to 80% <p>Electrical input:</p> <ul style="list-style-type: none"> Input voltage: 12 V dc
<p>* For information about dual inline memory module (DIMM) type and supported DIMM size, see "Installing memory modules" on page 24.</p>		

Note: The operating system in the blade server must provide USB support for the blade server to recognize and use the CD drive and diskette drive. The BladeCenter unit uses USB for internal communication with these devices.

BladeCenter JS20 specifications for NEBS/ETSI environments

The following table provides a summary of the features and specifications of the BladeCenter JS20 Type 8842 in a NEBS/ETSI environment. This includes model-specific information.

<p>Microprocessor:</p> <p>Two IBM PowerPC® microprocessors with 512 KB ECC L2 cache Note: Use the Configuration/Setup Utility program to determine the type and speed of the microprocessors.</p> <p>Memory:</p> <ul style="list-style-type: none"> • Four DDR PC2700 sockets • Minimum: 1 GB • Maximum: 4 or 8 GB (depends on the blade server model) * <p>IDE devices:</p> <ul style="list-style-type: none"> • NEBS application does not support internal drives 	<p>Integrated functions:</p> <ul style="list-style-type: none"> • One dual-port Gigabit Ethernet controller • Light path diagnostics • Local service processor • One IDE hard disk drive controller with two channels • RS-485 interface for communication with BladeCenter management module • SOL <p>Predictive Failure Analysis (PFA) alerts:</p> <ul style="list-style-type: none"> • Microprocessors • Memory 	<p>Electrical input: 12 V dc</p> <p>Environment (NEBS):</p> <ul style="list-style-type: none"> • Air temperature: <ul style="list-style-type: none"> – Blade server on: 5° to 40°C (41° to 104°F). Altitude: -60 to 1800 m (-197 to 6000 ft) – Blade server on (short term): -5° to 55°C (23° to 131°F) Altitude: -60 to 1800 m (-197 to 6000 ft) – Blade server on: 5° to 30°C (41° to 86°F). Altitude: 1800 to 4000 m (6000 to 13 000 ft) – Blade server on (short term): -5° to 45°C (23° to 113°F). Altitude: 1800 to 4000 m (6000 to 13 000 ft) – Blade server off: -40° to 70°C (-40° to 158°F) • Humidity: <ul style="list-style-type: none"> – Blade server on: 5% to 80% – Blade server on (short term): 5% to 90% but not to exceed 0.024 kg water/kg of dry air – Blade server off: uncontrolled <p>Size:</p> <ul style="list-style-type: none"> • Height: 24.5 cm (9.7 inches) • Depth: 44.6 cm (17.6 inches) • Width: 2.9 cm (1.14 inches) • Maximum weight: 5.4 kg (12 lb)
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Notes:

1. The operating system in the blade server must provide USB support for the blade server to recognize and use the CD drive and an external diskette drive. The BladeCenter T unit uses USB for internal communication with these devices.
2. Processor power reduction methods might be invoked in the upper portion of the NEBS short term extended range. This condition is indicated by event log messages. Do not restart the blade server when power reduction is in effect.

What your IBM blade server offers

Your blade server is designed to take advantage of advancements in memory management and data storage. Your blade server includes:

- **IBM Director**

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

- **IBM PowerPC® 970 microarchitecture**

IBM PowerPC 970 microarchitecture technology leverages proven innovative IBM technologies to build powerful, scalable, reliable IBM-processor-based servers. PowerPC 970 microarchitecture technology includes features such as light path diagnostics, Predictive Failure Analysis (PFA), and Advanced System Management.¹

- **Microprocessor technology**

Your blade server supports two IBM PowerPC 970 microprocessors and comes with two microprocessors installed. Together, these two microprocessors enhance performance. With two microprocessors, your blade server can operate as a symmetric multiprocessing (SMP) server. With SMP, certain operating systems and application programs can distribute the processing load between the microprocessors. To use SMP, obtain an SMP-capable operating system. For a list of supported operating systems and other options, go to <http://www.ibm.com/servers/eserver/serverproven/compat/us/>.

- **Integrated network environment support**

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

- **I/O expansion**

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

- **System memory**

The memory controller provides support for up to four industry-standard 2.5 V, 184-pin, double-data-rate (DDR), PC2700, registered synchronous dynamic random-access memory (SDRAM) with error correcting code (ECC) dual inline memory modules (DIMMs). For the most current list of supported DIMMs, see the ServerProven® list at <http://www.ibm.com/servers/eserver/serverproven/compat/us/>. For more information, see “Installing memory modules” on page 24.

- **Light path diagnostics**

The light path diagnostics feature provides light-emitting diodes (LEDs) to assist in isolating problems with the blade server. An LED on the blade-server control panel is lit if an unusual condition or a problem occurs. If this happens, you can look at the LEDs on the system board to locate the source of the problem. For more information, see “Light path diagnostics overview” on page 80.

1. For more information about IBM PowerPC microarchitecture, go to <http://www.ibm.com/chips/products/powerpc/>.

- **Serial Over LAN**

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

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
- Customer support center 24 hours per day, 5 days a week (Monday through Friday)²
- Diagnostic support of Ethernet controller ports
- Error codes and messages
- ECC protection on the Level 2 (L2) cache
- ECC memory
- Light path diagnostics
- Power-on self-test (POST)
- Predictive Failure Analysis (PFA) alerts
- Service processor that communicates with the BladeCenter management module to enable remote blade server management
- SDRAM with serial presence detect (SPD) and vital product data (VPD)
- System error logging
- VPD (includes information stored in nonvolatile memory for easier remote viewing)
- Wake on LAN capability

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

IBM Director

With IBM Director, a network administrator can:

- View the hardware configuration of remote systems, in detail
- Monitor the usage and performance of critical components, such as microprocessors, disks, and memory
- Centrally manage individual or large groups of IBM and non-IBM Intel®-based servers, desktop computers, workstations, and mobile computers on a variety of platforms

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

- Advanced self-management capabilities for maximum system availability.
- Multiple operating-system platform support, including Microsoft Windows 2000 Server, Windows XP Professional, Red Hat Linux, SUSE LINUX, and Novell NetWare. For a complete list of operating systems that support IBM Director, see the IBM Director Compatibility Document. This document is in PDF at <http://www.ibm.com/pc/support/site.wss/document.do?Indocid=MIGR-61788>. It is updated every 6 to 8 weeks.
- Support for IBM and non-IBM servers, desktop computers, workstations, and mobile computers.
- Support for systems-management industry standards.
- Integration into leading workgroup and enterprise systems-management environments.
- Ease of use, training, and setup.

IBM Director also provides an extensible platform that supports advanced server tools that are designed to reduce the total cost of managing and supporting networked systems. By deploying IBM Director, you can achieve reductions in ownership costs through the following benefits:

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

For more information about IBM Director, see the documentation on the *IBM Director* CD that comes with the server, the IBM Director Information Center at http://publib.boulder.ibm.com/infocenter/eserver/v1r2/topic/diricinfo/fqm0_main.html, and the IBM xSeries Systems Management Web page at http://www.ibm.com/servers/eserver/xseries/systems_management/, which presents an overview of IBM Systems Management and IBM Director.

Chapter 2. Blade server power, controls, and indicators

This chapter describes the power features, how to turn on and turn off the blade server, what the controls and indicators mean, and where the system board jumpers and switches are located and how to use them.

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 will not respond.
- While the blade server is powering up, the power-on LED on the front of the server is lit. See “The control panel buttons and LEDs” on page 13 for the power-on LED states.
- After an orderly shutdown of the operating system occurs, the Wake on LAN feature is permanently enabled in the blade server system firmware code. Therefore, **Enabled** is the default setting. The Wake on LAN setting for each blade server is stored in the management-module nonvolatile random-access memory (NVRAM). To disable the Wake on LAN feature for one or more blade servers, use the BladeCenter management-module Web interface. For more information about the BladeCenter management-module Web interface, see the *BladeCenter and BladeCenter T Management Module User's Guide*.
- 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 turn on the blade server remotely by means of the service processor in the BladeCenter management module.
- If your operating system supports the Wake on LAN feature and it has not been disabled through the BladeCenter management-module Web interface, the Wake on LAN feature can turn on the blade server.

Turning off the blade server

When you turn off the blade server, it is still connected to power through the BladeCenter unit. The blade server can respond to requests from the service processor, such as a remote request to turn on the blade server. To remove all power from the blade server, you must remove it from the BladeCenter unit.

Shut down the operating system before you turn off the blade server. See the operating-system documentation for information about shutting down the operating system.

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

- You can press the power-control button on the blade server (behind the control panel door; see “The control panel buttons and LEDs” on page 13). This also starts an orderly shutdown of the operating system, if this feature is supported by the operating system.

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

- If the operating system stops functioning, you can press and hold the power-control button for more than 4 seconds to turn off the blade server.
- The management module can turn off the blade server.

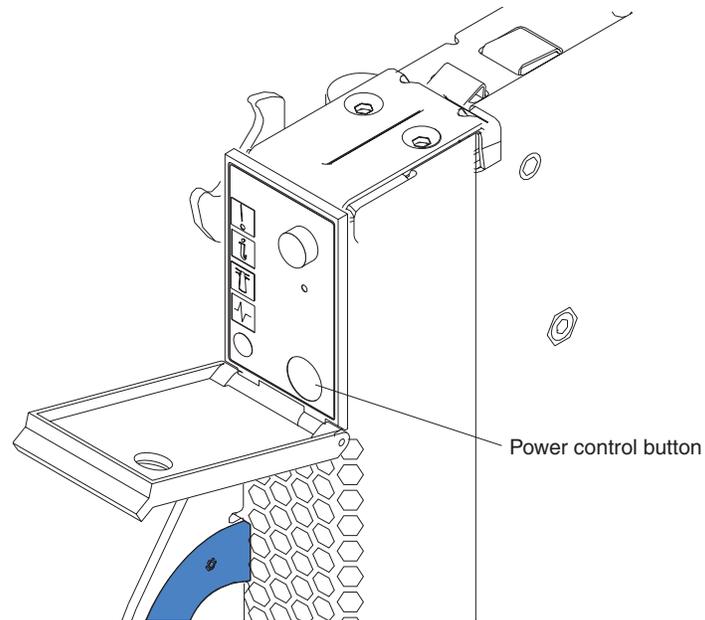
Note: After turning off the blade server, wait at least 30 seconds for the hard disk drives to stop spinning before you remove the blade server from the BladeCenter unit.

The control panel buttons and LEDs

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

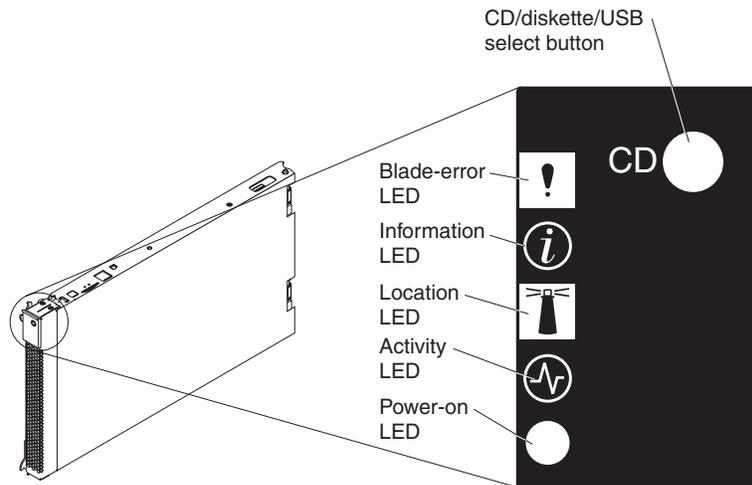
Power-control button: This button is behind the control-panel door. Press this button to manually turn the blade server on or off.

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.



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 7, “Solving problems,” on page 47.
- This blade server does not have a keyboard/video/mouse select button.



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

Information LED: When this amber LED is lit, it indicates that information about a system error in the blade server has been placed in the management-module event log. The information LED can be turned off through the management-module Web interface or through IBM Director Console.

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

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

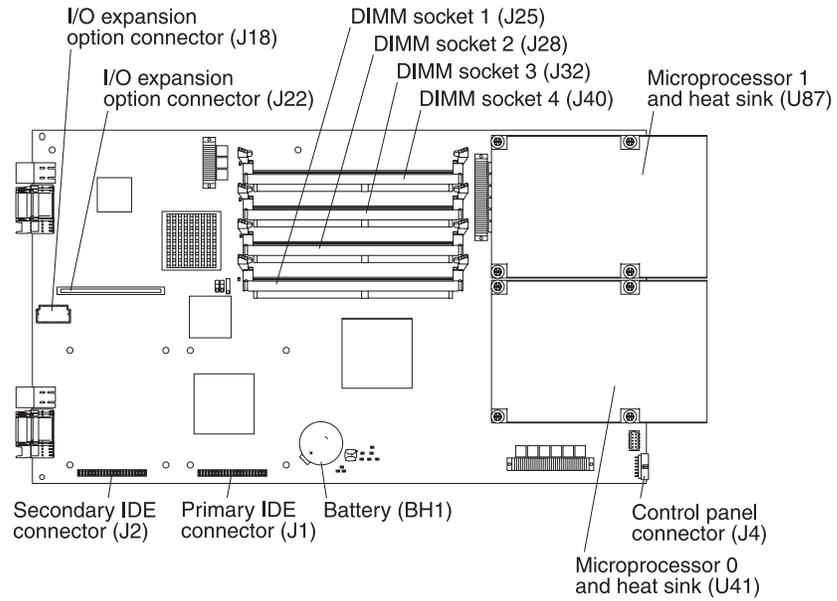
Power-on LED: This green LED indicates the power status of the blade server in the following manner:

- Flashing rapidly: The service processor on the blade server is communicating with the management module.
- Flashing slowly: The blade server has power but is not turned on.
- Lit continuously: The blade server has power and is turned on.

System-board internal and option 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.

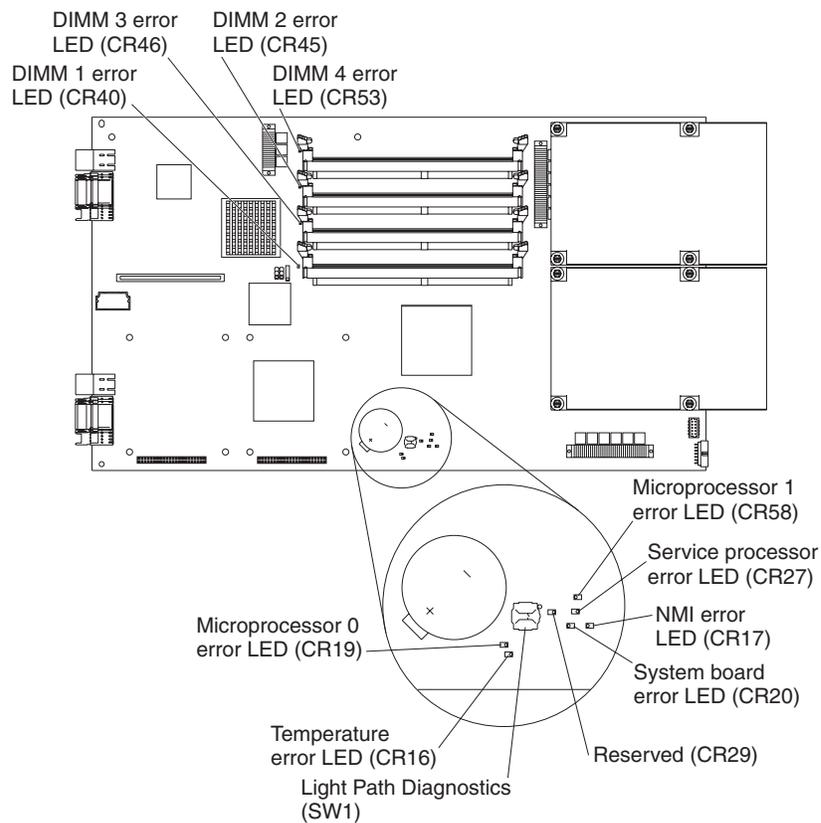


System-board LEDs

The following illustration shows the location of the LEDs on the system board. You might need to refer to this illustration when solving problems with the blade server. You must remove the blade server from the BladeCenter unit, open the cover, and press the light path diagnostics button (SW1) to light any error LEDs that were turned on during processing.

Notes:

- Power is available to light the light path diagnostics LEDs for a short period of time after the blade server is removed from the BladeCenter unit. During that period of time, you can light the light path diagnostics LEDs for a maximum of 25 seconds (or less, depending on the number of LEDs that are lit and the length of time the blade server is removed from the BladeCenter unit) by pressing the light path diagnostics button (SW1).
- Error LED CR29 is not used.
- For the locations of the corresponding DIMM sockets and microprocessor connectors on the system board, see the illustration in “System-board internal and option connectors” on page 15.



Chapter 3. Preparing the BladeCenter unit

This chapter describes the tasks that you must perform before you can use the BladeCenter unit with the blade server.

Preinstallation checklist

Before you can use the BladeCenter unit with the blade server, you must correctly set up and configure the BladeCenter unit, and install and configure the required components in the BladeCenter unit. If you have not already done so, perform the activities on the following checklist:

- ___ 1. Set up the rack in which you will install the BladeCenter unit. See the documentation that comes with the rack for instructions.
- ___ 2. Install the BladeCenter unit in the rack. For more information, see the *Rack Installation Instructions* that come with the BladeCenter unit.
- ___ 3. For a Type 8677-1xx (where *x* is any alphanumeric character) BladeCenter unit, make sure that the BladeCenter unit has the correct customer interface card (CIC). See the *BladeCenter JS20 Type 8842 Installation and User's Guide*, which is available at <http://www.ibm.com/support/>, for instructions.
- ___ 4. Install either two or four power modules in the BladeCenter unit. For a Type 8677 BladeCenter unit that is configured with power modules of less than 2000 watts, see the *BladeCenter Power Module Upgrade Guidelines Technical Update*, which is available at <http://www.ibm.com/support/>, to make sure that the power modules are sufficient to power all the components that you will install.
- ___ 5. Install and configure one of the following Ethernet switch modules in I/O module bay 1 of the BladeCenter unit. See the *Installation Guide* that comes with the switch module for instructions.
 - IBM 4-Port Gigabit Ethernet Switch Module
 - Nortel Networks 2-7 Layer Ethernet Switch Module for IBM BladeCenter
 - Cisco Systems Intelligent Gigabit Ethernet Switch Module for IBM BladeCenter

If you plan to install the blade server operating system through the Ethernet network, you also must install and configure a second Ethernet switch module in I/O module bay 2 of the BladeCenter unit. This switch module does not have to be the same type as the switch module in I/O module bay 1.
- ___ 6. Configure the BladeCenter management module, the Ethernet switch modules, and other BladeCenter components to support a Serial over LAN (SOL) connection. See the *BladeCenter Serial Over LAN Setup Guide*, which is available at <http://www.ibm.com/support/>, for instructions.

Checking the status of the media tray

If you received a BladeCenter unit other than a Type 8677, this topic does not apply.

Important: If you received a Type 8677 BladeCenter unit before June 2003, the customer interface card (CIC) in the media tray of the BladeCenter unit might need to be replaced before the CD drive will work correctly with a BladeCenter JS20 Type 8842.

If you received a Type 8677 BladeCenter unit before June 2003, start the management-module Web interface and perform these steps to determine if the CIC in your BladeCenter unit needs to be replaced:

1. In the navigation pane on the left side, select **Monitors**; then, select **Hardware VPD**.
2. While looking at the “BladeCenter Hardware VPD” table in the right pane, find the row for module name “Media Tray”.
3. Check the “FRU Number” column for the “Media Tray”.
4. If you see 59P6629, have the CIC replaced before installing a BladeCenter JS20 Type 8842 in the BladeCenter unit.

To have the CIC replaced, call the IBM Support Center and report the CIC as a failed part and request replacement with the latest CIC field replaceable unit (FRU). The IBM Support Center team will evaluate the problem, determine which replacement part is required, and send the applicable part. In the U.S. and Canada, call 1-800-IBM-SERV (1-800-426-7378). In other countries, go to <http://www.ibm.com/planetwide/> to locate your support telephone numbers. (Instructions for removing and replacing parts in the media tray of the BladeCenter unit are provided in the *BladeCenter Type 8677 Hardware Maintenance Manual and Troubleshooting Guide*.)

Chapter 4. Installing options

This chapter provides instructions for adding options to the blade server.

Installation guidelines

Before you begin, read the following information:

- Read the safety information beginning on page v and the guidelines in “Handling static-sensitive devices” on page 20. This information will help you work safely with the blade server and options.
- Read the information in “Preinstallation checklist” on page 17.
- 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 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.
- For a list of supported options for the blade server, go to <http://www.ibm.com/servers/eserver/serverproven/compat/us>.

System reliability guidelines

To help ensure proper cooling and system reliability, 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 the blade server, the BladeCenter unit, and other electronic devices. To avoid damage, keep static-sensitive devices in their static-protective packages until you are ready to install them.

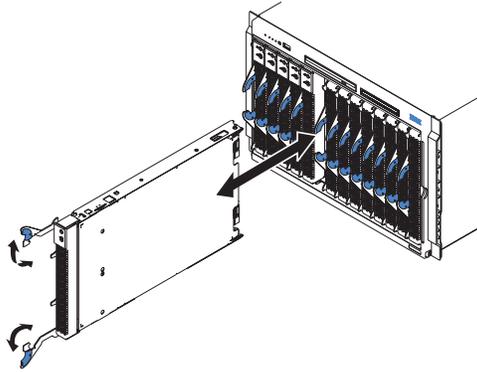
To reduce the possibility of damage from electrostatic discharge, observe the following precautions:

- When working on the BladeCenter T unit, use an electrostatic discharge (ESD) wrist strap, especially when you will be handling modules, options, and blade servers. To work properly, the wrist strap must have a good contact at both ends (touching your skin at one end and firmly connected to the ESD connector on the front or back of the BladeCenter T unit).
- Limit your movement. Movement can cause static electricity to build up around you.
- Handle the device carefully, holding it by its edges or its frame.
- Do not touch solder joints, pins, or exposed printed circuitry.
- 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 any *unpainted* metal surface of the BladeCenter chassis or any *unpainted* metal surface on any other grounded rack component in the rack in which you are installing the device for at least 2 seconds. (This drains static electricity from the package and from your body.)
- Remove the device from its package and install it directly into the blade server or BladeCenter unit without setting down the device. If it is necessary to set down the device, put it in its static-protective package. Do not place the device on your BladeCenter chassis or on a metal surface.
- Take additional care when handling devices during cold weather. Heating reduces indoor humidity and increases static electricity.

Removing the blade server from the BladeCenter unit

The following illustration shows an example of how to remove the blade server from a typical BladeCenter unit; the orientation of the blade server depends on the type of BladeCenter unit you have.

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



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.
- Note the number of the bay that contains the blade server that you will remove. You will 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:

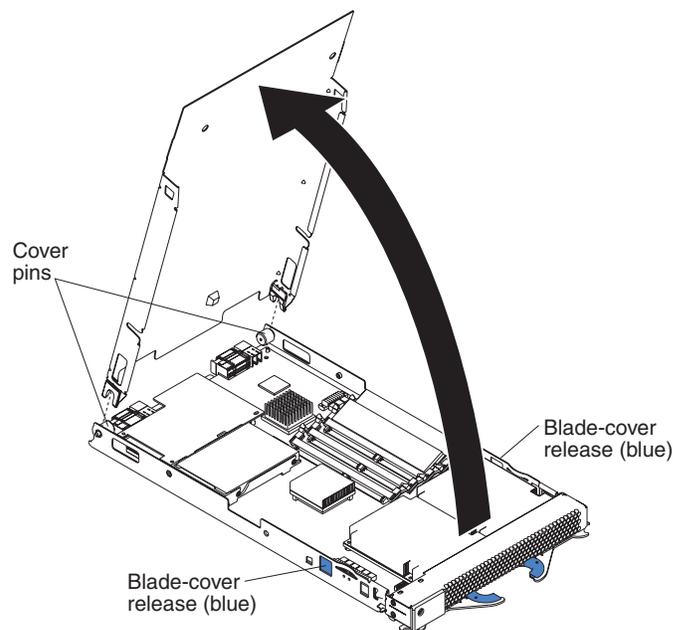
1. Read the safety information beginning on page v and “Installation guidelines” on page 19.
2. If the blade server is operating, the power-on LED is lit continuously (steady). Shut down the operating system by typing the `shutdown -h now` command. If the blade server was not turned off, press the power-control button (behind the blade-server control-panel door) to turn off the blade server. See “The control panel buttons and LEDs” on page 13 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.



Complete the following steps to open the blade server cover:

1. Read the safety information beginning on page v and “Installation guidelines” on page 19.
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 cover open, as shown in the illustration.
4. Lift the cover from the blade server and set it aside.

Statement 21:



CAUTION:

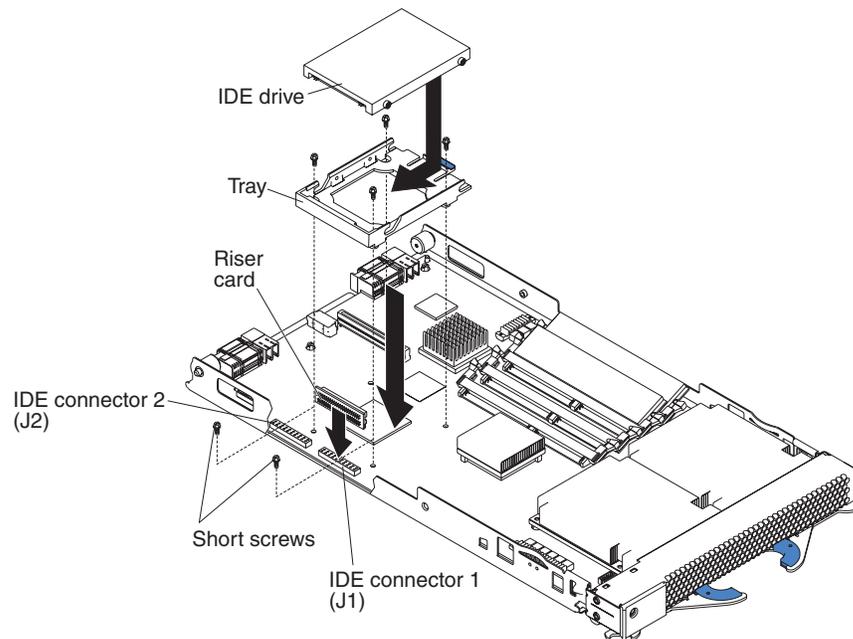
Hazardous energy is present when the blade server is connected to the power source. Always replace the blade cover before installing the blade server.

Installing IDE hard disk drives

The blade server has two connectors on the system board for installing optional 2.5-inch integrated drive electronics (IDE) hard disk drives. Each IDE connector is on a separate channel. Some models come with at least one 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.



Attention:

- Drives must be installed in the following order: IDE connector 1 (J1) first, then IDE connector 2 (J2).
- Do not install a hard disk drive in IDE connector 2 if you intend to also install an optional I/O expansion card. The I/O expansion card occupies the same area as the second IDE hard disk drive.
- 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 primary (master). See the documentation that came with your hard disk drive for instructions.

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

1. Read the safety information beginning on page v and “Installation guidelines” on page 19.
2. 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 “The control panel buttons and LEDs” on page 13 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 21 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 22 for instructions.
5. Insert the riser card from the option kit into an IDE connector on the blade server system board.

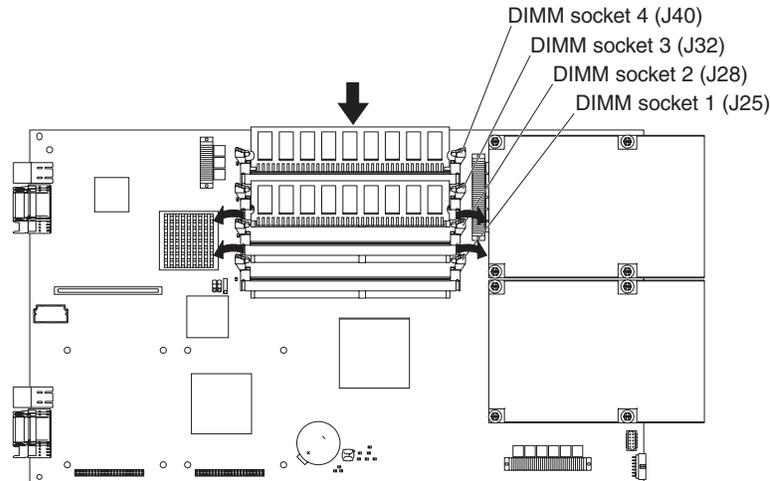
6. Place the tray from the option kit over the riser card as shown in the preceding illustration, aligning the tray with the screws on the system board. Note the four screws that are under the four screw holes in the tray. Set the tray aside and remove the four screws.
7. Replace the tray and secure the tray to the system board with screws from the hardware kit.
8. Set any jumpers or switches on the hard disk drive, if this requirement is specified on the drive label or in the documentation that comes with the drive.
9. Place the hard disk drive into the tray and, from the rear edge of the hard disk drive, push it into the connector on the riser card until the hard disk drive moves past the lever at the back of 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 29.

Installing memory modules

You can increase the amount of memory in the blade server by installing additional memory-module options. The following items describe the types of dual inline memory modules (DIMMs) that the blade server supports and other information that you must consider when installing DIMMs:

- The system board contains four DIMM connectors and supports two-way memory interleaving.
- As of the date of this publication, the blade server supports a minimum of 512 MB and a maximum of 8 GB of system memory (depending on the blade server model). The DIMM options available are 256 MB, 512 MB, 1 GB, and 2 GB, with the following exceptions:
 - 256 MB DIMMs are not supported by the 8842-4Tx and 8842-RTx models.
 - 512 MB DIMMs are not supported by the 8842-RTx models.
 - 2 GB DIMMs are not supported by the 8842-21x, 8842-E1x, 8842-E2x, 8842-41x, and 8842-4Ax models.
- Install only 2.5 V, 184-pin, double-data-rate (DDR), PC2700, registered synchronous dynamic random-access memory (SDRAM) with error correcting code (ECC) DIMMs. For a current list of supported DIMMs for the blade server, go to <http://www.ibm.com/servers/eserver/serverproven/compat/us>.
- Install DIMMs in a matched pair. Each pair must be the same capacity, speed, type, and technology. You can mix compatible DIMMs from various manufacturers. The second pair of DIMMs does not have to be the same size as the first pair.
- After you install or remove a DIMM, the new configuration information is automatically saved in the blade server firmware code.

The following illustration shows how to install DIMMs on the system board.



Before you begin, read the documentation that comes with the option.

Complete the following steps to install a DIMM:

1. Read the safety information beginning on page v and “Installation guidelines” on page 19.
2. 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 “The control panel buttons and LEDs” on page 13 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 21 for instructions.
4. Carefully place the blade server on a flat, static-protective surface.
5. Open the blade server cover. See “Opening the blade server cover” on page 22 for instructions.
6. Locate the DIMM connectors on the system board. Determine the connectors into which you will install the DIMMs.

The blade server comes with two 256 MB DIMMs installed in the DIMM 3 (J32) and DIMM 4 (J40) memory connectors. When you install additional DIMMs, be sure to install them as a pair, in DIMM connectors 1 and 2 (J25 and J28).

Install the DIMMs in the following order:

Pair	DIMM connectors
First	3 and 4 (J32 and J40)
Second	1 and 2 (J25 and J28)

7. Touch the static-protective package that contains the DIMM option to any *unpainted* metal surface on the BladeCenter chassis or any *unpainted* surface on any other grounded rack component. Then, remove the DIMM from the package.
8. To install the DIMMs, repeat the following steps for each DIMM that you install:
 - a. Turn the DIMM so that the DIMM keys align correctly with the connector on the system board.

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

- b. Insert the DIMM by pressing the DIMM along the guides into the connector. Make sure that the retaining clips snap into the closed positions.

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

9. If you have other options to install or remove, do so now; otherwise, go to “Completing the installation” on page 29.

Installing an I/O expansion card

You can add an optional I/O expansion card (adapter) to the blade server to give the blade server additional network connections for communicating on a network.

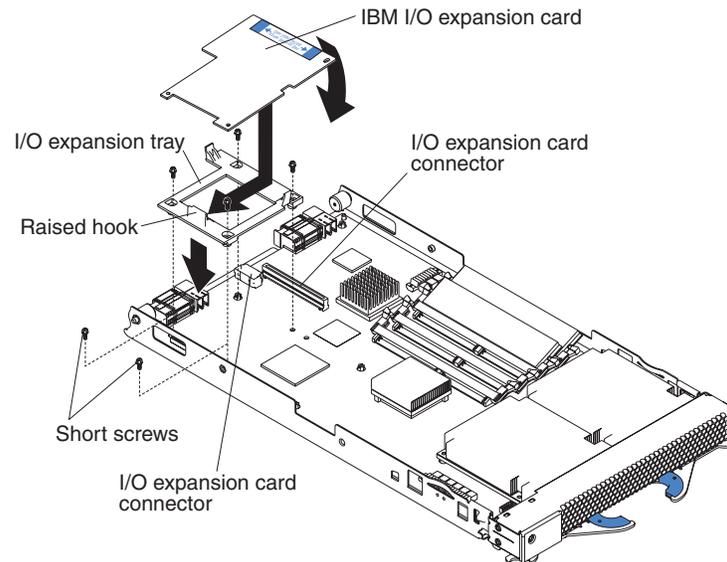
When you add an I/O expansion card, you must make sure that the switch modules in I/O bays 3 and 4 on the BladeCenter unit both support the I/O expansion card network-interface type. For example, if you add an Ethernet expansion card to the blade server, the modules in I/O bays 3 and 4 on the BladeCenter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

Important:

- Installation of an I/O expansion card requires removal of the hard disk drive that is installed in IDE connector 2. The I/O expansion card occupies the same space as this hard disk drive and replaces it. You cannot install a hard disk drive in IDE connector 2 while an I/O expansion card is installed in the blade server.
- The Myrinet Cluster Expansion Card for IBM BladeCenter comes with a cable for connection to the system board of a compatible device. However, the cable is not used in the BladeCenter JS20 Type 8842. Therefore, when you install a Myrinet Cluster Expansion Card for IBM BladeCenter into a BladeCenter JS20 Type 8842, *do not* connect the cable from the I/O expansion card to the system board.
- If you plan to install a Fibre Channel expansion card and use it for remote startup (boot) operations, call the IBM Support Center for additional information. In the U.S. and Canada, call 1-800-IBM-SERV (1-800-426-7378). In other countries, go to <http://www.ibm.com/planetwide/> to locate your support telephone numbers.

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

The following illustration shows how to install an I/O expansion card on the blade server. The card is installed near IDE connector 2.



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

1. Read the safety information beginning on page v and “Installation guidelines” on page 19.
2. 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 “The control panel buttons and LEDs” on page 13 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 21 for information).
4. Carefully place the blade server on a flat, static-protective surface.
5. Open the cover (see “Opening the blade server cover” on page 22 for instructions).
6. Install the I/O expansion card tray:
 - a. If there is no IDE hard disk drive in IDE connector 2, remove the four screws as shown in the previous illustration. Then, continue with step 6c.
 - b. If an IDE hard disk drive is in IDE connector 2, remove the hard disk drive and tray. Save the four long screws that secured the tray to the system board. Remove the riser card that connected the IDE hard disk drive to the blade server system board.
 - c. Secure the tray to the system board with the screws from the option kit, as shown in the previous illustration.
7. Install the I/O expansion card:
 - a. Orient the I/O expansion card as shown in the previous illustration.
 - b. Slide the notch in the narrow end of the card into the raised hook on the tray; then, gently pivot the wide end of the card into the I/O expansion card connectors, as shown in the previous illustration.

Note: For device driver and configuration information to complete the installation of the I/O expansion card, see the documentation that comes with the card. Some documentation might also be on the IBM *BladeCenter Documentation* CD that comes with the BladeCenter unit. For the latest editions of the IBM BladeCenter documentation, go to <http://www.ibm.com/support> on the World Wide Web.

8. If you have other options to install or remove, do so now; otherwise, go to “Completing the installation” on page 29.

Ethernet controller, switch module, and cabling requirements

One dual-port Gigabit Ethernet controller is integrated on the BladeCenter JS20 Type 8842 system board. To support Ethernet connections and the Serial Over LAN (SOL) feature and to configure the blade server, you must install an optional Ethernet-compatible switch module, such as the Nortel Networks Layer 2-7 GbE Switch Module for IBM BladeCenter or IBM 4-Port Gb Ethernet Switch Module for BladeCenter, in I/O bay 1 of the BladeCenter unit.

Each controller port provides a 1000-Mbps full-duplex interface for connecting to one of the Ethernet-compatible switch modules in I/O bays 1 and 2. If you plan to attach additional Ethernet devices to the blade server or the BladeCenter unit, you must install an optional Ethernet-compatible switch module, such as the Nortel Networks Layer 2-7 GbE Switch Module for IBM BladeCenter or IBM 4-Port Gb Ethernet Switch Module for BladeCenter, in I/O bay 3 or 4 of the BladeCenter unit, to support these additional Ethernet connections.

The optional Ethernet switch modules contain four ports with RJ-45 connectors. These connectors provide a 10/100/1000 Base-T interface (either at half-duplex or full duplex) for connecting twisted-pair cable to the Ethernet network. You must purchase and install a compatible cable to connect these devices. To connect an Ethernet controller port to a repeater or switch module, use an unshielded twisted pair (UTP) cable with RJ-45 connectors at both ends. For 100 Mbps or higher operation, Category 5 cabling is required. For 10 Mbps operation, Category 3 or Category 5 cabling is required.

Notes:

- For more information about Ethernet requirements, see the documentation that comes with the Ethernet devices and the *Installation and User's Guide* for your BladeCenter unit.
- For more information about installing, configuring, and using the Ethernet switch modules, see the documentation that comes with the Ethernet switch module that you are using, such as the *IBM 4-Port Gb Ethernet Switch Module for BladeCenter Installation and User's Guide* or *Nortel Networks Layer 2-7 GbE Switch Module for IBM BladeCenter Installation Guide*.
- For more information about the SOL feature, see Chapter 5, “Configuration requirements for the blade server,” on page 35, the *IBM BladeCenter and BladeCenter T Serial Over LAN Setup Guide*, and the *BladeCenter and BladeCenter T Management Module Command-Line Interface Reference Guide*.

Completing the installation

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

1. Close the blade server cover (see “Closing the blade server cover” on page 30).

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.

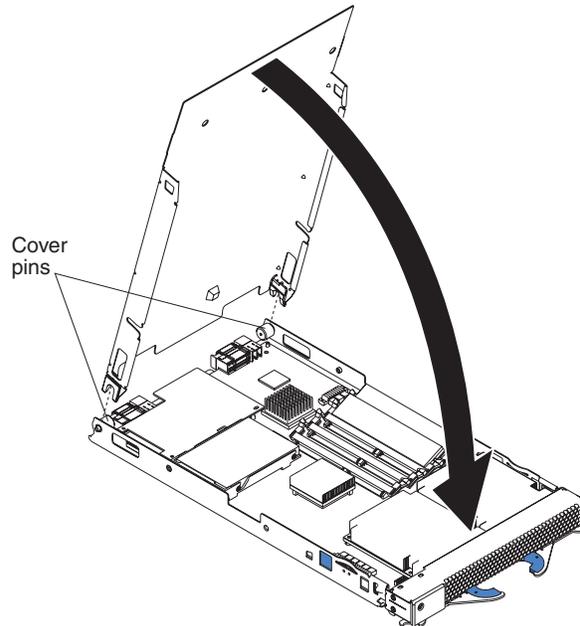
2. Reinstall the blade server into the BladeCenter unit (see “Installing the blade server in the BladeCenter unit” on page 31).
3. Turn on the blade server (see “Turning on the blade server” on page 11).

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.

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.

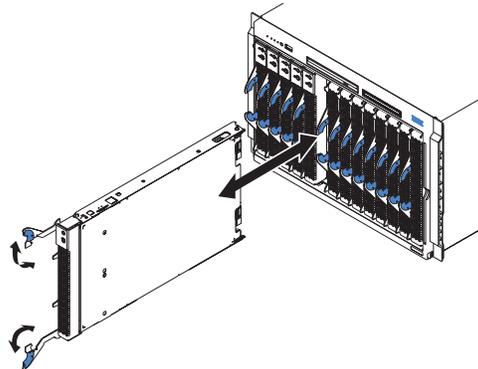


Complete the following steps to close the blade server cover:

1. Read the safety information beginning on page v and “Installation guidelines” on page 19.
2. Lower the cover so that the slots at the rear slide down onto the pins at the rear of the blade server, as shown in the illustration. Before 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.
3. Pivot the cover to the closed position as shown in the illustration, until it clicks into place.

Installing the blade server in the BladeCenter unit

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



Notes:

- For information about the design of the BladeCenter unit, including the hot-swap blade bays, see the BladeCenter unit *Installation and User's Guide*.
- The blade server is a hot-swap device. 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.
- The maximum number of blade servers that the BladeCenter unit supports depends on the BladeCenter unit type and varies by the wattage of the power supplies that are installed in the BladeCenter unit. For more information about determining the power requirements for the blade server, see the *IBM BladeCenter Power Module Upgrade Guidelines Technical Update* for your BladeCenter unit.
- To maintain proper cooling, performance, and system reliability, do not operate the BladeCenter unit for more than 1 minute without a blade server or filler blade installed in each blade bay.

When you remove a filler blade from a blade bay in the BladeCenter unit so that you can install a blade server, *do not* discard the filler blade. You will need the filler blade if you ever remove the blade server. For future use, store the filler blade in a static-protective environment, such as the static-protective package that comes with the blade server.

Attention: If you plan to remove a blade server and reinstall it, be sure to note the number of the bay that contains the blade server before you remove it. Then, reinstall the blade server 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.

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.

Complete the following steps to install a blade server into the BladeCenter unit:

1. Read the safety information beginning on page v and “Installation guidelines” on page 19.
2. If you have not done so already, install any options needed, such as disk drives or memory, in the blade server.

Note: Some of the JS20 Type 8842 blade server options are unique and are not compatible with the options that are installed in other IBM blade server types. Make sure that all of the options that you are installing are designed for use with the JS20 Type 8842 blade server. For a list of supported options for the blade server, see <http://www.ibm.com/servers/eserver/serverproven/compat/us>.

3. Select the bay for the blade server.
4. If the bay that you selected contains a filler blade, remove the filler blade. For future use, store the filler blade in a static-protective environment.
5. Make sure that the release levers on the blade server are in the open position (perpendicular to the blade server).
6. Slide the blade server into the bay until it stops. The spring-loaded doors further back in the bay that cover the bay opening move out of the way as you insert the blade server.
7. Push the release levers on the front of the blade server to the closed position.
8. (Optional) A set of blank labels comes with the blade server. When you install the blade server in the BladeCenter unit, write identifying information on a label and place the label on the BladeCenter unit bezel. See the documentation for your BladeCenter unit for recommended label placement.

Important:

- a. If you install a blade server in bay 14, place the label next to the product name. Do not cover the label that contains the system information.
- b. Do not place the label on the blade server or in any way block the ventilation holes on the blade server.

9. If this is not the initial installation of this blade server in the BladeCenter unit, continue with the next step.

If this is the initial installation of this blade server in the BladeCenter unit, you must perform the following additional tasks:

- a. Configure the BladeCenter unit for Serial Over LAN (SOL) support (see the *IBM BladeCenter and BladeCenter T Serial Over LAN Setup Guide*).
- b. Turn on the blade server by pressing the power-control button on the blade server control panel. The power-on LED on the blade server changes from the slowly-flashing state to a continuously lit (steady) state.
- c. Establish a Telnet connection and an SOL session to enable communication between the blade server and a monitor, keyboard, and mouse.

The BladeCenter unit contains a video connector for attaching a monitor. However, the blade server does not contain a video controller. You must establish an SOL connection to the blade server for console output. You can do this remotely through a separate client system that uses the Telnet program.

For additional information about SOL requirements, see the *IBM BladeCenter and BladeCenter T Serial Over LAN Setup Guide*. For additional information about monitors, see the BladeCenter unit *Installation and User's Guide*.

- d. Install the operating system. Use the installation instructions that come with the operating system, or download the latest operating-system installation instructions from the IBM Support Web page at <http://www.ibm.com/support/>. For more information, see Chapter 6, "Installing the operating system," on page 45.
10. If you have already installed the operating system on the blade server, configured the BladeCenter components for SOL support, and established an SOL session, the blade server is ready to use.

If you have not already done so, turn on the blade server by pressing the power-control button on the blade server control panel. The power-on LED on the blade server changes from the slowly-flashing state to a continuously lit (steady) state.
 11. If you have other blade servers to install, you can do so now.

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 blade server does not support a direct connection to a monitor, keyboard, or mouse. Therefore, to enable communication between the blade server and these devices, you must perform the configuration tasks that are described in Chapter 5, "Configuration requirements for the blade server," on page 35 and the *IBM BladeCenter and BladeCenter T Serial Over LAN Setup Guide*.

Chapter 5. Configuration requirements for the blade server

This chapter contains the configuration tasks that you must perform so that you can run Serial Over LAN (SOL) sessions on the blade server and use the IBM BladeCenter management-module command-line interface. This chapter also describes other configuration requirements for the blade server.

SOL provides a means to manage servers remotely by using a command-line interface (CLI) over a Telnet or Secure Shell (SSH) connection. SOL is required to manage servers that do not have KVM support, such as the JS20 Type 8842 blade server.

SOL provides console redirection for both BIOS and the blade server operating system. The SOL feature redirects server serial-connection data over a LAN without the need for special cabling. The SOL connection enables blade servers to be managed from any remote location with Internet access. The advantages of SOL include:

- Remote administration without keyboard, video, or mouse (headless servers)
- Reduced cabling and no need for a serial concentrator
- Standard Telnet interface that eliminates the need for special client software

After you install the blade server in the BladeCenter unit, the blade server is automatically configured. The Broadcom Ethernet controller device driver is installed after you install the operating system. The blade server is automatically reconfigured after you install software or hardware. IBM will periodically make firmware updates available for the blade server. Before you continue, you can make sure that the blade server has the latest version of firmware code. For additional information, see “Updating the firmware code for the blade server and the service processor” on page 40.

Since the firmware code in the blade server uses auto-configuration, additional blade-server configuration programs are not required for the blade server. However, if you have attached other devices to the blade server or the BladeCenter unit, you must configure those devices as described in the applicable documentation that comes with those devices or the BladeCenter unit. You do not have to set any passwords to use the blade server. If you change the battery or replace the system-board assembly, you must reset the date and time through your operating system.

For information about setting up your network configuration for remote management, see the IBM *BladeCenter Planning and Installation Guide* or the IBM *BladeCenter T Planning and Installation Guide* located at <http://www.ibm.com/support> on the World Wide Web.

Complete the following steps to locate the most recent version of BladeCenter documentation, including the IBM *BladeCenter Planning and Installation Guide* or the IBM *BladeCenter T Planning and Installation Guide*:

1. Go to <http://www.ibm.com/support>.
2. In the **Learn** section, click **Publications**.
3. On the “Publications” page, in the **Brand** field, select **Servers**.
4. In the **Family** field, select **BladeCenter** or **BladeCenter T**.
5. In the **Type** field, select the type for your BladeCenter unit. Do not change the default values in the **Model** and **Operating system** fields.

6. Click **Continue**.

A list of the available BladeCenter documentation will be displayed under the heading **Results by date**.

Using the Serial Over LAN (SOL) feature on the blade server

In addition to performing the configuration tasks in this chapter, you must perform the following SOL tasks. These tasks are described in the *IBM BladeCenter and BladeCenter T Serial Over LAN Setup Guide*:

- Update and configure BladeCenter components for SOL operation using the management-module Web-based management and configuration program
- Configure the BladeCenter unit to operate using SOL
- Enable the SOL feature for the blade server
- Establish an SOL connection

The blade server has built-in support for the SOL feature. However, the SOL feature works only if it is enabled for the BladeCenter unit *and* the blade server. If the SOL feature is not already enabled for the blade server, you must enable the SOL feature.

You must establish an SOL connection and start an SOL session on the blade server before you can perform the following activities:

- Establish a communications channel to the blade server
- Install the operating system on the blade server
- Have the blade server serviced

To support the SOL feature and to make sure that your blade server is correctly auto-configured, you must install a compatible Ethernet switch module in I/O bay 1 of the BladeCenter unit. Examples of compatible Ethernet switch modules are the IBM 4-Port Gb Ethernet Switch Module for BladeCenter and the Nortel Networks Layer 2-7 GbE Switch Module for IBM BladeCenter. For more information about installing, configuring, and using these switch modules, see the following documentation:

- *IBM 4-Port Gb Ethernet Switch Module for BladeCenter Installation and User's Guide*
- *Nortel Networks Layer 2-7 GbE Switch Module for IBM BladeCenter Installation Guide*
- *BladeCenter and BladeCenter T Management Module Command-Line Interface Reference Guide*
- *IBM BladeCenter and BladeCenter T Serial Over LAN Setup Guide*

The SOL feature is accessed through the management-module command-line interface. For information about using the command-line interface, see the *BladeCenter and BladeCenter T Management Module Command-Line Interface Reference Guide*.

Notes:

- The BladeCenter unit needs to be configured only once.
- If your blade server contains a different type of optional Ethernet-compatible switch module in I/O bay 1 than the switch modules that are mentioned in this chapter, see the documentation that comes with the Ethernet switch module that you are using.

- Before you can run programs on the blade server, you must install an operating system on the blade server. For information about installing the operating system, see Chapter 6, “Installing the operating system,” on page 45.
- Throughout this document, the management-module Web-based user interface is also known as the BladeCenter management-module Web interface.
- Throughout this document, the user name is also known as the user identifier or user ID for logging onto the management module.

Starting the management and configuration program in the management module

Use the management-module Web-based management and configuration program for:

- Configuring the BladeCenter unit to operate using SOL
- Updating and configuring BladeCenter components for SOL operation

Complete the following steps to start the Web-based management and configuration program. (For additional information, see the BladeCenter unit *Installation and User's 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.

Connecting to the management module through a directly connected computer

The computer that you are connecting to the management module must be configured to operate on the same subnet as the BladeCenter management module. If the IP address of the management module is outside of your local domain, you must change the Internet protocol properties on the computer that you are connecting.

To access the management model through a direct-attached computer after initial BladeCenter installation and configuration, complete the following steps:

1. Connect a crossover cable from the remote management and console (Ethernet) connector on the management module to the Ethernet network connector on the computer that you are connecting.
2. Open a Web browser on the computer and direct it to the static IP address that is assigned to the management module. If you do not know this IP address, ask your system administrator.
3. Enter a valid user name and password to start the remote session.

Configuring the Gigabit Ethernet controller

One dual-port Gigabit Ethernet controller is integrated on the blade server system board. Each controller port provides a 1000-Mbps full-duplex interface for connecting to one of the Ethernet-compatible switch modules in I/O bays 1 and 2, which enables simultaneous transmission and reception of data on the Ethernet local area network (LAN). Each Ethernet-controller port on the system board is routed to a different switch module in I/O bay 1 or bay 2. The routing from the Ethernet-controller port to the I/O bay will vary according to whether an Ethernet adapter is enabled and the operating system that is installed. See “Blade server Ethernet controller enumeration” on page 39 for information about how to determine the routing from the Ethernet-controller ports to I/O bays for your blade server.

Note: Other types of blade servers, such as the BladeCenter HS20 Type 8678, that are installed in the same BladeCenter unit as this BladeCenter JS20 Type 8842 might have different requirements for Ethernet controller routing. See the documentation that comes with the other blade servers for detailed information.

The bonding function enables two Ethernet ports to operate as failover devices for each other.

- If you are using the AIX[®] operating system, the Ether Channel device driver performs the bonding function. For additional information, see the documentation that comes with your operating system.
- If you are using one of the Linux operating systems, the bonding function also enables two Ethernet ports to operate as one Ethernet port with twice as much throughput as two individual Ethernet ports. To use the bonding function for Ethernet ports through the Linux operating systems, you must use the bonding device driver (for Linux) that comes with your operating system. Do not use the bonding device driver that comes with other blade servers. For additional information about the bonding device driver for Linux, go to the Linux on POWER Web site at <http://techsupport.services.ibm.com/server/lopdiags/>. Depending on the operating system that you installed, click the **SUSE LINUX** or **Red Hat** tab. Then, select the applicable readme file from the list of files under the **Supporting information** heading in the right navigation column. Review the contents of this readme file for instructions.

You do not have to set any jumpers or configure the controllers for the blade server operating system. However, you must install a device driver to enable the blade server operating system to address the Ethernet-controller ports. For device drivers and information about configuring your Ethernet-controller ports, see the Ethernet software documentation that comes with your blade server, or contact your IBM marketing representative or authorized reseller. For updated information about configuring the controllers, go to the IBM Support Web site at <http://www.ibm.com/support>.

Blade server Ethernet controller enumeration

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

The routing of an Ethernet controller or controller port to a particular BladeCenter unit I/O bay depends on the type of Ethernet expansion card that is installed. You can verify which Ethernet-controller port in this blade server is routed to which I/O bay by using the following test:

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

Communications from optional Ethernet adapters and other I/O expansion cards are routed to I/O bays 3 and 4. You can verify which controller port on an expansion card is routed to which I/O bay by performing the same test, using a controller on the expansion card and a compatible switch module or pass-thru module in I/O bay 3 or 4:

- If you have removed an Ethernet adapter from the blade server and installed a different Ethernet adapter.
- If you have installed an I/O expansion card on the blade server.

Configuring the blade server for Fibre Channel boot

If you plan to set up your system configuration for remote startup (boot) operations through Fibre Channel switch modules, you must configure the blade server for Fibre Channel boot.

Note: The IBM BladeCenter JS20 Fibre Channel Expansion Card (part number 73P6112) must be installed in the blade server.

Complete the following steps to configure the blade server for Fibre Channel boot:

1. From the management-module Web interface, set the startup (boot) sequence for the blade server to **Hard drive 2**.
2. Turn on the blade server and establish a Serial Over LAN (SOL) session with the blade server. (See the *BladeCenter and BladeCenter T Serial Over LAN Setup Guide* for instructions.)
3. Observe the progress codes on the console. When D5BB appears, immediately press the 8 key. The open firmware prompt (>) appears.
4. At the open firmware prompt, enter the following commands:

```
dev /packages/gui
setup-fcp-disk
```

The open firmware Main Menu appears.

5. From the Main Menu, select option 2 (**Select Media Adapter**).
After you make this selection, a wait message is displayed, followed by the **Select Media Adapter** menu.
6. From the **Select Media Adapter** menu, select the Fibre Channel adapter.
After you make this selection, a wait message and several additional messages are displayed, followed by the **Select Device** menu.
7. From the **Select Device** menu, select the Fibre Channel device that you want to set as the boot device.
After you make this selection, the **Select Task** menu is displayed.
8. From the **Select Task** menu, select **normal boot mode**. (This creates an **ibm,fw-fcpdisk** alias in the /aliases node.)
After you make this selection, the command prompt appears.
9. Restart the blade server.

For additional information about setting up your system configuration for remote startup operations through Fibre Channel switch modules, contact the IBM technical support team. In the U.S. and Canada, call 1-800-IBM-SERV (1-800-426-7378). In other countries, go to <http://www.ibm.com/planetwide/> to locate your support telephone numbers.

Updating the firmware code for the blade server and the service processor

This section describes how to determine the current code levels for the blade server (system) firmware and Integrated Systems Management Processor (service processor). Information on how to validate, update and commit the system firmware is included.

The blade server contains firmware code for the system and service processor. IBM will periodically make firmware updates available for the blade server and the service processor. You can maintain the latest levels of firmware code for the blade server and the service processor in the blade server by installing firmware updates as they become available. Be sure to follow the instructions in this section.

Determining current blade server firmware code levels

Complete the following steps to view the current firmware code levels for the blade server and the service processor:

1. Access and log onto the BladeCenter management-module Web interface as described in the BladeCenter unit *Installation and User's Guide*.
2. From the **Blade Tasks** section, select **Firmware VPD**.

The **Blade Server Firmware VPD** window contains the build identifier, release, and revision. Compare this information to the firmware information on the IBM Support Web site at <http://www.ibm.com/support>. If these two types of information match, then the blade server has the latest firmware code. If these two types of information differ, download the latest firmware code from the IBM Support Web site. Follow the update instructions on the IBM Support Web site.

Note: The firmware version displayed by the BladeCenter unit management module might be different from the version displayed by your operating

system. Cross-referenced information is given in the firmware information on the IBM Support Web site at <http://www.ibm.com/support>, and in the readme file for the firmware image.

Updating the firmware code for the blade server service processor

To apply the latest firmware code for the blade server service processor, flash the service processor. Download the latest firmware code for the blade server service processor from the IBM Support Web site at <http://www.ibm.com/support>. Use the BladeCenter management-module Web interface to flash the service processor. Follow the update instructions on the IBM Support Web site.

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

Notes:

- For additional information about the hardware and firmware requirements for other BladeCenter components, see the *IBM BladeCenter and BladeCenter T Serial Over LAN Setup Guide*.
- Go to the IBM Support Web site, <http://www.ibm.com/support>, for the latest information about upgrading the device drivers, firmware code, and basic input/output system (BIOS) code for other BladeCenter components.

Updating and managing the system flash using Linux service aids

This section describes how to update and verify the system flash using Linux service aids.

Updating the system flash using Linux

The Linux service aid for managing the system flash is separate from the operating system installation and is available for download from the following Web site: <http://techsupport.services.ibm.com/server/lopdiags/>.

Note: The `update_flash` command can only be performed if the `update_flash` service aid has been installed on the blade server for the appropriate version of Linux.

Complete the following steps to update the system firmware code:

1. Obtain the flash image that you want to update and place it in the `/etc/microcode` directory (create the directory, if it does not exist).
2. Issue the following command:

```
update_flash -f /etc/microcode/<update_image_name>
```

After the system reboots successfully and once you are satisfied with the functionality of the new image, commit the update using the following Linux command:

```
update_flash -c
```

This will copy your new image from the TEMP side to PERM side of flash.

Verifying the system firmware levels using Linux

To verify the system firmware levels on the PERM and TEMP sides, enter the following command at the Linux prompt (the entire command must be entered on one line):

```
for file in `ls /proc/device-tree/openprom/*bank*`; do echo $file;
```

```
cat $file; echo; echo; done
```

For Example: This command will return output similar to the following information:

```
/proc/device-tree/openprom/ibm,fw-bank
P
/proc/device-tree/openprom/ibm,fw-perm-bank
FW04310120, 17:16:09, 07/26/2004
/proc/device-tree/openprom/ibm,fw-temp-bank
FW04310120, 17:16:09, 07/26/2004
```

- The value for **ibm,fw-bank** indicates what side you booted from (T for TEMP, P for PERM).
- The value for **ibm,fw-perm-bank** identifies the firmware version, date, and time stamp of the firmware on the PERM side.
- The value for **ibm,fw-temp-bank** indicates the firmware version, date, and time stamp of the firmware on the TEMP side.

Notes:

- If you have to recover the system firmware code, see “Recovering the system firmware code” on page 84.
- The IBM Remote Deployment Manager (RDM) program does not support the BladeCenter JS20 Type 8842.
- A reboot of the system must be done after using `update_flash -c` for the firmware level shown in **ibm,fw-perm-bank** to be current.
- For additional information about operating-system diagnostics, see the *BladeCenter JS20 Type 8842 Hardware Maintenance Manual and Troubleshooting Guide* that comes with the blade server.

Updating and managing system flash using AIX diagnostics

This section describes how to update, commit, and verify the system flash using AIX diagnostics.

Note: For additional information about the CE login function and AIX operating-system diagnostics, see the *BladeCenter JS20 Type 8842 Hardware Maintenance Manual and Troubleshooting Guide* that comes with the blade server.

Updating the system flash using AIX

Attention: Do *not* power off the system while performing this task!

Complete the following steps:

1. Obtain the flash image that you want to update from the IBM Support Web site at <http://www.ibm.com/support>. (Look for the flash image for Type 8842, under “AIX Diagnostics Version Number”; this is the version used by the AIX diagnostics service aid.)
 - If you want to update the image from the local file system, put the image into the `/etc/microcode` directory on the system before running this service aid.
 - If you want to update the image from media (diskette or optical media), put the image on the media of choice before running this service aid.
2. Run diagnostics.
 - If you have booted AIX, login as “root” or use the CE login; then, at the command line, enter:

diag

- Otherwise, boot standalone diagnostics; then press Enter.
3. From the “Function Selection” menu, choose **Task Selection**.
 4. From the “Tasks Selection List”, choose **Update and Manage System Flash**.
 5. From the “Update and Manage System Flash” list:
 - If, in step 1 on page 42, you have put the image in the /etc/microcode file system, then choose the **File System** selection. At the flash update image file prompt, specify the directory that contains the image (normally **/etc/microcode**), and then choose **Commit** (PF7).
 - If, in step 1 on page 42, you have put the image on optical media or diskette, place the media containing the image into the drive and choose **Removable Media** and then choose **Commit** (PF7).

Note: If you have booted standalone diagnostics from a CD, you may remove the standalone diagnostics CD media from the drive and replace it with the optical media containing the image that you want to update.

6. Follow the instructions that are displayed on the screen; for example:
Choose **Yes** to proceed with the flash operation.
7. After the system flash operation completes, and the system reboots, you may remove the media containing the image from the diskette or optical drive, or from the /etc/microcode directory on the file system. You may also remove the temporary file created in the “/var/update_flash_image” directory after the reboot occurs, after you log in to the operating system.

Committing the temporary firmware image using AIX

After the system reboots successfully and once you are satisfied with the functionality of the new image, commit the update by using the following AIX diagnostic commands:

1. Run diagnostics.
 - If you have booted AIX, log in as “root” or use the CE login; then, at the command line, enter:
diag
 - Otherwise, boot standalone diagnostics; then press Enter.
2. From the “Function Selection” menu, choose **Task Selection**.
3. From the “Tasks Selection List” choose **Update and Manage System Flash**.
4. Choose **Commit the Temporary Image**.
5. Choose **Yes** to commit the image.
6. Press F10 to exit diagnostics

Note: This selection commits the Temporary system firmware image to the PERM image when booted from the Temporary image.

Verifying the system firmware levels using AIX

To verify levels of system firmware on the PERM and TEMP sides, use the AIX diagnostics “Update and Manage System Flash” (see “Updating the system flash using AIX” on page 42). The diagnostics function displays the system firmware image level for both the PERM and TEMP sides as well as an indication as to which side was used for the current boot cycle. The following illustration is an example screen:

UPDATE AND MANAGE FLASH

802810

The current permanent system firmware image is 2b204_310
The current temporary system firmware image is 2b204_310
The system is currently booted from the temporary firmware image.

Move cursor to selection, then press 'Enter'.

Validate and Update System Firmware
Validate System Firmware
Commit the Temporary Image

F1=Help

F10=Exit

F3=Previous Menu

If the system was booted using the permanent image instead of the temporary image (as shown in the preceding example), the screen example would show:

The system is currently booted from the permanent firmware image.

and the last selection option is changed to:

Reject the Temporary Image

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. The command-line interface also provides access to the text-console command prompt for each blade server through an SOL connection. This enables the blade servers to be managed from a remote location. For information and instructions, see the *BladeCenter and BladeCenter T Management Module Command-Line Interface Reference Guide*.

Using the simple network management protocol (SNMP)

In addition to the management-module command-line interface, you can use the simple network management protocol (SNMP) to perform configuration procedures. SNMP commands are described in the *BladeCenter and BladeCenter T Management Module Command-Line Interface Reference Guide*. For additional information about SNMP requirements, features, functions, and variables, see the documentation that comes with the Ethernet switch module that you are using; for example:

- *IBM 4-Port Gb Ethernet Switch Module for BladeCenter Installation and User's Guide*
- *Nortel Networks Layer 2-7 GbE Switch Module for IBM BladeCenter Installation Guide*

Chapter 6. Installing the operating system

Before you install the operating system on the blade server, make sure that you provide a Serial Over LAN (SOL) connection to the blade server and that the blade server is powered on. If you have not already done so, you must configure the SOL feature on the blade server to establish an SOL connection and enable the SOL feature; then, start an SOL session. For instructions for performing these activities, see the *IBM BladeCenter and BladeCenter T Serial Over LAN Setup Guide*.

Note: For information about SOL commands, see the *BladeCenter and BladeCenter T Management Module Command-Line Interface Reference Guide*.

Important:

- If you plan to install the operating system through the Ethernet network, you must install and configure a second Ethernet switch module into the appropriate I/O bay of the BladeCenter unit. For additional information, see:
 - Chapter 3, “Preparing the BladeCenter unit,” on page 17
 - “Configuring the Gigabit Ethernet controller” on page 38
 - “Blade server Ethernet controller enumeration” on page 39
 - The documentation that comes with the Ethernet switch module that you are using
- After you install the operating system on the blade server, you must install any service packs or update packages that come with the operating system. For additional information, see the instructions that come with your operating-system documentation and the service packs or update packages.
- The blade server has no external USB ports; however, it can communicate with and use the USB diskette drive, CD drive, and USB port that are in the BladeCenter unit chassis.

To install the operating system on a blade server, follow the installation instructions that come with the operating system. You can download the latest operating-system installation instructions from the IBM Support Web page at <http://www.ibm.com/support/> and install the operating system at the BladeCenter unit (local deployment).

Complete the following steps to download the installation instructions:

1. Go to the IBM Support Web page at <http://www.ibm.com/support/>.
2. In the **Learn** section, click **Operating system installation**.
3. In the **For any product** section, under **Select your product**, in the **Brand** field, select **Servers**.
4. In the **Family** field, select **BladeCenter JS20**.
5. In the **Type** field, select **8842**. Do not change the default value in the **Model** field.
6. Select your operating system from the list in the **Operating system** field.
7. Click **Continue**.

A list of the available installation instructions will be displayed under the heading **OS installation by date**.

After you install the operating system, be sure to install the ppc64 Linux utilities that apply to your operating system. Instructions for installing these utilities are in the same documentation that describes how to install the operating system.

Notes:

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

If your operating system does not have the required device drivers, contact your IBM marketing representative or authorized reseller, or see your operating-system documentation for additional information.

2. The IBM Remote Deployment Manager (RDM) program does not support the BladeCenter JS20 Type 8842. However, you can use the following programs for remote deployment:
 - For AIX, Red Hat Linux, or SUSE LINUX operating-system deployments, you can use Cluster Systems Management (CSM) from IBM. Go to <http://www.ibm.com/servers/eserver/clusters/software/>.
 - For AIX operating-system deployments, you can use Network Installation Manager (NIM) from IBM. See your AIX operating-system documentation for additional information.
 - For SUSE LINUX operating-system deployments, you can use the AutoYast utility program from SUSE LINUX. Go to <http://www.suse.de/~nashif/autoinstall/>.

Communicating directly with a blade server

After you have completely installed and configured the operating system, you can use a Telnet or SSH session to communicate directly with the JS20 Type 8842 blade server operating system. See the documentation for your operating system for information about using its command-line interface.

Chapter 7. Solving problems

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

If you cannot locate and correct the problem using the information in this chapter, see the *BladeCenter JS20 Type 8842 Hardware Maintenance Manual and Troubleshooting Guide* that comes with the blade server, and the Server Support flowchart in the front of this book.

A problem with the BladeCenter JS20 Type 8842 might relate to either the BladeCenter JS20 Type 8842 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 *Hardware Maintenance Manual and Troubleshooting Guide* or Problem Determination and Service Guide for your BladeCenter unit.

For troubleshooting information about other BladeCenter components, see the *Hardware Maintenance Manual and Troubleshooting Guide* or Problem Determination and Service Guide for your BladeCenter unit, product-specific documentation, and other related documentation. For the latest editions of the IBM BladeCenter documentation, go to <http://www.ibm.com/support> on the World Wide Web. See “Related documentation” on page 2 for additional information.

Important: If you cannot access the CD drive on the BladeCenter unit, contact a service support representative for assistance.

Diagnostic tools overview

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

- **Power-on self-test (POST) firmware checkpoints and error codes**

The firmware checkpoints are progress codes that your blade server displays during POST. See “Checkpoint codes” on page 49 for more information.

- **Firmware error codes and location codes**

For detailed descriptions of the firmware error codes, see “Firmware error codes” on page 65.

Some firmware error codes also include location codes. The location code information is required to identify the failing component. Check the system error logs and event logs to determine the location code information that corresponds to the firmware error code.

- **Troubleshooting charts**

These charts list problem symptoms and steps to correct the problems. See the “Troubleshooting charts” on page 77 for more information.

- **Light path diagnostics**

Use light path diagnostics to diagnose system errors. See “Light path diagnostics overview” on page 80 for more information.

- **Diagnostic utilities for the Linux and AIX operating systems**

Diagnostic utilities for the Linux operating system are available from IBM. For more information, go to <http://www.ibm.com/servers/eservers/support/bladecenter/>; in the **Hardware** field select **BladeCenter JS20**, in the **Software** field select **Linux on POWER environment**, then click **Go**.

A diagnostic CD for the AIX operating system is available from IBM. Go to <http://techsupport.services.ibm.com/server/mdownload/diags/download> to download the CD image. See the *BladeCenter JS20 Type 8842 Hardware Maintenance Manual and Troubleshooting Guide* for instructions on using the utilities.

Other supported operating systems might have diagnostic tools available through the operating system. Consult your operating system documentation for more information.

Notes:

- For additional information about firmware error codes, location codes, error logs, event logs, and firmware checkpoints, see the *BladeCenter JS20 Type 8842 Hardware Maintenance Manual and Troubleshooting Guide*.
- If you are unable to find the system error logs in the blade-server firmware code, view the system event logs in the BladeCenter management module.
- Before you have the blade server serviced, make sure that you provide a Serial Over LAN (SOL) connection to the blade server. To do this, you must configure the SOL feature on the blade server and start an SOL session as described in the *IBM BladeCenter and BladeCenter T Serial Over LAN Setup Guide*.

System checkout

If your system fails to start after installation or an error occurs while running, perform the following steps:

1. Visually check the blade server system board for any lit external LEDs.
 - a. Turn off the server.
 - b. Remove the blade server from the BladeCenter unit.
 - c. Open the blade server and press and hold the light path diagnostics button. See “Light path diagnostics table” on page 81 for the location of the light path diagnostics button.
 - d. Perform the steps in “Identifying problems using the light path diagnostics” on page 80 to identify lit error LEDs on the blade server.
 - 1) If any LEDs light, see “Light path diagnostics table” on page 81.
 - 2) If there is no error LED lit, proceed to the next step.
2. Reinstall the blade server in the same bay of the BladeCenter unit.
3. To test the blade server, turn on the blade server and start an SOL session (see the *IBM BladeCenter and BladeCenter T Serial Over LAN Setup Guide*).
4. Observe the progress codes in the SOL window and record any POST error messages or system checkpoint codes that occur. If an error occurs, see “Firmware error codes” on page 65 for more information.
5. Review the BladeCenter management-module event log and Linux Syslog to see if an error was recorded. If there is a hardware error, contact a service support representative and provide the details of the problem. If there is no hardware error, contact a service support representative for more information to resolve your problem.

Checkpoint codes

The POST firmware checkpoints (progress codes) indicate the detection of a problem if the server stops on a checkpoint during the startup process.

- A four-digit code indicates successful completion of POST when the server does not stop on that checkpoint.
- A result other than a four-digit code indicates that POST might have detected a problem. Error messages also appear during startup if POST detects a hardware-configuration problem. The last POST firmware checkpoint code posted is the most likely failure.

Checkpoints display in the system 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. These checkpoints have the following forms:

Dxxx, Exxx Dxxx and Exxx checkpoints indicate that a system processor is in control and is initializing the system resources. Control passes to the operating system when E105 displays on the operator panel display. Location code information might also display on the operator panel during this time.

These codes range from Dxxx to EFFF.

Error codes If a fault is detected, an 8-digit error code is displayed in the BladeCenter management-module event log. A location code might be displayed at the same time on the second line.

The management-module log, which can be accessed through the BladeCenter unit, contains the most recent error codes and messages that the system generated during POST.

Checkpoint code	Description	Suggested action
D001	Peripheral component interconnect (PCI) probe process complete; create PCI interrupt routing properties.	<ol style="list-style-type: none">1. Perform the system checkout procedure. See "System checkout" on page 48.2. This error indicates that you might have a problem with the system board. Contact a service support representative for more information.
D002	PCI adapter nonvolatile random-access memory (NVRAM) hint created; system is restarting.	<ol style="list-style-type: none">1. Perform the system checkout procedure. See "System checkout" on page 48.2. This error indicates that you might have a problem with the system board. Contact a service support representative for more information.
D003	PCI probing is complete.	<ol style="list-style-type: none">1. Perform the system checkout procedure. See "System checkout" on page 48.2. This error indicates that you might have a problem with the system board. Contact a service support representative for more information.
D004	Start the console installation; loading the graphical interface package.	<ol style="list-style-type: none">1. Perform the system checkout procedure. See "System checkout" on page 48.2. This error indicates that you might have a problem with the system board. Contact a service support representative for more information.

Checkpoint code	Description	Suggested action
D008	Initialize the console and flush the queues.	<ol style="list-style-type: none"> 1. Perform the system checkout procedure. See “System checkout” on page 48. 2. This error indicates that you might have a problem with the system board. Contact a service support representative for more information.
D00D	Evaluate the NVRAM script.	<ol style="list-style-type: none"> 1. Perform the system checkout procedure. See “System checkout” on page 48. 2. This error indicates that you might have a problem with the system board. Contact a service support representative for more information.
D010	First pass of the open firmware initialization is complete; establish parameters for restart.	<ol style="list-style-type: none"> 1. Perform the system checkout procedure. See “System checkout” on page 48. 2. This error indicates that you might have a problem with the system board. Contact a service support representative for more information.
D011	First pass of the open firmware initialization is complete; control returned to the initialization firmware.	<ol style="list-style-type: none"> 1. Perform the system checkout procedure. See “System checkout” on page 48. 2. This error indicates that you might have a problem with the system board. Contact a service support representative for more information.
D012	Second pass of the open firmware initialization is complete; control returned to the initialization firmware.	<ol style="list-style-type: none"> 1. Perform the system checkout procedure. See “System checkout” on page 48. 2. This error indicates that you might have a problem with the system board. Contact a service support representative for more information.
D099	Start the system information validation utility.	<ol style="list-style-type: none"> 1. Perform the system checkout procedure. See “System checkout” on page 48. 2. This error indicates that you might have a problem with the system board. Contact a service support representative for more information.
D100	The system serial number was found to be blank.	<ol style="list-style-type: none"> 1. Enter a valid serial number. The backspace and delete keys can be used to edit the value entered. Note: See the Hardware Maintenance and Troubleshooting Guide for more information about entering the serial number. 2. If the problem remains, you might have a problem with the system board. Contact a service support representative for more information.
D101	A machine serial number has been entered.	Re-enter the serial number used for D100. The backspace and delete keys can be used to edit the value entered.
D102	The machine type field has been found to be blank.	<ol style="list-style-type: none"> 1. Enter a valid machine type. The backspace and delete keys can be used to edit the value entered. 2. If the problem remains, you might have a problem with the system board. Contact a service support representative for assistance.
D103	The machine type has been entered.	Re-enter a valid machine type. The backspace and delete keys can be used to edit the value entered.

Checkpoint code	Description	Suggested action
D104	The model field has been found to be blank.	<ol style="list-style-type: none"> 1. Enter a valid machine model. The backspace and delete keys can be used to edit the value entered. 2. If the problem remains, you might have a problem with the system board. Contact a service support representative for assistance.
D105	The machine type has been entered.	Re-enter a valid machine type. The backspace and delete keys can be used to edit the value entered.
D106	The universal unique identifier (UUID) universal is blank; the new value has been calculated and the field has been updated.	This error indicates that you might have a problem with the system board. Contact a service support representative for assistance.
D5BB	There is a startup delay with the countdown for overriding or modifying the startup behavior.	<ol style="list-style-type: none"> 1. Perform the system checkout procedure. See “System checkout” on page 48. 2. This error indicates that you might have a problem with the system board. Contact a service support representative for more information.
E101	Create a run-time abstraction service (RTAS) node.	<ol style="list-style-type: none"> 1. Perform the system checkout procedure. See “System checkout” on page 48. 2. This error indicates that you might have a problem with the system board. Contact a service support representative for more information.
E102	Load and initialize the RTAS.	<ol style="list-style-type: none"> 1. Perform the system checkout procedure. See “System checkout” on page 48. 2. This error indicates that you might have a problem with the system board. Contact a service support representative for more information.
E105	Transfer control to the operating system (normal mode startup).	<ul style="list-style-type: none"> • Perform the system checkout procedure. See “System checkout” on page 48. • See <i>BladeCenter JS20 Type 8842 Hardware Maintenance Manual and Troubleshooting Guide</i>.
E10A	Load the RTAS device tree.	<ol style="list-style-type: none"> 1. Perform the system checkout procedure. See “System checkout” on page 48. 2. This error indicates that you might have a problem with the system board. Contact a service support representative for more information.
E10B	Set the RTAS device properties.	<ol style="list-style-type: none"> 1. Perform the system checkout procedure. See “System checkout” on page 48. 2. This error indicates that you might have a problem with the system board. Contact a service support representative for more information.
E130	Build the device tree.	<ol style="list-style-type: none"> 1. Perform the system checkout procedure. See “System checkout” on page 48. 2. This error indicates that you might have a problem with the system board. Contact a service support representative for more information.

Checkpoint code	Description	Suggested action
E134	Create the memory node.	<ol style="list-style-type: none"> 1. Perform the system checkout procedure. See “System checkout” on page 48. 2. This error indicates that you might have a problem with the system board. Contact a service support representative for more information.
E138	Create the options node.	<ol style="list-style-type: none"> 1. Perform the system checkout procedure. See “System checkout” on page 48. 2. This error indicates that you might have a problem with the system board. Contact a service support representative for more information.
E139	Create the aliases node and system aliases.	<ol style="list-style-type: none"> 1. Perform the system checkout procedure. See “System checkout” on page 48. 2. This error indicates that you might have a problem with the system board. Contact a service support representative for more information.
E13A	Create the packages node.	<ol style="list-style-type: none"> 1. Perform the system checkout procedure. See “System checkout” on page 48. 2. This error indicates that you might have a problem with the system board. Contact a service support representative for more information.
E140	Load the operating system.	See the <i>BladeCenter JS20 Type 8842 Hardware Maintenance Manual and Troubleshooting Guide</i> .
E141	Synchronize the operating-system boot list with the management-module boot list.	<ol style="list-style-type: none"> 1. Make sure that the boot list is correct using the management-module boot list menu. 2. Perform the system checkout procedure. See “System checkout” on page 48. 3. This error indicates that you might have a problem with the system board. Contact a service support representative for assistance.
E142	The management-module boot list is set from the operating-system boot list.	<ol style="list-style-type: none"> 1. Make sure that the boot list is correct using the management-module boot list menu. 2. Perform the system checkout procedure. See “System checkout” on page 48. 3. This error indicates that you might have a problem with the system board. Contact a service support representative for assistance.
E143	The operating-system boot list is set from the management-module boot list.	<ol style="list-style-type: none"> 1. Make sure that the boot list is correct using the management-module boot list menu. 2. Perform the system checkout procedure. See “System checkout” on page 48. 3. This error indicates that you might have a problem with the system board. Contact a service support representative for assistance.
E149	Create the startup manager node.	<ol style="list-style-type: none"> 1. Perform the system checkout procedure. See “System checkout” on page 48. 2. This error indicates that you might have a problem with the system board. Contact a service support representative for more information.

Checkpoint code	Description	Suggested action
E14A	Build the vital product data-to-operating-system lookup table.	<ol style="list-style-type: none"> 1. Perform the system checkout procedure. See “System checkout” on page 48. 2. This error indicates that you might have a problem with the system board. Contact a service support representative for more information.
E14C	Create the terminal emulator node.	<ol style="list-style-type: none"> 1. Perform the system checkout procedure. See “System checkout” on page 48. 2. This error indicates that you might have a problem with the system board. Contact a service support representative for more information.
E14D	Load the startup image.	See the <i>BladeCenter JS20 Type 8842 Hardware Maintenance Manual and Troubleshooting Guide</i> .
E150	Create the host (primary) PCI controller node.	<ol style="list-style-type: none"> 1. Perform the system checkout procedure. See “System checkout” on page 48. 2. If the problem remains, you might have a problem with the system board. Contact a service support representative for assistance.
E151	Probe the PCI bus.	<ol style="list-style-type: none"> 1. Perform the system checkout procedure. See “System checkout” on page 48. 2. This error indicates that you might have a problem with the system board. Contact a service support representative for more information.
E152	Probe for the adapter firmware code; evaluate if present.	<ol style="list-style-type: none"> 1. Perform the system checkout procedure. See “System checkout” on page 48. 2. This error indicates that you might have a problem with the system board. Contact a service support representative for more information.
E153	End the adapter firmware code probing and evaluation.	<ol style="list-style-type: none"> 1. Perform the system checkout procedure. See “System checkout” on page 48. 2. This error indicates that you might have a problem with the system board. Contact a service support representative for more information.
E154	Create the PCI bridge node.	<ol style="list-style-type: none"> 1. Perform the system checkout procedure. See “System checkout” on page 48. 2. This error indicates that you might have a problem with the system board. Contact a service support representative for more information.
E155	Probing the PCI bridge secondary bus.	<ol style="list-style-type: none"> 1. Perform the system checkout procedure. See “System checkout” on page 48. 2. If the problem remains, you might have a problem with the system board. Contact a service support representative for assistance.
E158	Reserved	Contact a service support representative for assistance.
E15B	Transfer control to the operating system (service-mode startup).	See the <i>BladeCenter JS20 Type 8842 Hardware Maintenance Manual and Troubleshooting Guide</i> .

Checkpoint code	Description	Suggested action
E15F	Adapter vital product data (VPD) evaluation.	<ol style="list-style-type: none"> 1. Perform the system checkout procedure. See “System checkout” on page 48. 2. If the problem remains, you might have a problem with the system board. Contact a service support representative for assistance.
E170	Beginning of the PCI bus probe.	<ol style="list-style-type: none"> 1. Perform the system checkout procedure. See “System checkout” on page 48. 2. If the problem remains, you might have a problem with the system board. Contact a service support representative for assistance.
E172	First pass of the PCI device probe.	<ol style="list-style-type: none"> 1. Perform the system checkout procedure. See “System checkout” on page 48. 2. If the problem remains, you might have a problem with the system board. Contact a service support representative for assistance.
E174	Establishing the host connection.	<ol style="list-style-type: none"> 1. Make sure that the Boot Internet protocol (BOOTP) server is configured for this client. Correct any BOOTP server problems; then, retry the operation. 2. Make sure that the network connections are correct; then, retry the operation. 3. Perform the system checkout procedure. See “System checkout” on page 48. 4. If there are no problems with the BOOTP server or the network connection, replace the system-board assembly. Contact a service support representative for assistance.
E175	Boot Internet protocol (BOOTP) request.	<ol style="list-style-type: none"> 1. Make sure that the BOOTP server is correctly configured for this client. Correct any BOOTP server problems; then, retry the operation. 2. Make sure that network connections are correct; then, retry the operation. 3. Perform the system checkout procedure. See “System checkout” on page 48. 4. If there are no problems with the BOOTP server or the network connection, replace the system-board assembly. Contact a service support representative for assistance.
E176	Trivial file transfer protocol (TFTP) file transfer.	<ol style="list-style-type: none"> 1. Make sure that the blade server is correctly configured; then, retry the operation. 2. Make sure that the network connections are correct; then, retry the operation. 3. If there are no problems with the BOOTP server or the network connection, replace the system-board assembly. Contact a service support representative for assistance.

Checkpoint code	Description	Suggested action
E177	Transfer failure due to a TFTP error condition.	<ol style="list-style-type: none"> 1. Make sure that the BOOTP server is correctly configured; then, retry the operation. 2. Make sure that the network connections are correct; then, retry the operation. 3. Perform the system checkout procedure. See “System checkout” on page 48. 4. If there are no problems with the BOOTP server or the network connection, replace the system-board assembly. Contact a service support representative for assistance.
E17B	Microprocessor clock-speed measurement.	<ol style="list-style-type: none"> 1. Perform the system checkout procedure. See “System checkout” on page 48. 2. If the problem remains, you might have a problem with the system board. Contact a service support representative for assistance.
E191	Create an industry standard architecture (ISA) reserved node.	<ol style="list-style-type: none"> 1. Perform the system checkout procedure. See “System checkout” on page 48. 2. This error indicates that you might have a problem with the system board. Contact a service support representative for more information.
E19A	NVRAM auto-boot? variable not found - assume FALSE.	<ol style="list-style-type: none"> 1. Perform the system checkout procedure. See “System checkout” on page 48. 2. This error indicates that you might have a problem with the system board. Contact a service support representative for more information.
E19B	NVRAM menu? variable not found - assume FALSE.	<ol style="list-style-type: none"> 1. Perform the system checkout procedure. See “System checkout” on page 48. 2. This error indicates that you might have a problem with the system board. Contact a service support representative for more information.
E19D	Create the NVRAM node.	<ol style="list-style-type: none"> 1. Perform the system checkout procedure. See “System checkout” on page 48. 2. This error indicates that you might have a problem with the system board. Contact a service support representative for more information.
E19E	Real-time-clock initialization.	<ol style="list-style-type: none"> 1. Perform the system checkout procedure. See “System checkout” on page 48. 2. This error indicates that you might have a problem with the system board. Contact a service support representative for more information.
E1A0	Reserved - open firmware function.	<ol style="list-style-type: none"> 1. Perform the system checkout procedure. See “System checkout” on page 48. 2. This error indicates that you might have a problem with the system board. Contact a service support representative for more information.
E1A1	The user requested startup to the open firmware prompt that was initiated by a keyboard entry.	<ol style="list-style-type: none"> 1. Perform the system checkout procedure. See “System checkout” on page 48. 2. This error indicates that you might have a problem with the system board. Contact a service support representative for more information.

Checkpoint code	Description	Suggested action
E1A2	The user requested startup using the default service-mode boot list that was initiated by a keyboard entry.	<ol style="list-style-type: none"> 1. Perform the system checkout procedure. See “System checkout” on page 48. 2. This error indicates that you might have a problem with the system board. Contact a service support representative for more information.
E1A3	The user requested startup using the customized service-mode boot list that was initiated by a keyboard entry.	<ol style="list-style-type: none"> 1. Perform the system checkout procedure. See “System checkout” on page 48. 2. This error indicates that you might have a problem with the system board. Contact a service support representative for more information.
E1A5	The user requested startup to the open firmware prompt using a service-processor command.	<ol style="list-style-type: none"> 1. Perform the system checkout procedure. See “System checkout” on page 48. 2. This error indicates that you might have a problem with the system board. Contact a service support representative for more information.
E1A6	The user requested startup using the default service-mode boot list of the service-processor command.	<ol style="list-style-type: none"> 1. Perform the system checkout procedure. See “System checkout” on page 48. 2. This error indicates that you might have a problem with the system board. Contact a service support representative for more information.
E1A7	The user requested startup using the customized service-mode boot list of the service-processor command.	<ol style="list-style-type: none"> 1. Perform the system checkout procedure. See “System checkout” on page 48. 2. This error indicates that you might have a problem with the system board. Contact a service support representative for more information.
E1A8	System startup to the open firmware prompt.	<ol style="list-style-type: none"> 1. Perform the system checkout procedure. See “System checkout” on page 48. 2. This error indicates that you might have a problem with the system board. Contact a service support representative for more information.
E1A9	Reserved - open firmware function.	<ol style="list-style-type: none"> 1. Perform the system checkout procedure. See “System checkout” on page 48. 2. This error indicates that you might have a problem with the system board. Contact a service support representative for more information.
E1AA	System startup check for NVRAM settings.	<ol style="list-style-type: none"> 1. Perform the system checkout procedure. See “System checkout” on page 48. 2. This error indicates that you might have a problem with the system board. Contact a service support representative for more information.
E1AB	System startup using the default service-mode boot list.	<ol style="list-style-type: none"> 1. Perform the system checkout procedure. See “System checkout” on page 48. 2. This error indicates that you might have a problem with the system board. Contact a service support representative for more information.

Checkpoint code	Description	Suggested action
E1AC	System startup using the customized service-mode boot list.	<ol style="list-style-type: none"> 1. Perform the system checkout procedure. See “System checkout” on page 48. 2. This error indicates that you might have a problem with the system board. Contact a service support representative for more information.
E1AD	System startup to the operating system.	<ol style="list-style-type: none"> 1. Perform the system checkout procedure. See “System checkout” on page 48. 2. This error indicates that you might have a problem with the system board. Contact a service support representative for more information.
E1AE	System startup to multiboot menu using the NVRAM settings.	<ol style="list-style-type: none"> 1. Perform the system checkout procedure. See “System checkout” on page 48. 2. This error indicates that you might have a problem with the system board. Contact a service support representative for more information.
E1AF	System startup to the utilities menu using the NVRAM settings.	<ol style="list-style-type: none"> 1. Perform the system checkout procedure. See “System checkout” on page 48. 2. This error indicates that you might have a problem with the system board. Contact a service support representative for more information.
E1B1	Create the serial node.	<ol style="list-style-type: none"> 1. Perform the system checkout procedure. See “System checkout” on page 48. 2. This error indicates that you might have a problem with the system board. Contact a service support representative for more information.
E1B2	XOFF received - waiting for XON.	Have the blade server serviced. Contact a service support representative for assistance.
E1B3	XON received.	Have the blade server serviced. Contact a service support representative for assistance.
E1B6	Reserved	Have the blade server serviced. Contact a service support representative for assistance.
E1BD	Reserved	Have the blade server serviced. Contact a service support representative for assistance.
E1C4	Create the ISA timer chip node.	<ol style="list-style-type: none"> 1. Perform the system checkout procedure. See “System checkout” on page 48. 2. This error indicates that you might have a problem with the system board. Contact a service support representative for more information.
E1C5	Create the ISA interrupt controller (PIC) node.	<ol style="list-style-type: none"> 1. Perform the system checkout procedure. See “System checkout” on page 48. 2. This error indicates that you might have a problem with the system board. Contact a service support representative for more information.
E1C6	Create the direct memory access (DMA) node.	<ol style="list-style-type: none"> 1. Perform the system checkout procedure. See “System checkout” on page 48. 2. This error indicates that you might have a problem with the system board. Contact a service support representative for more information.
E1D0	Reserved	Have the blade server serviced.

Checkpoint code	Description	Suggested action
E1D3	Reserved	Have the blade server serviced.
E1D4	Reserved	Have the blade server serviced.
E1DB	Reserved	Have the blade server serviced.
E1DC	Reserved	Have the blade server serviced.
E1F0	Start the out-of-box-experience function.	<ol style="list-style-type: none"> 1. Perform the system checkout procedure. See “System checkout” on page 48. 2. This error indicates that you might have a problem with the system board. Contact a service support representative for more information.
E1F1	Begin the self-test sequence on startup devices.	<ol style="list-style-type: none"> 1. Perform the system checkout procedure. See “System checkout” on page 48. 2. This error indicates that you might have a problem with the system board. Contact a service support representative for more information.
E1F2	Reserved	Have the blade server serviced. Contact a service support representative for assistance.
E1F3	Reserved	Have the blade server serviced. Contact a service support representative for assistance.
E1F4	End the self-test sequence on startup devices.	<ol style="list-style-type: none"> 1. Perform the system checkout procedure. See “System checkout” on page 48. 2. This error indicates that you might have a problem with the system board. Contact a service support representative for more information.
E1F5	Build the boot list.	<ol style="list-style-type: none"> 1. Perform the system checkout procedure. See “System checkout” on page 48. 2. This error indicates that you might have a problem with the system board. Contact a service support representative for more information.
E1F6	Determine the startup-device sequence.	<ol style="list-style-type: none"> 1. Make sure that the boot list is applicable by using the management-module boot list menu. 2. Perform the system checkout procedure. See “System checkout” on page 48. 3. This error indicates that you might have a problem with the system board. Contact a service support representative for more information.
E1F7	No startup image located.	See the <i>BladeCenter JS20 Type 8842 Hardware Maintenance Manual and Troubleshooting Guide</i> .
E1F8	Build the boot list for SCSI adapters. The location of the SCSI adapter being scanned is also displayed.	<ol style="list-style-type: none"> 1. Perform the system checkout procedure. See “System checkout” on page 48. 2. This error indicates that you might have a problem with the system board. Contact a service support representative for more information.
E1F9	Build the boot list for Fibre Channel adapters. The location of the storage area network (SAN) adapter being scanned is also displayed.	<ol style="list-style-type: none"> 1. Perform the system checkout procedure. See “System checkout” on page 48. 2. This error indicates that you might have a problem with the system board. Contact a service support representative for more information.
E1FA	Reserved	Have the blade server serviced.

Checkpoint code	Description	Suggested action
E1FB	Reserved	Have the blade server serviced.
E1FC	Build the boot list for serial storage architecture (SSA) adapters. The location code of the SSA adapter being scanned is also displayed.	<ol style="list-style-type: none"> 1. Perform the system checkout procedure. See “System checkout” on page 48. 2. This error indicates that you might have a problem with the system board. Contact a service support representative for more information.
E1FD	E1FD and another progress code (Exxx) will alternate in the operator panel. The other code indicates where the error occurred.	<ol style="list-style-type: none"> 1. Perform the system checkout procedure. See “System checkout” on page 48. 2. This error indicates that you might have a problem with the system board. Contact a service support representative for more information.
E1FE	Build the boot list for Fibre Channel adapters. The world-wide port number (WWPN) of the SAN adapter being scanned is also displayed.	<ol style="list-style-type: none"> 1. Perform the system checkout procedure. See “System checkout” on page 48. 2. This error indicates that you might have a problem with the system board. Contact a service support representative for more information.
E1FF	Building the boot list for Fibre Channel adapters. The WWPN of the SAN adapter being scanned is also displayed.	<ol style="list-style-type: none"> 1. Perform the system checkout procedure. See “System checkout” on page 48. 2. This error indicates that you might have a problem with the system board. Contact a service support representative for more information.
E199	Restarting (rebooting) the partition to activate the changes that are specified in the boot-image’s executable and linkable format (ELF) header.	<ol style="list-style-type: none"> 1. Check the http://www.ibm.com/support Web site for a later firmware version that might address the problem. For additional information, see “Updating the firmware code for the blade server and the service processor” on page 40. 2. If a later firmware version is not available, or if the problem remains after you update the firmware code, go to the “Boot problem resolution” section in the <i>BladeCenter JS20 Type 8842 Hardware Maintenance Manual and Troubleshooting Guide</i>. Follow the instructions in that section.
E200	I ² C bus controller initialization.	<ol style="list-style-type: none"> 1. Perform the system checkout procedure. See “System checkout” on page 48. 2. If the problem remains, force the system to start from the PERM flash image to reflash the TEMP image for recovery. See “Recovering the system firmware code” on page 84. 3. If the problem remains, replace the blade server. Contact a service support representative for assistance.
E201	The flash random-access memory (RAM) cyclic redundancy check (CRC) checksum is valid.	<ol style="list-style-type: none"> 1. Perform the system checkout procedure. See “System checkout” on page 48. 2. This error indicates that you might have a problem with the system board. Contact a service support representative for more information.
E202	Programmable interrupt controller (MPIC) initialization.	<ol style="list-style-type: none"> 1. Perform the system checkout procedure. See “System checkout” on page 48. 2. This error indicates that you might have a problem with the system board. Contact a service support representative for more information.

Checkpoint code	Description	Suggested action
E203	Disable the TimeBase (TB) function.	<ol style="list-style-type: none"> 1. Perform the system checkout procedure. See “System checkout” on page 48. 2. This error indicates that you might have a problem with the system board. Contact a service support representative for more information.
E204	CRC check of the image in RAM.	<ol style="list-style-type: none"> 1. Perform the system checkout procedure. See “System checkout” on page 48. 2. This error indicates that you might have a problem with the system board. Contact a service support representative for more information.
E206	Reenable the TimeBase (TB) function.	<ol style="list-style-type: none"> 1. Perform the system checkout procedure. See “System checkout” on page 48. 2. This error indicates that you might have a problem with the system board. Contact a service support representative for more information.
E209	Serial input/output (SIO), communication line 1 (COM1), and general purpose input/output (GPIO) initialization.	<ol style="list-style-type: none"> 1. Perform the system checkout procedure. See “System checkout” on page 48. 2. This error indicates that you might have a problem with the system board. Contact a service support representative for more information.
E20A	Load 256 K flash code into Level 2 (L2) cache.	<ol style="list-style-type: none"> 1. Perform the system checkout procedure. See “System checkout” on page 48. 2. This error indicates that you might have a problem with the system board. Contact a service support representative for more information.
E20B	Read startup mode.	<ol style="list-style-type: none"> 1. Perform the system checkout procedure. See “System checkout” on page 48. 2. This error indicates that you might have a problem with the system board. Contact a service support representative for more information.
E20C	Control of the master processor has been transferred to the Partition FirmWare (PFW).	<ol style="list-style-type: none"> 1. Perform the system checkout procedure. See “System checkout” on page 48. 2. This error indicates that you might have a problem with the system board. Contact a service support representative for more information.
E20D	Startup mode has been obtained.	<ol style="list-style-type: none"> 1. Perform the system checkout procedure. See “System checkout” on page 48. 2. This error indicates that you might have a problem with the system board. Contact a service support representative for more information.
E20F	Run from Level 2 (L2) cache.	<ol style="list-style-type: none"> 1. Perform the system checkout procedure. See “System checkout” on page 48. 2. This error indicates that you might have a problem with the system board. Contact a service support representative for more information.

Checkpoint code	Description	Suggested action
E210	Load and relocate the hardware isolation layer (HIL).	<ol style="list-style-type: none"> 1. Perform the system checkout procedure. See “System checkout” on page 48. 2. This error indicates that you might have a problem with the system board. Contact a service support representative for more information.
E211	CRC check of the image in flash RAM.	<ol style="list-style-type: none"> 1. Perform the system checkout procedure. See “System checkout” on page 48. 2. This error indicates that you might have a problem with the system board. Contact a service support representative for more information.
E212	Get processor status and presence.	<ol style="list-style-type: none"> 1. Perform the system checkout procedure. See “System checkout” on page 48. 2. This error indicates that you might have a problem with the system board. Contact a service support representative for more information.
E213	Memory initialization.	<ol style="list-style-type: none"> 1. Make sure that the DIMMs are correctly installed and seated; then, restart the blade server. 2. Start the blade server from the PERM flash image to recover the TEMP image. See “Recovering the system firmware code” on page 84. 3. This error indicates that you might have a problem with the system board. Contact a service support representative for more information.
E214	Pattern 1 memory test.	<ol style="list-style-type: none"> 1. Make sure that the DIMMs are correctly installed and seated; then, restart the blade server. 2. Start the blade server from the PERM flash image to recover the TEMP image. See “Recovering the system firmware code” on page 84. 3. This error indicates that you might have a problem with the system board. Contact a service support representative for more information.
E215	Pattern 2 memory test.	<ol style="list-style-type: none"> 1. Make sure that the DIMMs are correctly installed and seated; then, restart the blade server. 2. Start the blade server from the PERM flash image to recover the TEMP image. See “Recovering the system firmware code” on page 84. 3. This error indicates that you might have a problem with the system board. Contact a service support representative for more information.
E216	Clear memory.	<ol style="list-style-type: none"> 1. Make sure that the DIMMs are correctly installed and seated; then, restart the blade server. 2. Start the blade server from the PERM flash image to recover the TEMP image. See “Recovering the system firmware code” on page 84. 3. This error indicates that you might have a problem with the system board. Contact a service support representative for more information.

Checkpoint code	Description	Suggested action
E217	Setup DMA address re-mapping logic (DART), HIL base, and storage description register 1 (SDR1).	<ol style="list-style-type: none"> 1. Perform the system checkout procedure. See "System checkout" on page 48. 2. This error indicates that you might have a problem with the system board. Contact a service support representative for more information.
E218	Copy the set of flash RAM to memory.	<ol style="list-style-type: none"> 1. Perform the system checkout procedure. See "System checkout" on page 48. 2. This error indicates that you might have a problem with the system board. Contact a service support representative for more information.
E219	Save the dual in-line memory module (DIMM) serial presence detects (SPDs) and the processor status and presence.	<ol style="list-style-type: none"> 1. Perform the system checkout procedure. See "System checkout" on page 48. 2. This error indicates that you might have a problem with the system board. Contact a service support representative for more information.
E21A	Running code from memory.	<ol style="list-style-type: none"> 1. Perform the system checkout procedure. See "System checkout" on page 48. 2. This error indicates that you might have a problem with the system board. Contact a service support representative for more information.
E21B	Load PFW into memory.	<ol style="list-style-type: none"> 1. Perform the system checkout procedure. See "System checkout" on page 48. 2. This error indicates that you might have a problem with the system board. Contact a service support representative for more information.
E21C	Run HyperTransport (HT) initialization.	<ol style="list-style-type: none"> 1. Perform the system checkout procedure. See "System checkout" on page 48. 2. This error indicates that you might have a problem with the system board. Contact a service support representative for more information.
E21D	Run PCI initialization.	<ol style="list-style-type: none"> 1. Perform the system checkout procedure. See "System checkout" on page 48. 2. This error indicates that you might have a problem with the system board. Contact a service support representative for more information.
E21E	Run I/O advanced programmable interrupt controller (APIC) initialization.	<ol style="list-style-type: none"> 1. Perform the system checkout procedure. See "System checkout" on page 48. 2. This error indicates that you might have a problem with the system board. Contact a service support representative for more information.
E21F	Building the partition fundamental data structure (PFDS).	<ol style="list-style-type: none"> 1. Perform the system checkout procedure. See "System checkout" on page 48. 2. This error indicates that you might have a problem with the system board. Contact a service support representative for more information.
E2B0	Reserved	No action is required.
E2B1	Reserved	No action is required.

Checkpoint code	Description	Suggested action
E440	Validate NVRAM and initialize partitions as needed.	<ol style="list-style-type: none"> 1. Perform the system checkout procedure. See “System checkout” on page 48. 2. This error indicates that you might have a problem with the system board. Contact a service support representative for more information.
E441	Generate /options node and NVRAM configuration variable properties.	<ol style="list-style-type: none"> 1. Perform the system checkout procedure. See “System checkout” on page 48. 2. This error indicates that you might have a problem with the system board. Contact a service support representative for more information.
E442	Validate NVRAM partitions.	<ol style="list-style-type: none"> 1. Perform the system checkout procedure. See “System checkout” on page 48. 2. This error indicates that you might have a problem with the system board. Contact a service support representative for more information.
E443	Generate NVRAM configuration variable dictionary words.	<ol style="list-style-type: none"> 1. Perform the system checkout procedure. See “System checkout” on page 48. 2. This error indicates that you might have a problem with the system board. Contact a service support representative for more information.
E444	Clearing and rebuilding of NVRAM common hardware reference platform (CHRP) region initiated by operator.	<ol style="list-style-type: none"> 1. Perform the system checkout procedure. See “System checkout” on page 48. 2. This error indicates that you might have a problem with the system board. Contact a service support representative for more information.
E800	Start the instantiation of RTAS.	Have the blade server serviced. Contact a service support representative for assistance.
E810	Initialize input/output configuration (IOCONFIG) pfd.	Have the blade server serviced. Contact a service support representative for assistance.
E820	Initialize logical partition event (lpevent).	<ol style="list-style-type: none"> 1. Perform the system checkout procedure. See “System checkout” on page 48. 2. This error indicates that you might have a problem with the system board. Contact a service support representative for more information.
E830	Initialize event scan.	<ol style="list-style-type: none"> 1. Perform the system checkout procedure. See “System checkout” on page 48. 2. This error indicates that you might have a problem with the system board. Contact a service support representative for more information.
E840	Initialize hot plug process.	<ol style="list-style-type: none"> 1. Perform the system checkout procedure. See “System checkout” on page 48. 2. This error indicates that you might have a problem with the system board. Contact a service support representative for more information.
E842	Initialize check exception buffers.	<ol style="list-style-type: none"> 1. Perform the system checkout procedure. See “System checkout” on page 48. 2. This error indicates that you might have a problem with the system board. Contact a service support representative for more information.

Checkpoint code	Description	Suggested action
E843	Initialize interface and operating system access.	<ol style="list-style-type: none"> 1. Perform the system checkout procedure. See "System checkout" on page 48. 2. This error indicates that you might have a problem with the system board. Contact a service support representative for more information.
E850	Initialize dynamic reconfiguration.	<ol style="list-style-type: none"> 1. Perform the system checkout procedure. See "System checkout" on page 48. 2. This error indicates that you might have a problem with the system board. Contact a service support representative for more information.
E860	Initialize sensors.	<ol style="list-style-type: none"> 1. Perform the system checkout procedure. See "System checkout" on page 48. 2. This error indicates that you might have a problem with the system board. Contact a service support representative for more information.
E865	Initialize vital product data (VPD).	<ol style="list-style-type: none"> 1. Perform the system checkout procedure. See "System checkout" on page 48. 2. This error indicates that you might have a problem with the system board. Contact a service support representative for more information.
E870	Initialize pfds memory manager.	<ol style="list-style-type: none"> 1. Perform the system checkout procedure. See "System checkout" on page 48. 2. This error indicates that you might have a problem with the system board. Contact a service support representative for more information.
E875	Initialize rtas_last_error.	<ol style="list-style-type: none"> 1. Perform the system checkout procedure. See "System checkout" on page 48. 2. This error indicates that you might have a problem with the system board. Contact a service support representative for more information.
E876	Initialize rtas_error_inject.	<ol style="list-style-type: none"> 1. Perform the system checkout procedure. See "System checkout" on page 48. 2. This error indicates that you might have a problem with the system board. Contact a service support representative for more information.
E890	Initialize Open Firmware.	Have the blade server serviced. Contact a service support representative for assistance.
EAA1	Probe PCI-PCI bridge.	<ol style="list-style-type: none"> 1. Perform the system checkout procedure. See "System checkout" on page 48. 2. This error indicates that you might have a problem with the system board. Contact a service support representative for more information.

Firmware error codes

Table 1 provides an abbreviated list of the 8-digit alphanumeric firmware error codes that might appear during system initialization or operation.

Notes:

- When you are solving a problem with the BladeCenter JS20 Type 8842 blade server, you must determine whether the problem is in the BladeCenter JS20 Type 8842 blade server or in the BladeCenter unit.
 - There is a blade-server problem 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, the problem is in the BladeCenter unit. For more information, see the *Hardware Maintenance Manual and Troubleshooting Guide* or Problem Determination and Service Guide that comes with the BladeCenter unit.
- For more information about the firmware error codes, see the “Diagnostics” in the *BladeCenter JS20 Type 8842 Hardware Maintenance Manual and Troubleshooting Guide* that comes with the blade server.

Table 1. Abbreviated list of firmware error codes

Error code	Failing device or problem found	Suggested action
20A80000	Insufficient information to start the server.	<ol style="list-style-type: none">1. Contact your network administrator to make sure that the server and gateway network are correct.2. Contact a service support representative for assistance.
20A80001	The client Internet Protocol (IP) address is already in use by another network device.	<ol style="list-style-type: none">1. Contact your network administrator to make sure that the server and gateway network are correct.2. Contact a service support representative for assistance.
20A80002	Cannot get the gateway IP address.	<ol style="list-style-type: none">1. Contact your network administrator to make sure that the server and gateway network are correct.2. Contact a service support representative for assistance.
20A80003	Cannot get the server hardware address.	<ol style="list-style-type: none">1. Contact your network administrator to make sure the server and gateway network are correct.2. Contact a service support representative for assistance.
20A80004	Boot Internet protocol (BOOTP) failed.	<ol style="list-style-type: none">1. Make sure that the BOOTP server is correctly configured for this client.2. Check the network connection. If the network connection is good, retry the operation. If there is no network connection, contact your network administrator.3. If there are no problems with the BOOTP server or the network connection, replace the system-board assembly. Contact a service support representative for more information.

Table 1. Abbreviated list of firmware error codes (continued)

Error code	Failing device or problem found	Suggested action
20A80005	The trivial file transfer protocol (TFTP) failed.	<ol style="list-style-type: none"> 1. Make sure that the BOOTP server is correctly configured for this client. 2. Check the network connection. If the network connection is good, retry the operation. If there is no network connection, contact your network administrator. 3. If there are no problems with the BOOTP server or the network connection, replace the system-board assembly. Contact a service support representative for more information.
20A80006	The startup image is too large.	<ol style="list-style-type: none"> 1. Make sure that the BOOTP server is correctly configured for this client. 2. Check the network connection. If the network connection is good, retry the operation. If there is no network connection, contact your network administrator. 3. If there are no problems with the BOOTP server or the network connection, replace the system-board assembly. Contact a service support representative for more information.
20A80100	A SAN device was found in the boot list; however, the ibm,fw-fcpdisk alias name has not been defined in the /alias node.	Type the setup-fc-disk command at the open firmware prompt and press Enter; then, restart the blade server.
20A80102	The ibm,fw-fcpdisk alias is not a SAN device.	Run the setup-fc-disk utility.
20A80104	The disk2 alias was found and copied to the ibm,fw-fcpdisk alias.	This is an informational message. No action is required.
20A80110	The ibm,fw-fcpdisk alias was modified.	This is an informational message. No action is required.
20D0000F	The device failed the self-test; error or location code information might not be available.	<ul style="list-style-type: none"> • If a location code is specified, replace the device at that location. • Perform the system checkout procedure. See “System checkout” on page 48.
20D00010	The device failed the self-test; cannot locate package.	<ol style="list-style-type: none"> 1. If a location code is reported with the error, replace the device at that location code. 2. Replace the system-board assembly. Contact a service support representative for more information.
20D00011	The run-time extraction services (RTAS) program attempt to allocate memory failed.	Perform the system checkout procedure. See “System checkout” on page 48.

Table 1. Abbreviated list of firmware error codes (continued)

Error code	Failing device or problem found	Suggested action										
20D008 xx	<p>Failure to access VPD data.</p> <p>Where xx is:</p> <table border="1"> <thead> <tr> <th>xx</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>0E, 0F</td> <td>Machine type or model</td> </tr> <tr> <td>10, 11</td> <td>System serial number</td> </tr> <tr> <td>16, 17</td> <td>Universal unique identifier (UUID)</td> </tr> <tr> <td>1E</td> <td>Startup (boot) mode</td> </tr> </tbody> </table>	xx	Description	0E, 0F	Machine type or model	10, 11	System serial number	16, 17	Universal unique identifier (UUID)	1E	Startup (boot) mode	<p>Perform the system checkout procedure. See “System checkout” on page 48.</p>
xx	Description											
0E, 0F	Machine type or model											
10, 11	System serial number											
16, 17	Universal unique identifier (UUID)											
1E	Startup (boot) mode											
20D00900	The blade server failed to generate a UUID value.	<ol style="list-style-type: none"> 1. Replace the memory in the blade server. 2. Replace the system-board assembly. Contact a service support representative for assistance. 										
20D00901	The blade server failed to communicate with the service processor.	Have the blade server serviced. Contact a service support representative for assistance.										
20D00902	The blade server is starting from the permanent firmware code page (PERM image).	<p>If the blade server was set to start from the permanent firmware code page (PERM image), this is an informational message.</p> <p>If it was not, this indicates that the blade server was unable to start from the temporary firmware code page (TEMP image).</p> <p>Go to “Recovering the system firmware code” on page 84. Have the blade server serviced.</p>										
20D00903	The blade server failed to find the /openprom package. This is most likely a software error.	Have the blade server serviced. Contact a service support representative for assistance.										
20D1000A	The blade server failed to send the startup-failure message to the service processor.	Perform the system checkout procedure. See “System checkout” on page 48.										
20D10004	The blade server failed to locate service processor device-tree node.	Perform the system checkout procedure. See “System checkout” on page 48.										
20D10005	The blade server failed to restart.	Perform the system checkout procedure. See “System checkout” on page 48.										
20D10006	The blade server failed to restart a partition.	Perform the system checkout procedure. See “System checkout” on page 48.										
20D10007	Partition firmware error before stdout ready.	Perform the system checkout procedure. See “System checkout” on page 48.										
20D10010	Stack underflow from the Fibre Channel adapter.	<ol style="list-style-type: none"> 1. Check the http://www.ibm.com/support Web site for microcode updates for the Fibre Channel adapter. Apply the latest update, if one is available. 2. If an update is not available, contact a system administrator for assistance. 3. Perform the system checkout procedure. See “System checkout” on page 48. 										

Table 1. Abbreviated list of firmware error codes (continued)

Error code	Failing device or problem found	Suggested action
20EE000B	The blade server could not find the operating system among the devices in the boot list. Note: The startup sequence is also known as the boot list.	<ul style="list-style-type: none"> If you have not installed an operating system on the blade server, install it now. If you have installed an operating system on the blade server, make sure that the startup sequence contains at least one device with a valid operating-system startup image. If the startup device is a SAN device, also see error code 20A80100. <p>If the problem remains, have the blade server serviced. Contact a service support representative for assistance.</p>
20EE000F	Unable to find the package node.	Perform the system checkout procedure. See “System checkout” on page 48.
20EE0010	Unable to process the root vpd method.	Perform the system checkout procedure. See “System checkout” on page 48.
20EE0011	Unable to process the vpd method.	Perform the system checkout procedure. See “System checkout” on page 48.
20EE0012	Unable to process the mem-dimm-vpd method.	Perform the system checkout procedure. See “System checkout” on page 48.
20EE0015	The blade server failed to read the VPD startup path field value.	<ol style="list-style-type: none"> Make sure that the boot list in the management module is correct. Perform the system checkout procedure. See “System checkout” on page 48.
20EE0016	The blade server failed to update the VPD with the new startup path field value.	<ol style="list-style-type: none"> Make sure that the boot list in the management module is correct. Perform the system checkout procedure. See “System checkout” on page 48.
20EE0020	The environment variable, startup-device, exceeds the maximum number of characters.	<ol style="list-style-type: none"> Make sure that the boot list in the management module is correct. Perform the system checkout procedure. See “System checkout” on page 48.
20EE0021	The environment variable, startup-device, contains more than five entries.	<ol style="list-style-type: none"> Make sure that the boot list in the management module is correct. Perform the system checkout procedure. See “System checkout” on page 48.
20EE0022	The environment variable, startup-device, contains an entry that exceeds 255 characters in length.	<ol style="list-style-type: none"> Make sure that the boot list in the management module is correct. Perform the system checkout procedure. See “System checkout” on page 48.
20EE0023	The blade server failed to set the operating-system boot list from the management-module boot list.	<ol style="list-style-type: none"> Make sure that the boot list in the management module is correct. Check the http://www.ibm.com/support Web site for firmware updates for the management module, service processor, and blade server. Apply the latest updates, if they are available. If updates are not available, contact your system administrator for assistance. <p>If the problem remains, call for service.</p>

Table 1. Abbreviated list of firmware error codes (continued)

Error code	Failing device or problem found	Suggested action
20EE0100	The firmware code on an I/O adapter is not supported on the blade server. This error code only affects the start-time operation, not the adapter functionality under the operating system.	<p>This is an informational message. The adapter firmware code device driver is not supported on the blade server. For a list of supported operating systems and other options, go to http://www.ibm.com/servers/eserver/serverproven/compat/us.</p> <p>Remove the adapter and replace it with an adapter whose firmware-code device driver is supported on the blade server.</p>
20FF0001	Problem with VPD.	<ul style="list-style-type: none"> • If a location code is specified, replace the device at that location. • If an error LED is lit, see “Light path diagnostics table” on page 81. Then, replace the failing component, if it is user-replaceable. • Have the blade server serviced if: <ul style="list-style-type: none"> – There is no location code or error LED to indicate the failing component. – The failing component is not user-replaceable.
21020010	The USB CD drive remained busy longer than the amount of allocated time.	<ol style="list-style-type: none"> 1. Retry the operation. 2. Check the http://www.ibm.com/support Web site for firmware updates for the management module, service processor, and blade server. Apply the latest updates, if they are available. 3. If updates are not available, contact a system administrator for assistance. 4. If the problem remains, replace the USB CD drive. 5. If the problem remains, replace the system-board assembly. For replacement instructions, see the Hardware Maintenance and Troubleshooting Guide.
21020011	The USB CD drive: processing of ATA or ATAPI command was not completed within the amount of allocated time.	<ol style="list-style-type: none"> 1. Retry the operation. 2. If the problem remains, the CD in the USB CD drive might not be readable. Remove the CD and insert another CD. 3. If the problem remains, replace the USB CD drive. 4. If the problem remains, replace the system-board assembly. Contact a service support representative for assistance.
21020012	The USB CD drive: execution of ATA or ATAPI command by the USB CD failed.	<ol style="list-style-type: none"> 1. Make sure that the required cables are correctly attached to the power and signal connectors on the USB CD drive. Make sure that the cables are not damaged. If the cables are damaged, replace them, then, retry the operation. 2. If the problem remains, the CD in the USB CD drive might not be readable. 3. Contact a service support representative for assistance.

Table 1. Abbreviated list of firmware error codes (continued)

Error code	Failing device or problem found	Suggested action
21020013	The USB CD drive: startable CD is missing.	<ol style="list-style-type: none"> 1. Retry the operation. 2. If the problem remains, remove the CD and insert another CD. The CD in the USB CD drive might not be readable. 3. If the problem remains, replace the USB CD drive. 4. If the problem remains, replace the system-board assembly. Contact a service support representative for assistance.
21020014	The USB CD drive: the CD has been changed.	<ol style="list-style-type: none"> 1. Retry the operation. 2. Check the http://www.ibm.com/support Web site for firmware updates for the management module, service processor, and blade server. Apply the latest updates, if they are available. 3. If updates are not available, contact your system administrator for assistance. 4. If the problem remains, replace the USB CD drive. 5. If the problem remains, replace the system-board assembly. Contact a service support representative for assistance.
21020015	The USB CD drive: failure of ATA or ATAPI packed command processing by USB CD drive.	<ol style="list-style-type: none"> 1. If the problem remains, remove the CD and insert another CD. The CD in the USB CD drive might not be readable. 2. Check the http://www.ibm.com/support Web site for firmware updates for the management module, service processor, and blade server. Apply the latest updates, if they are available. 3. If updates are not available, contact a system administrator for assistance. 4. If the problem remains, replace the USB CD drive. 5. If the problem remains, replace the system-board assembly. Contact a service support representative for assistance.
22000001	Peripheral component interconnect (PCI) Ethernet adapter failure.	Replace the adapter.
22001001	PCI Ethernet adapter failure.	Replace the adapter.
22001002	PCI Ethernet adapter failure.	Replace the adapter.
22010001	PCI Ethernet adapter failure.	Replace the adapter.
22011001	PCI Ethernet adapter failure.	Replace the adapter.

Table 1. Abbreviated list of firmware error codes (continued)

Error code	Failing device or problem found	Suggested action
22003002	Gigabit Ethernet adapter failure.	<p>If the location code identifies a slot:</p> <ol style="list-style-type: none"> 1. Reseat the adapter and restart the blade server. 2. Replace the adapter. 3. Check the http://www.ibm.com/support Web site for system firmware updates. Apply the latest update, if one is available. 4. If an update is not available, contact a system administrator for assistance. <p>If the location code identifies the system, replace the system-board assembly. Contact a service support representative for assistance.</p>
22003003	Gigabit Ethernet adapter failure.	<p>If there is no adapter in the PCI slot in the blade server, replace the system-board assembly. Contact a service support representative for assistance.</p> <p>If there is an adapter in the PCI slot in the blade server, perform the following steps:</p> <ol style="list-style-type: none"> 1. Turn off the blade server. 2. Remove the adapter; then, turn on the blade server. 3. If the problem no longer exists, replace the adapter that you removed. <p>If the problem remains, replace the system-board assembly. Contact a service support representative for assistance.</p>
25A00001	Level 2 (L2) cache controller failure.	Replace the system-board assembly. Contact a service support representative for assistance.
25A10001	L2 cache static random-access memory (SRAM) failure.	Replace the system-board assembly. Contact a service support representative for assistance.
25A80xxx	Nonvolatile random-access memory (NVRAM) problems.	<p>NVRAM errors are caused by low-battery voltage or power outages that occur during normal system usage. Except for firmware error code 2580000, these error codes are warnings that the NVRAM data content had to be reestablished, and do not require any component replacement, unless the problem remains. When one of these error occurs, any system customization (for example, the startup device sequence) has been lost.</p> <p>If the problem remains, replace the battery in the blade server. For additional information, see the Hardware Maintenance and Troubleshooting Guide.</p> <p>Note: After you replace the battery, you must reset the system date and time through the operating system that you installed.</p> <p>If the problem still remains, replace the system-board assembly. Contact a service support representative for assistance.</p>

Table 1. Abbreviated list of firmware error codes (continued)

Error code	Failing device or problem found	Suggested action
25A80000	Initialization failed; the device failed the test.	<p>If the problem remains, replace the battery in the blade server. For additional information, see the Hardware Maintenance and Troubleshooting Guide.</p> <p>Note: After you replace the battery, you must reset the system date and time through the operating system that you installed.</p> <p>If the problem still remains, replace the system-board assembly. Contact a service support representative for assistance.</p>
25A80100	The NVRAM data validation check failed.	<ol style="list-style-type: none"> 1. Turn off the blade server; then, turn it on. 2. Retry the operation before replacing any system component. <p>If the problem remains, replace the battery in the blade server. For additional information, see the Hardware Maintenance and Troubleshooting Guide.</p> <p>Note: After you replace the battery, you must reset the system date and time through the operating system that you installed.</p> <p>If the problem still remains, replace the system-board assembly. Contact a service support representative for assistance.</p>
25A80201	Unable to expand target partition while saving configuration variable.	<p>If the problem remains, replace the battery in the blade server. For additional information, see the Hardware Maintenance and Troubleshooting Guide.</p> <p>Note: After you replace the battery, you must reset the system date and time through the operating system that you installed.</p> <p>If the problem still remains, replace the system-board assembly. Contact a service support representative for assistance.</p>
25A80202	Unable to expand target partition while writing BladeCenter management-module event log entry.	<p>If the problem remains, replace the battery in the blade server. For additional information, see the Hardware Maintenance and Troubleshooting Guide.</p> <p>Note: After you replace the battery, you must reset the system date and time through the operating system that you installed.</p> <p>If the problem still remains, replace the system-board assembly. Contact a service support representative for assistance.</p>
25A80203	Unable to expand target partition while writing VPD data.	<p>If the problem remains, replace the battery in the blade server. For additional information, see the Hardware Maintenance and Troubleshooting Guide.</p> <p>Note: After you replace the battery, you must reset the system date and time through the operating system that you installed.</p> <p>If the problem still remains, replace the system-board assembly. Contact a service support representative for assistance.</p>

Table 1. Abbreviated list of firmware error codes (continued)

Error code	Failing device or problem found	Suggested action
25A80210	Setenv/\$Setenv parameter error; name contains a null character.	<p>If the problem remains, replace the battery in the blade server. For additional information, see the Hardware Maintenance and Troubleshooting Guide.</p> <p>Note: After you replace the battery, you must reset the system date and time through the operating system that you installed.</p> <p>If the problem still remains, replace the system-board assembly. Contact a service support representative for assistance.</p>
25A80211	Setenv/\$Setenv parameter error; value contains a null character.	<p>If the problem remains, replace the battery in the blade server. For additional information, see the Hardware Maintenance and Troubleshooting Guide.</p> <p>Note: After you replace the battery, you must reset the system date and time through the operating system that you installed.</p> <p>If the problem still remains, replace the system-board assembly. Contact a service support representative for assistance.</p>
25A80998	NVRAMRC script evaluation error.	<p>Perform the following steps to remove the NVRAMRC script:</p> <ol style="list-style-type: none"> 1. Boot to the open firmware prompt. 2. Enter the following command: <pre>0 0 " nvramrc" \$setenv</pre> <p>If the problem remains, contact your system administrator for assistance.</p>
25A80999	NVRAMRC script evaluation error; stack unbalanced on completion.	<p>This is a firmware debug environment error. No action is required. No component replacement is required.</p> <p>If the problem remains, have the blade server serviced.</p>
25000000	The blade server failed to set the Write Delay (WRDLY) bit in the memory controller register.	<ol style="list-style-type: none"> 1. Start from the PERM flash image to reflash the TEMP image for recovery. See “Recovering the system firmware code” on page 84. 2. If the problem remains, replace the blade server. Contact a service support representative for assistance.
25C00000	No DIMMs were detected.	<p>Note: For additional information about DIMMs, see “Installing memory modules” on page 24.</p> <ol style="list-style-type: none"> 1. Make sure that the DIMMs are correctly seated. If necessary, reseal the DIMMs. 2. Restart the blade server. 3. Perform the system checkout procedure. See “System checkout” on page 48. <p>If the problem remains, replace the system-board assembly. Contact a service support representative for assistance.</p>

Table 1. Abbreviated list of firmware error codes (continued)

Error code	Failing device or problem found	Suggested action																																
25C0xx yy	<p>DIMM failure:</p> <p>where xx and yy are:</p> <table border="1"> <thead> <tr> <th data-bbox="375 352 423 384">xx</th> <th data-bbox="472 352 602 384">Description</th> </tr> </thead> <tbody> <tr> <td data-bbox="375 394 407 426">01</td> <td data-bbox="472 394 634 426">DIMM4 missing</td> </tr> <tr> <td data-bbox="375 436 407 468">02</td> <td data-bbox="472 436 732 499">DIMM3 unsupported and DIMM4 missing</td> </tr> <tr> <td data-bbox="375 510 407 541">04</td> <td data-bbox="472 510 748 573">DIMM3 failed and DIMM4 missing</td> </tr> <tr> <td data-bbox="375 583 407 615">10</td> <td data-bbox="472 583 634 615">DIMM3 missing</td> </tr> <tr> <td data-bbox="375 625 407 657">12</td> <td data-bbox="472 625 683 657">DIMM3 unsupported</td> </tr> <tr> <td data-bbox="375 667 407 699">14</td> <td data-bbox="472 667 602 699">DIMM3 failed</td> </tr> <tr> <td data-bbox="375 709 407 741">20</td> <td data-bbox="472 709 764 772">DIMM3 missing and DIMM4 unsupported</td> </tr> <tr> <td data-bbox="375 783 407 814">21</td> <td data-bbox="472 783 683 814">DIMM4 unsupported</td> </tr> <tr> <td data-bbox="375 825 407 856">22</td> <td data-bbox="472 825 683 888">DIMM3 and DIMM4 unsupported</td> </tr> <tr> <td data-bbox="375 898 407 930">24</td> <td data-bbox="472 898 748 961">DIMM3 failed and DIMM4 unsupported</td> </tr> <tr> <td data-bbox="375 972 407 1003">40</td> <td data-bbox="472 972 764 1035">DIMM3 missing and DIMM4 failed</td> </tr> <tr> <td data-bbox="375 1045 407 1077">41</td> <td data-bbox="472 1045 602 1077">DIMM4 failed</td> </tr> <tr> <td data-bbox="375 1087 407 1119">42</td> <td data-bbox="472 1087 748 1150">DIMM4 failed and DIMM3 unsupported</td> </tr> <tr> <td data-bbox="375 1161 407 1192">44</td> <td data-bbox="472 1161 748 1192">DIMM3 and DIMM4 failed</td> </tr> <tr> <td data-bbox="375 1203 407 1234">88</td> <td data-bbox="472 1203 683 1266">DIMM3 and DIMM4 mismatch</td> </tr> </tbody> </table>	xx	Description	01	DIMM4 missing	02	DIMM3 unsupported and DIMM4 missing	04	DIMM3 failed and DIMM4 missing	10	DIMM3 missing	12	DIMM3 unsupported	14	DIMM3 failed	20	DIMM3 missing and DIMM4 unsupported	21	DIMM4 unsupported	22	DIMM3 and DIMM4 unsupported	24	DIMM3 failed and DIMM4 unsupported	40	DIMM3 missing and DIMM4 failed	41	DIMM4 failed	42	DIMM4 failed and DIMM3 unsupported	44	DIMM3 and DIMM4 failed	88	DIMM3 and DIMM4 mismatch	<p>Note: For additional information about DIMMs, see “Installing memory modules” on page 24.</p> <ol style="list-style-type: none"> 1. Make sure that all the DIMMs in the blade server are supported. Replace all the unsupported DIMMs. 2. Make sure that the DIMMs are installed in matched pairs. If the DIMMs are not installed in matched pairs, reinstall them in matched pairs. 3. Make sure that the DIMMs are correctly seated. If necessary, reseal the DIMMs. 4. Restart the blade server. 5. Remove and reinstall the DIMMs one at a time until the failing DIMM is isolated. Replace the defective DIMM. <p>If the problem remains, replace the system-board assembly. Contact a service support representative for assistance.</p>
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01	DIMM4 missing																																	
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Table 1. Abbreviated list of firmware error codes (continued)

Error code	Failing device or problem found	Suggested action																																
25C0xx yy (continued)	DIMM failure (continued): where xx and yy are: <table border="1" data-bbox="397 352 820 1293"> <thead> <tr> <th data-bbox="397 352 479 384">yy</th> <th data-bbox="479 352 820 384">Description</th> </tr> </thead> <tbody> <tr> <td data-bbox="397 394 479 426">01</td> <td data-bbox="479 394 820 426">DIMM2 missing</td> </tr> <tr> <td data-bbox="397 436 479 468">02</td> <td data-bbox="479 436 820 468">DIMM1 unsupported and DIMM2 missing</td> </tr> <tr> <td data-bbox="397 478 479 510">04</td> <td data-bbox="479 478 820 510">DIMM1 failed and DIMM2 missing</td> </tr> <tr> <td data-bbox="397 520 479 552">10</td> <td data-bbox="479 520 820 552">DIMM1 missing</td> </tr> <tr> <td data-bbox="397 562 479 594">12</td> <td data-bbox="479 562 820 594">DIMM1 unsupported</td> </tr> <tr> <td data-bbox="397 604 479 636">14</td> <td data-bbox="479 604 820 636">DIMM1 failed</td> </tr> <tr> <td data-bbox="397 646 479 678">20</td> <td data-bbox="479 646 820 678">DIMM1 missing and DIMM2 unsupported</td> </tr> <tr> <td data-bbox="397 688 479 720">21</td> <td data-bbox="479 688 820 720">DIMM2 unsupported</td> </tr> <tr> <td data-bbox="397 730 479 762">22</td> <td data-bbox="479 730 820 762">DIMM1 and DIMM2 unsupported</td> </tr> <tr> <td data-bbox="397 772 479 804">24</td> <td data-bbox="479 772 820 804">DIMM1 failed and DIMM2 unsupported</td> </tr> <tr> <td data-bbox="397 814 479 846">40</td> <td data-bbox="479 814 820 846">DIMM1 missing and DIMM2 failed</td> </tr> <tr> <td data-bbox="397 856 479 888">41</td> <td data-bbox="479 856 820 888">DIMM2 failed</td> </tr> <tr> <td data-bbox="397 898 479 930">42</td> <td data-bbox="479 898 820 930">DIMM2 failed and DIMM1 unsupported</td> </tr> <tr> <td data-bbox="397 940 479 972">44</td> <td data-bbox="479 940 820 972">DIMM1 and DIMM2 failed</td> </tr> <tr> <td data-bbox="397 982 479 1014">88</td> <td data-bbox="479 982 820 1014">DIMM1 and DIMM2 mismatch</td> </tr> </tbody> </table>	yy	Description	01	DIMM2 missing	02	DIMM1 unsupported and DIMM2 missing	04	DIMM1 failed and DIMM2 missing	10	DIMM1 missing	12	DIMM1 unsupported	14	DIMM1 failed	20	DIMM1 missing and DIMM2 unsupported	21	DIMM2 unsupported	22	DIMM1 and DIMM2 unsupported	24	DIMM1 failed and DIMM2 unsupported	40	DIMM1 missing and DIMM2 failed	41	DIMM2 failed	42	DIMM2 failed and DIMM1 unsupported	44	DIMM1 and DIMM2 failed	88	DIMM1 and DIMM2 mismatch	<p>Note: For additional information about DIMMs, see “Installing memory modules” on page 24.</p> <ol style="list-style-type: none"> 1. Make sure that all the DIMMs in the blade server are supported. Replace all the unsupported DIMMs. 2. Make sure that the DIMMs are installed in matched pairs. If the DIMMs are not installed in matched pairs, reinstall them in matched pairs. 3. Make sure that the DIMMs are correctly seated. If necessary, reseal the DIMMs. 4. Restart the blade server. 5. Remove and reinstall the DIMMs one at a time until the failing DIMM is isolated. Replace the defective DIMM. <p>If the problem remains, replace the system-board assembly. Contact a service support representative for assistance.</p>
yy	Description																																	
01	DIMM2 missing																																	
02	DIMM1 unsupported and DIMM2 missing																																	
04	DIMM1 failed and DIMM2 missing																																	
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42	DIMM2 failed and DIMM1 unsupported																																	
44	DIMM1 and DIMM2 failed																																	
88	DIMM1 and DIMM2 mismatch																																	
25C10001	One or more DIMMs have failed.	<p>Note: For additional information about DIMMs, see “Installing memory modules” on page 24.</p> <ol style="list-style-type: none"> 1. Restart the blade server. 2. Remove and reinstall the DIMMs one at a time until the failing DIMM is isolated. 3. Replace the defective DIMM. 																																
25C10002	One or more DIMMs are not supported.	<p>Note: For additional information about DIMMs, see “Installing memory modules” on page 24.</p> <p>Make sure that all the DIMMs in the blade server are supported. Replace all the unsupported DIMMs.</p>																																

Table 1. Abbreviated list of firmware error codes (continued)

Error code	Failing device or problem found	Suggested action
25C10003	One component in a DIMM pair is either unsupported or defective, or a DIMM pair contains unmatched components.	<p>Note: For additional information about DIMMs, see “Installing memory modules” on page 24.</p> <ol style="list-style-type: none"> 1. Make sure that all the DIMMs in the blade server are supported. Replace all the unsupported DIMMs. 2. Make sure that the DIMMs are installed in matched pairs. If the DIMMs are not installed in matched pairs, reinstall them in matched pairs. 3. Make sure that the DIMMs are correctly seated. If necessary, reseal the DIMMs. 4. Restart the blade server. 5. Remove and reinstall the DIMMs one at a time until the failing DIMM is isolated. Replace the defective DIMM.
26020008	PCI device firmware code evaluation error.	<p>If the location code identifies a slot:</p> <ol style="list-style-type: none"> 1. Reseat the adapter and restart the blade server. 2. Replace the adapter. 3. Check the http://www.ibm.com/support Web site for system firmware updates. Apply the latest update, if one is available. 4. If an update is not available, contact a system administrator for assistance. <p>If the location code identifies the system board, replace the system-board assembly. Contact a service support representative for assistance.</p>
2803000A	The Hypervisor function to get or set the time-of-day (TOD) reported an error.	<p>Errors that are reported against the real-time clock can be caused by low battery voltage and (more rarely) by power outages that occur during normal system usage. These errors are warnings that the real-time clock data content must be re-established, and do not require any component or FRU replacement unless the problem remains. When one of these errors occurs, the time and date information has been lost.</p> <p>Reset the system date and time through the operating system that you installed.</p> <p>If the problem remains, perform the following steps:</p> <ol style="list-style-type: none"> 1. Check for system or service processor firmware updates. Apply the latest updates, if they are available. 2. Replace the battery in the blade server. For additional information, see the Hardware Maintenance and Troubleshooting Guide. <p>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.</p> 3. If the problem remains, replace the blade server. Contact a service support representative for assistance.
2B208888	Operating-system termination request has been received.	This is an informational message. No action is required.

Table 1. Abbreviated list of firmware error codes (continued)

Error code	Failing device or problem found	Suggested action
2B2x00EE	An exception error has been reported for a microprocessor.	<p>The type of interrupt that caused the exception is specified by the x as follows:</p> <ul style="list-style-type: none"> 0 - Unknown interrupt 1 - System reset interrupt (SRI) 2 - Machine check interrupt 3 - Data storage interrupt (DSI) 4 - Instruction storage interrupt (ISI) 5 - External interrupt (EXI) 6 - Alignment interrupt (ALI) 7 - Program interrupt (SRI) 8 - Floating unavailable interrupt (FUI) <p>Complete the following steps:</p> <ol style="list-style-type: none"> 1. Check the http://www.ibm.com/support Web site for system firmware updates. Apply the latest update, if one is available. 2. If an update is not available, contact a system administrator for assistance. <p>If the problem remains, replace the system-board assembly. Contact a service support representative for assistance.</p>

Troubleshooting charts

The following tables list problem symptoms and suggested solutions. See the *BladeCenter JS20 Type 8842 Hardware Maintenance Manual and Troubleshooting Guide* for more detailed troubleshooting charts. 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 unit *Hardware Maintenance Manual and Troubleshooting Guide* or Problem Determination and Service 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*, Problem Determination and Service Guide, or other documentation that comes with the device for more information.

CD drive problems

Symptom	Suggested action
The BladeCenter JS20 Type 8842 cannot access the CD drive in the BladeCenter unit.	<ol style="list-style-type: none"> 1. Important: If you are using a Type 8677 BladeCenter unit and you received it before June 2003, the customer interface card (CIC) in the media tray of the BladeCenter unit might need to be replaced before the CD drive will work correctly with a BladeCenter JS20 Type 8842. To determine whether the CIC in the BladeCenter unit requires replacement, follow the instructions in “Checking the status of the media tray” on page 17. 2. If the BladeCenter unit contains the correct CIC and the problem remains, determine whether other blade servers can access the CD drive. 3. If other blade servers can access the CD drive, there might be a problem with the BladeCenter JS20 Type 8842. Contact a service support representative for assistance.
<p>Note: For all other CD drive problems, see the BladeCenter unit <i>Hardware Maintenance Manual and Troubleshooting Guide</i> or Problem Determination and Service Guide.</p>	

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. On a BladeCenter Type 8677 or similar unit, if the blade server is in blade bays 7 through 14, power modules are in power-module bays 1, 2, 3, and 4. d. On a BladeCenter T unit, if the blade server is in blade bays 6 through 8, power modules are in power-module bays 1, 2, 3, and 4. e. 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. f. 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. 2. If you just installed an option in the blade server, remove it, and restart the blade server. If the blade server now turns on, troubleshoot the option (see the documentation that comes with the option for information). 3. Try another blade server in the blade bay; if it works, replace the faulty blade server. 4. If the problem remains, have the blade server serviced.

Memory problems

Memory symptom	Suggested action
The amount of system memory displayed is less than the amount of physical memory installed.	<p>Make sure that:</p> <ul style="list-style-type: none"> • The memory modules are seated correctly. • You have installed the correct type of memory. • All banks of memory on the DIMMs are enabled. The server might have automatically disabled a DIMM bank when it detected a problem. • The DIMMs are not defective. If a DIMM has failed, an 8-digit error code will be displayed in the following format: “25C0xx yy”. <p>To identify the specific DIMM that has failed, see “25C0xx yy” in Table 1 beginning on page 65, and obtain the values for “xx” and “yy”. Replace the failing DIMM; then, restart the server.</p> <ul style="list-style-type: none"> • The blade-server firmware code automatically updated the memory configuration, if you changed the memory. <p>If the problem remains, call for service.</p>

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"> • Chapter 5, “Configuration requirements for the blade server,” on page 35 • The following documentation: <ul style="list-style-type: none"> – The <i>Hardware Maintenance Manual and Troubleshooting Guide</i> or <i>Problem Determination and Service Guide</i> for your BladeCenter unit – The <i>IBM BladeCenter and BladeCenter T Serial Over LAN Setup Guide</i> <p>Note: For the latest editions of the IBM BladeCenter documentation, go to http://www.ibm.com/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 you installed an optional I/O adapter, make sure that:</p> <ul style="list-style-type: none"> • The option is designed for the blade server. See the “Server Support” flowchart on the cover for information about obtaining ServerProven™ compatibility information from the World Wide Web. • You followed the installation instructions that came with the option. • You have not loosened any other installed options or cables. • The new configuration information was saved in the blade-server firmware code. Whenever memory or an option is changed, the new configuration information is automatically saved in the blade-server firmware code. <p>If the problem remains, call for service.</p>

Option problems

Option symptom	Suggested action
An IBM option that was just installed does not work.	Make sure that: <ul style="list-style-type: none">• The option is designed for the blade server. See the “Server Support” flowchart on the cover for information about obtaining ServerProven compatibility information from the World Wide Web.• You followed the installation instructions that came with the option.• You have not loosened any other installed options or cables. If the problem remains, call for service.
An IBM option that used to work does not work now.	Make sure that all of the option hardware and cable connections are secure. If the option comes with its own test instructions, use those instructions to test the option. If the problem remains, call for service.

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. If the problem remains, call for service.

Light path diagnostics overview

If the system-error LED on the system LED panel on the front or rear of the BladeCenter unit is lit, one or more error LEDs on the BladeCenter unit components also might be lit. These LEDs help identify the cause of the problem.

Identifying problems using the light path diagnostics

This section provides the information to identify, using the light path diagnostics, problems that might arise during installation. To locate the actual component that caused the error, you must locate the lit error LED on that component.

For example:

A blade server error has occurred and you have noted that the blade server blade-error LED is lit on the blade-server control panel. You then:

1. Remove the blade server from the BladeCenter unit.
2. Place the blade server on a flat, static-protective surface.
3. Remove the cover from the blade server.
4. Press and hold the light path diagnostics button to relight the LEDs that were lit before you removed the blade server from the BladeCenter unit. The LEDs will remain lit for as long as you press the button, to a maximum of 25 seconds.

See “Light path diagnostics table” for:

- An illustration that shows the location of the light path diagnostics button and error LEDs
- A table that describes the error LEDs and the actions that you should take if these LEDs are lit

Light path diagnostics table

Use Table 2 on page 82 to help determine the cause of the error and the action that you should take.

Notes:

- Power is available to light the light path diagnostics LEDs for a short period of time after the blade server is removed from the BladeCenter unit. During that period of time, you can light the light path diagnostics LEDs for a maximum of 25 seconds (or less, depending on the number of LEDs that are lit and the length of time the blade server is removed from the BladeCenter unit) by pressing the light path diagnostics button (SW1).
- Error LED CR29 is not used.
- For the locations of the corresponding dual inline memory module (DIMM) sockets and microprocessor connectors on the system board, see the illustration in “System-board internal and option connectors” on page 15.

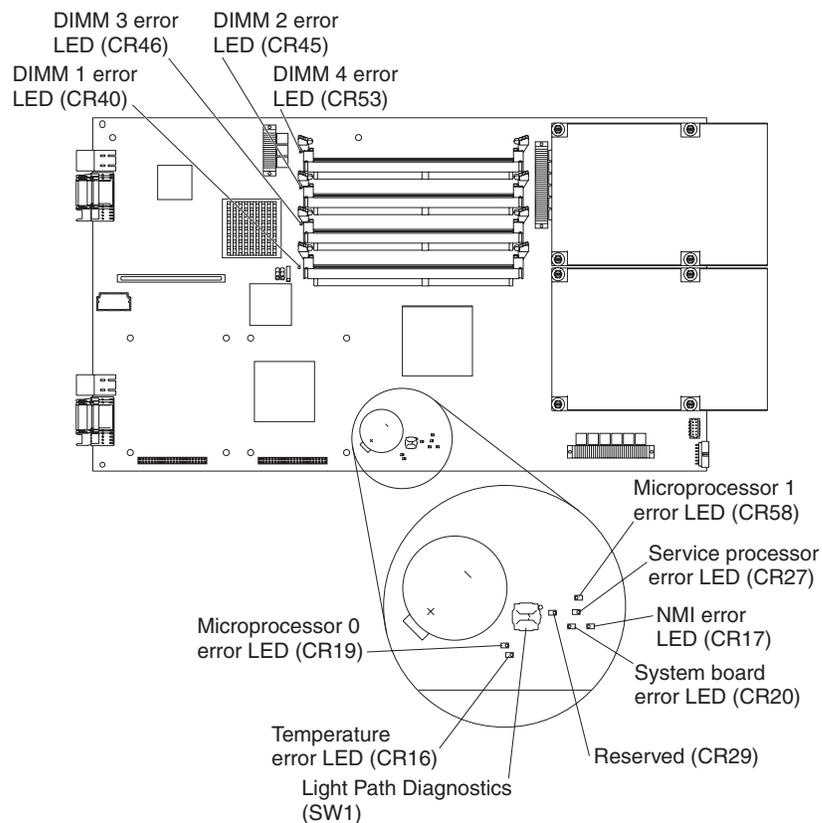


Table 2. Light path diagnostics

Lit blade-error LED	Cause	Action
None	An error has occurred and cannot be isolated, or the service processor has failed.	An error has occurred that is not represented by a light path diagnostics LED. Check the system event log in the BladeCenter management module for more information about the error.
DIMM x error	A memory error occurred.	<p>Replace the DIMM indicated by the lit DIMM failure LED.</p> <p>Note: Multiple DIMM LEDs do not necessarily indicate multiple DIMM failures. If more than one DIMM LED is lit, reseal or replace one DIMM at a time until error is corrected. Check the system event log in the BladeCenter management module for information about the error.</p> <p>If the problem remains, have the blade server serviced.</p>
Processor x error	The microprocessor has failed.	<p>Attention: To help ensure proper cooling and system reliability, two microprocessors and two heat sinks are required on the system board in the blade server at all times. The microprocessors and heat sinks on the system board are not replaceable. Therefore, if a microprocessor or heat sink becomes defective, you must replace the system-board assembly. Contact a service support representative for assistance.</p>
Service processor error	The service processor has failed.	<p>Have the blade server serviced.</p> <p>Note: There are two service processor error LEDs: CR27 (amber) and CR38 (green).</p>
NMI error	The system board has failed.	<ol style="list-style-type: none"> 1. Replace the blade server cover, reinsert the blade server in the BladeCenter unit, and then restart the server. 2. Check the system event log in the BladeCenter management module for information about the error. <p>If the problem remains, have the blade server serviced.</p>
System board error	The system board has failed.	<p>Replace the blade server cover, reinsert the blade server in the BladeCenter unit, and then restart the server.</p> <p>If the problem remains, have the blade server serviced.</p>

Table 2. Light path diagnostics (continued)

Lit blade-error LED	Cause	Action
Temperature error	The system temperature has exceeded a threshold level.	<ol style="list-style-type: none"> 1. Check to see if a blower on the BladeCenter unit has failed. If it has, replace the blower. 2. Make sure the room temperature is not too high. (See “Features and specifications” on page 6 for temperature information.) <p>If the problem remains, have the blade server serviced.</p>
IDE bus x error	The IDE bus indicated by the error LED has failed.	<ol style="list-style-type: none"> 1. Reseat or replace the hard disk drive (or other IDE device) on IDE bus x. 2. If the LED stays on, replace the system-board assembly as described in the Hardware Maintenance and Troubleshooting Guide. 3. Replace the blade server cover, reinsert the blade server in the BladeCenter unit, and then restart the server. <p>If the problem remains, have the blade server serviced.</p>
Processor x phase-locked loop (PLL) error	The microprocessor circuit is defective, and cannot process the required signals.	<p>Attention: To help ensure proper cooling and system reliability, two microprocessors and two heat sinks are required on the system board in the blade server at all times. The microprocessors and heat sinks on the system board are not replaceable. Therefore, if a microprocessor or heat sink becomes defective, you must replace the system-board assembly. Contact a service support representative for assistance.</p>
VRM error	The integrated VRM on the system board has failed.	<ol style="list-style-type: none"> 1. To verify the error, replace the blade-server cover, reinsert the blade server in the BladeCenter unit, and then restart the server. 2. If the LED stays lit, replace the system-board assembly. Contact a service support representative for assistance.

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. This is indicated by the error code 20D00902.
- The system hangs or is non-responsive after the system is started with no checkpoints.

If your system hangs, you can force the system to start from the PERM image by using the code page jumper (J14).

- Setting jumper J14 to pins 2 and 3 will force the blade server to start (boot) from the PERM image.
- Setting jumper J14 to pins 1 and 2 will enable the blade server to start (boot) from either the TEMP or PERM image.

Recovery of system firmware code using service aids

Linux on pSeries® service aids for hardware diagnostics are available for customers who have installed and are running the Linux operating system. Users can install these free diagnostics tools for effective diagnosis and repair of the system in the rare instance when a system error occurs.

This service aid toolkit provides the key tools required to take advantage of the inherent pSeries hardware RAS functions as outlined in the Linux on pSeries RAS White paper available from http://techsupport.services.ibm.com/server/Linux_on_pSeries/images/Linux_RAS.pdf. These functions include first failure data capture and error log analysis. With the toolkit installed, problem determination and correction is greatly enhanced and the likelihood of an extended system outage is reduced.

The Linux service aids for hardware diagnostics are separate from the operating system installation and are available for download from the following Web site: <http://techsupport.services.ibm.com/server/lopdiaags/>.

Note: The **Update_Flash** command can only be performed if the Linux service tools have been installed on the blade server.

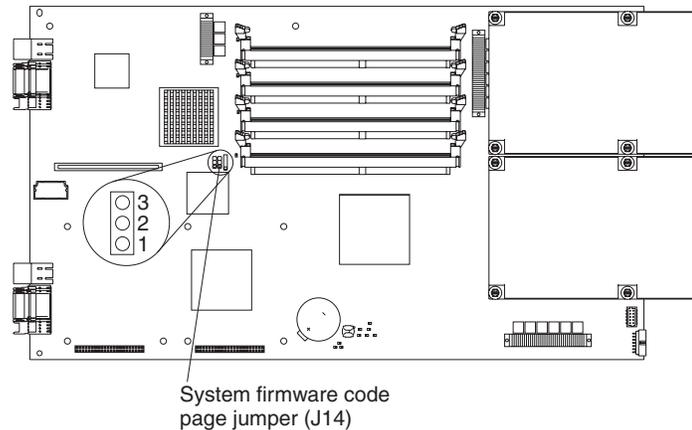
Starting the TEMP image

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

Note: Do not perform these steps if the system error code 20D00902 has already occurred on your system.

1. Turn off the blade server.
2. Remove the blade server (see “Removing the blade server from the BladeCenter unit” on page 21).
3. Open the blade-server cover (see “Opening the blade server cover” on page 22 for instructions).

4. Locate jumper J14 (system firmware code page jumper) on the system board.



5. Move jumper J14 to pins 2 and 3 to enable system firmware recovery mode.
6. Replace the cover and reinstall the blade server in the BladeCenter unit, making sure that the blade server controls all relevant components and restart the blade server.
7. If the system starts up and boots to the operating-system prompt, see “Recovering the TEMP image from the PERM image.” If the system does not boot to the operating-system prompt, replace the system-board assembly. Contact a service support representative for assistance.

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

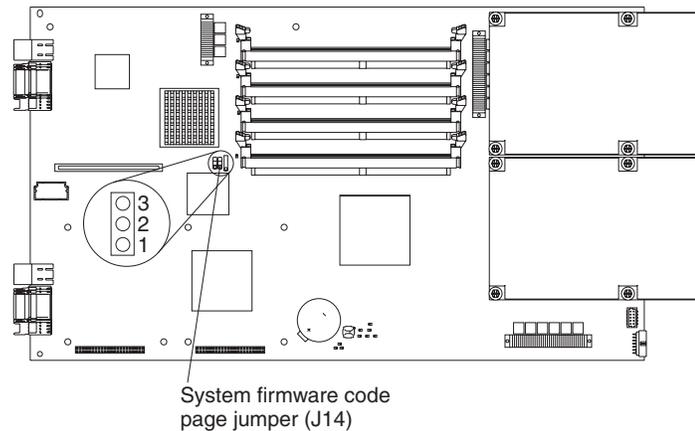
To recover the TEMP image from the PERM image, you must perform the reject function. The reject function copies the PERM image into the TEMP image. To perform the reject function, complete the following steps:

1. If you have not started the system from the TEMP image, do so now. For additional information, see “Starting the TEMP image” on page 84.
2. 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/>.
3. Reject the TEMP image.
 - If you are using the Red Hat Linux or SUSE LINUX operating system, type the following command:

```
update_flash -r
```
 - If you are using the AIX operating system, type the following command:

```
/usr/lpp/diagnostics/bin/update_flash -r
```
4. Shut down the blade server using the operating system.
5. If you have not moved jumper J14 as described in “Starting the TEMP image” on page 84, restart the system.
6. If you moved jumper J14, complete the following steps:
 - a. Turn off the blade server.
 - b. Remove the blade server (see “Removing the blade server from the BladeCenter unit” on page 21).
 - c. Open the blade-server cover (see “Opening the blade server cover” on page 22 for instructions).

- d. Locate jumper J14 (system firmware code page jumper) on the system board.



- e. Move jumper J14 to pins 1 and 2 to enable system firmware recovery mode.
f. Replace the cover and reinstall the blade server in the BladeCenter unit, making sure that the blade server controls all relevant components.

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.

- g. Restart the blade server.
h. Verify that the system starts from the TEMP image.
 - If you are using one of the Linux operating systems, go to “Verifying the system firmware levels using Linux” on page 41.
 - If you are using the AIX operating system, go to “Committing the temporary firmware image using AIX” on page 43.

i. Update the flash again, if you are updating the system firmware code.

You might need to update the firmware code to the latest version. See <http://www.ibm.com/support> for more information about how to update the firmware code.

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. IBM Statement of Limited Warranty Z125-4753-08 04/2004

Part 1 - General Terms

Part 1 - General Terms

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

What this Warranty Covers

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

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

What this Warranty Does not Cover

This warranty does not cover the following:

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

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

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

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

How to Obtain Warranty Service

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

What IBM Will Do to Correct Problems

When you contact IBM for service, you must follow the problem determination and resolution procedures that IBM specifies. An initial diagnosis of your problem can be made either by a technician over the telephone or electronically by access to an IBM website.

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

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

If your problem can be resolved with a Customer Replaceable Unit (“CRU”) (e.g., keyboard, mouse, speaker, memory, hard disk drive), IBM will ship the CRU to you for you to install.

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

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

Exchange of a Machine or Part

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

Your Additional Responsibilities

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

You also agree to:

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

Limitation of Liability

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

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

Circumstances may arise where, because of a default on IBM's part or other liability, you are entitled to recover damages from IBM. In each such instance, regardless of the basis on which you are entitled to claim damages from IBM (including fundamental breach, negligence, misrepresentation, or other contract or tort claim), except for any liability that cannot be waived or limited by applicable laws, IBM is liable for no more than

1. damages for bodily injury (including death) and damage to real property and tangible personal property; and
2. the amount of any other actual direct damages, up to the charges (if recurring, 12 months' charges apply) for the Machine that is subject of the claim. For purposes of this item, the term "Machine" includes Machine Code and Licensed Internal Code ("LIC").

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

UNDER NO CIRCUMSTANCES IS IBM, ITS SUPPLIERS OR RESELLERS LIABLE FOR ANY OF THE FOLLOWING EVEN IF INFORMED OF THEIR POSSIBILITY: 1) THIRD PARTY CLAIMS AGAINST YOU FOR DAMAGES (OTHER THAN THOSE UNDER THE FIRST ITEM LISTED ABOVE); 2) LOSS OF,

OR DAMAGE TO, DATA; 3) SPECIAL, INCIDENTAL, OR INDIRECT DAMAGES OR FOR ANY ECONOMIC CONSEQUENTIAL DAMAGES; OR 4) LOST PROFITS, BUSINESS REVENUE, GOODWILL OR ANTICIPATED SAVINGS. SOME STATES OR JURISDICTIONS DO NOT ALLOW THE EXCLUSION OR LIMITATION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES, SO THE ABOVE LIMITATION OR EXCLUSION MAY NOT APPLY TO YOU. SOME STATES OR JURISDICTIONS DO NOT ALLOW LIMITATIONS ON HOW LONG AN IMPLIED WARRANTY LASTS, SO THE ABOVE LIMITATION MAY NOT APPLY TO YOU.

Governing Law

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

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

Jurisdiction

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

Part 2 - Country-unique Terms

AMERICAS

ARGENTINA

Jurisdiction: *The following is added after the first sentence:*

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

BOLIVIA

Jurisdiction: *The following is added after the first sentence:*

Any litigation arising from this Statement of Limited Warranty will be settled exclusively by the courts of the city of La Paz.

BRAZIL

Jurisdiction: *The following is added after the first sentence:*

Any litigation arising from this Statement of Limited Warranty will be settled exclusively by the court of Rio de Janeiro, RJ.

CHILE

Jurisdiction: *The following is added after the first sentence:*

Any litigation arising from this Statement of Limited Warranty will be settled exclusively by the Civil Courts of Justice of Santiago.

COLOMBIA

Jurisdiction: *The following is added after the first sentence:*

Any litigation arising from this Statement of Limited Warranty will be settled exclusively by the Judges of the Republic of Colombia.

EQUADOR

Jurisdiction: *The following is added after the first sentence:*

Any litigation arising from this Statement of Limited Warranty will be settled exclusively by the Judges of Quito.

MEXICO

Jurisdiction: *The following is added after the first sentence:*

Any litigation arising from this Statement of Limited Warranty will be settled exclusively by the Federal Courts of Mexico City, Federal District.

PARAGUAY

Jurisdiction: *The following is added after the first sentence:*

Any litigation arising from this Statement of Limited Warranty will be settled exclusively by the courts of the city of Asuncion.

PERU

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

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

URUGUAY

Jurisdiction: *The following is added after the first sentence:*

Any litigation arising from this Statement of Limited Warranty will be settled exclusively by the City of Montevideo Court's Jurisdiction.

VENEZUELA

Jurisdiction: *The following is added after the first sentence:*

Any litigation arising from this Statement of Limited Warranty will be settled exclusively by the Courts of the Metropolitan Area Of the City of Caracas.

NORTH AMERICA

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

To obtain warranty service from IBM in Canada or the United States, call 1-800-IBM-SERV (426-7378).

CANADA

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

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

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

laws in the Province of Ontario.

UNITED STATES

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

laws of the State of New York.

ASIA PACIFIC

AUSTRALIA

What this Warranty Covers: *The following paragraph is added to this section:*

The warranties specified in this Section are in addition to any rights you may have under the Trade Practices Act 1974 or other similar legislation and are only limited to the extent permitted by the applicable legislation.

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

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

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

laws of the State or Territory.

CAMBODIA AND LAOS

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

laws of the State of New York, United States of America.

CAMBODIA, INDONESIA, AND LAOS

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

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

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

post of chairman shall be filled by the president of the SIAC. Other vacancies shall be filled by the respective nominating party. Proceedings shall continue from the stage they were at when the vacancy occurred.

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

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

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

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

INDIA

Limitation of Liability: *The following replaces items 1 and 2 of this section:*

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

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

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

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

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

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

JAPAN

Governing Law: *The following sentence is added to this section:*

Any doubts concerning this Statement of Limited Warranty will be initially resolved between us in good faith and in accordance with the principle of mutual trust.

MALAYSIA

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

NEW ZEALAND

What this Warranty Covers: *The following paragraph is added to this section:*

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

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

Where Machines are not acquired for the purposes of a business as defined in the Consumer Guarantees Act 1993, the limitations in this section are subject to the limitations in that Act.

PEOPLE’S REPUBLIC OF CHINA (PRC)

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

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

PHILIPPINES

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

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

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

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

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

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

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

SINGAPORE

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

EUROPE, MIDDLE EAST, AFRICA (EMEA)

THE FOLLOWING TERMS APPLY TO ALL EMEA COUNTRIES:

The terms of this Statement of Limited Warranty apply to Machines purchased from IBM or an IBM reseller.

How to Obtain Warranty Service:

*Add the following paragraph in **Western Europe** (Andorra, Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Liechtenstein, Lithuania, Luxembourg, Malta, Monaco, Netherlands, Norway, Poland, Portugal, San Marino, Slovakia, Slovenia, Spain, Sweden, Switzerland, United Kingdom, Vatican State, and any country subsequently added to the European Union, as from the date of accession):*

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

If you purchase a Machine in one of the Western European countries, as defined above, you may obtain warranty service for that Machine in any of those countries from either (1) an IBM reseller approved to perform warranty service or (2) from IBM, provided the Machine has been announced and made available by IBM in the country in which you wish to obtain service.

If you purchased a Personal Computer Machine in Albania, Armenia, Belarus, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Georgia, Hungary, Kazakhstan, Kyrgyzstan, Federal Republic of Yugoslavia, Former Yugoslav Republic of Macedonia (FYROM), Moldova, Poland, Romania, Russia, Slovak Republic, Slovenia, or Ukraine, you may obtain warranty service for that Machine in any of those countries from either (1) an IBM reseller approved to perform warranty service or (2) from IBM.

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

Governing Law:

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

1) “the laws of Austria” in **Albania, Armenia, Azerbaijan, Belarus, Bosnia-Herzegovina, Bulgaria, Croatia, Georgia, Hungary, Kazakhstan, Kyrgyzstan, FYR Macedonia, Moldova, Poland, Romania, Russia, Slovakia, Slovenia, Tajikistan, Turkmenistan, Ukraine, Uzbekistan, and FR Yugoslavia**; 2) “the laws of France” in **Algeria, Benin, Burkina Faso, Cameroon, Cape Verde, Central African Republic, Chad, Comoros, Congo Republic, Djibouti, Democratic Republic of Congo, Equatorial Guinea, French Guiana, French Polynesia, Gabon, Gambia, Guinea, Guinea-Bissau, Ivory Coast, Lebanon, Madagascar, Mali, Mauritania, Mauritius, Mayotte, Morocco, New Caledonia, Niger, Reunion, Senegal, Seychelles, Togo, Tunisia, Vanuatu, and Wallis & Futuna**; 3) “the laws of Finland” in **Estonia, Latvia, and Lithuania**; 4) “the laws of England” in **Angola, Bahrain, Botswana, Burundi, Egypt, Eritrea, Ethiopia, Ghana, Jordan, Kenya, Kuwait, Liberia, Malawi, Malta, Mozambique, Nigeria, Oman, Pakistan, Qatar, Rwanda, Sao Tome, Saudi Arabia, Sierra Leone, Somalia, Tanzania, Uganda, United Arab Emirates, the United Kingdom, West Bank/Gaza, Yemen, Zambia, and Zimbabwe**; and 5) “the laws of South Africa” in **South Africa, Namibia, Lesotho and Swaziland**.

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

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

Greece, b) Tel Aviv-Jaffa for **Israel**, c) Milan for **Italy**, d) Lisbon for **Portugal**, and e) Madrid for **Spain**; and 9) **in the United Kingdom**, both of us agree to submit all disputes relating to this Statement of Limited Warranty to the jurisdiction of the English courts.

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

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

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

EUROPEAN UNION (EU)

THE FOLLOWING TERMS APPLY TO ALL EU COUNTRIES:

The warranty for Machines acquired in EU countries is valid and applicable in all EU countries provided the Machines have been announced and made available in such countries.

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

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

You may contact IBM at the following address:

IBM Warranty & Service Quality Dept.
PO Box 30
Spango Valley
Greenock
Scotland PA16 0AH

CONSUMERS

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

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

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

Except as otherwise provided by mandatory law:

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

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

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

FRANCE AND BELGIUM

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

Except as otherwise provided by mandatory law:

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

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

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

THE FOLLOWING TERMS APPLY TO THE COUNTRY SPECIFIED:

AUSTRIA

The provisions of this Statement of Limited Warranty replace any applicable statutory warranties.

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

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

The following paragraphs are added to this section:

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

The second paragraph does not apply.

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

During the warranty period, IBM will reimburse you for the transportation charges for the delivery of the failing Machine to IBM.

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

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

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

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

EGYPT

Limitation of Liability: *The following replaces item 2 in this section:*

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

Applicability of suppliers and resellers (unchanged).

FRANCE

Limitation of Liability: *The following replaces the second sentence of the first paragraph of this section:*

In such instances, regardless of the basis on which you are entitled to claim damages from IBM, IBM is liable for no more than: (items 1 and 2 unchanged).

GERMANY

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

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

The following paragraphs are added to this section:

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

The second paragraph does not apply.

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

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

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

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

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

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

HUNGARY

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

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

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

IRELAND

What this Warranty Covers: *The following is added to this section:*

Except as expressly provided in these terms and conditions, all statutory conditions, including all warranties implied, but without prejudice to the generality of the foregoing all warranties implied by the Sale of Goods Act 1893 or the Sale of Goods and Supply of Services Act 1980 are hereby excluded.

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

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

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

This section sets out the extent of IBM's liability and your sole remedy.

1. IBM will accept unlimited liability for death or personal injury caused by the negligence of IBM.
2. Subject always to the **Items for Which IBM is Not Liable** below, IBM will accept unlimited liability for physical damage to your tangible property resulting from the negligence of IBM.
3. Except as provided in items 1 and 2 above, IBM's entire liability for actual damages for any one Default will not in any event exceed the greater of 1) EUR 125,000, or 2) 125% of the amount you paid for the Machine directly relating to the Default.

Items for Which IBM is Not Liable

Save with respect to any liability referred to in item 1 above, under no circumstances is IBM, its suppliers or resellers liable for any of the following, even if IBM or they were informed of the possibility of such losses:

1. loss of, or damage to, data;
2. special, indirect, or consequential loss; or
3. loss of profits, business, revenue, goodwill, or anticipated savings.

SLOVAKIA

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

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

SOUTH AFRICA, NAMIBIA, BOTSWANA, LESOTHO AND SWAZILAND

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

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

UNITED KINGDOM

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

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

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

This section sets out the extent of IBM's liability and your sole remedy.

1. IBM will accept unlimited liability for:
 - a. death or personal injury caused by the negligence of IBM; and
 - b. any breach of its obligations implied by Section 12 of the Sale of Goods Act 1979 or Section 2 of the Supply of Goods and Services Act 1982, or any statutory modification or re-enactment of either such Section.
2. IBM will accept unlimited liability, subject always to the **Items for Which IBM is Not Liable** below, for physical damage to your tangible property resulting from the negligence of IBM.
3. IBM's entire liability for actual damages for any one Default will not in any event, except as provided in items 1 and 2 above, exceed the greater of 1) Pounds Sterling 75,000, or 2) 125% of the total purchase price payable or the charges for the Machine directly relating to the Default.

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

Items for Which IBM is Not Liable

Save with respect to any liability referred to in item 1 above, under no circumstances is IBM or any of its suppliers or resellers liable for any of the following, even if IBM or they were informed of the possibility of such losses:

1. loss of, or damage to, data;
2. special, indirect, or consequential loss; or
3. loss of profits, business, revenue, goodwill, or anticipated savings.

Part 3 - Warranty Information

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

Warranty Period

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

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

A warranty period of 3 years on parts and 1 year on labor means that IBM provides warranty service without charge for:

1. parts and labor during the first year of the warranty period; and
2. parts only, on an exchange basis, in the second and third years of the warranty period. IBM will charge you for any labor provided in performance of the repair or replacement(s) in the second and third year of the warranty period.

Machine - IBM BladeCenter JS20 blade server Type 8842

Country or Region of Purchase	Warranty Period	Type of Warranty Service*
Worldwide	3 years	5
* See “Types of Warranty Service” for the legend and explanations of warranty-service types.		

Types of Warranty Service

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

1. **Customer Replaceable Unit (“CRU”) Service**

IBM provides replacement CRUs to you for you to install. CRU information and replacement instructions are shipped with your Machine and are available from IBM at any time on your request. Installation of Tier 1 CRUs is your responsibility. If IBM installs a Tier 1 CRU at your request, you will be charged for the installation. You may install a Tier 2 CRU yourself or request IBM to install it, at no additional charge, under the type of warranty service designated for your Machine. IBM specifies in the materials shipped with a replacement CRU whether a defective CRU must be returned to IBM. When return is required, 1) return instructions and a container are shipped with the replacement CRU, and 2) you may be charged for the replacement CRU if IBM does not receive the defective CRU within 30 days of your receipt of the replacement.

2. **On-site Service**

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

3. **Courier or Depot Service***

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

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

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

5. **CRU and On-site Service**

This type of Warranty Service is a combination of Type 1 and Type 2 (see above).

6. **CRU and Courier or Depot Service**

This type of Warranty Service is a combination of Type 1 and Type 3 (see above).

7. **CRU and Customer Carry-In or Mail-In Service**

This type of Warranty Service is a combination of Type 1 and Type 4 (see above).

When a 5, 6 or 7 type of warranty service is listed, IBM will determine which type of warranty service is appropriate for the repair.

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

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

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

EU Country Telephone List

Phone numbers are subject to change without notice. For the warranty service contact telephone number in a country subsequently added to the EU and not yet reflected in the list below, contact IBM in that country or visit the website above for a current telephone listing.

Austria -- +43-1-24592-5901	Latvia -- +386-61-1796-699
Belgium -- +32-70-23-3392	Lithuania -- +386-61-1796-699
Cyprus -- +357-22-841100	Luxembourg -- +352-298-977-5063
Czech Republic -- +420-2-7213-1316	Malta -- +356-23-4175
Denmark -- +45-4520-8200	Netherlands -- +31-20-514-5770
Estonia -- +386-61-1796-699	Poland -- +48-22-878-6999
Finland -- +358-8001-4260	Portugal -- +351-21-892-7147
France -- +33-238-557-450	Slovakia -- +421-2-4954-1217
Germany -- +49-1805-253553	Slovenia -- +386-1-4796-699
Greece -- +30-210-680-1700	Spain -- +34-91-714-7983
Hungary -- +36-1-382-5720	Sweden -- +46-8-477-4420
Ireland -- +353-1-815-4000	United Kingdom -- +44-0870-550-0900
Italy -- +39-800-820-094	

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BladeCenter	Predictive Failure Analysis	XA-32
Chipkill	ServeRAID	XA-64
e-business logo	ServerGuide	X-Architecture
@server	ServerProven	XpandOnDemand
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i5/OS		

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

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

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

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

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

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

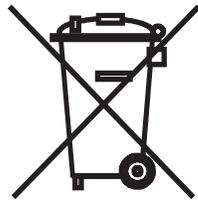
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This unit must be recycled or discarded according to applicable local and national regulations. IBM encourages owners of information technology (IT) equipment to responsibly recycle their equipment when it is no longer needed. IBM offers a variety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



Notice: This mark applies only to countries within the European Union (EU) and Norway.

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

注意: このマークは EU 諸国およびノルウェーにおいてのみ適用されます。

この機器には、EU 諸国に対する廃電気電子機器指令 2002/96/EC(WEEE) のラベルが貼られています。この指令は、EU 諸国に適用する使用済み機器の回収とリサイクルの骨子を定めています。このラベルは、使用済みになった時に指令に従って適正な処理をする必要があることを知らせるために種々の製品に貼られています。

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

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

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

Battery return program

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

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

In the Netherlands, the following applies.



For Taiwan: Please recycle batteries.



Electronic emission notices

BladeCenter JS20 Type 8842

Federal Communications Commission (FCC) statement

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no

guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult an IBM authorized dealer or service representative for help.

Properly shielded and grounded cables and connectors must be used in order to meet FCC emission limits. Proper cables and connectors are available from IBM authorized dealers. 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.

Responsible party:

International Business Machines Corporation
New Orchard Road
Armonk, NY 10504
Telephone: 1-919-543-2193

 Tested To Comply
With FCC Standards
FOR HOME OR OFFICE USE

Industry Canada Class B emission compliance statement

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

Avis de conformité à la réglementation d'Industrie Canada

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

European Union EMC Directive conformance statement

This product is in conformity with the protection requirements of EU Council Directive 89/336/EEC on the approximation of the laws of the Member States relating to electromagnetic compatibility. IBM cannot accept responsibility for any failure to satisfy the protection requirements resulting from a non recommended modification of the product, including the fitting of non-IBM option cards. This product has been tested and found to comply with the limits for Class B Information Technology Equipment according to CISPR 22/European Standard EN 55022. The limits for Class B equipment were derived for typical residential environments to provide reasonable protection against interference with licensed communication devices.

Japanese Voluntary Control Council for Interference (VCCI) statement

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取扱説明書に従って正しい取り扱いをして下さい。

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