IBM

BladeCenter PCI Express Gen 2 Expansion Blade

Installation Guide

IBM

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IBM

> **Note**
>
> Before using this information and the product it supports, read the general information in
> "Notices" on page 31, the *Warranty Information* document, and the *IBM Safety Information* and the
> *Environmental Notices and User Guide* documents on the IBM *Documentation* CD.
>
> **The most recent version of this document is available at http://www.ibm.com/supportportal.**

Contents

Safety

Before installing this product, read the Safety Information.

قبل تركيب هذا المنتج، يجب قراءة الملاحظات الآمنية

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

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

安裝本產品之前，請先閱讀「安全資訊」。

Prije instalacije ovog produkta obavezno pročitajte Sigurnosne Upute.

Před instalací tohoto produktu si přečtěte příručku bezpečnostních instrukcí.

Læs sikkerhedsforskrifterne, før du installerer dette produkt.

Lees voordat u dit product installeert eerst de veiligheidsvoorschriften.

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

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

Vor der Installation dieses Produkts die Sicherheitshinweise lesen.

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

לפני שתתקינו מוצר זה, קראו את הוראות הבטיחות.

A termék telepítése előtt olvassa el a Biztonsági előírásokat!

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

製品の設置の前に、安全情報をお読みください。

본 제품을 설치하기 전에 안전 정보를 읽으십시오.

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

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

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

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

Перед установкой продукта прочтите инструкции по
технике безопасности.

Pred inštaláciou tohto zariadenia si pečítaje Bezpečnostné predpisy.

Pred namestitvijo tega proizvoda preberite Varnostne informacije.

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

Läs säkerhetsinformationen innan du installerar den här produkten.

Guidelines for trained service technicians

This section contains information for trained service technicians.

Inspecting for unsafe conditions

Use this information to help you identify potential unsafe conditions in an IBM®
product that you are working on.

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

Consider the following conditions and the safety hazards that they present:
- Electrical hazards, especially primary power. Primary voltage on the frame can
  cause serious or fatal electrical shock.
- Explosive hazards, such as a damaged CRT face or a bulging capacitor.
- Mechanical hazards, such as loose or missing hardware.

To inspect the product for potential unsafe conditions, complete the following
steps:
1. Make sure that the power is off and the power cords are disconnected.
2. Make sure that the exterior cover is not damaged, loose, or broken, and observe
   any sharp edges.
3. Check the power cords:
   - Make sure that the third-wire ground connector is in good condition. Use a
     meter to measure third-wire ground continuity for 0.1 ohm or less between
     the external ground pin and the frame ground.
   - Make sure that the power cords are the correct type.

- Make sure that the insulation is not frayed or worn.

4. Remove the cover.
5. Check for any obvious non-IBM alterations. Use good judgment as to the safety of any non-IBM alterations.
6. Check inside the system for any obvious unsafe conditions, such as metal filings, contamination, water or other liquid, or signs of fire or smoke damage.
7. Check for worn, frayed, or pinched cables.
8. Make sure that the power-supply cover fasteners (screws or rivets) have not been removed or tampered with.

Guidelines for servicing electrical equipment

Observe these guidelines when you service electrical equipment.

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

- To ensure proper grounding of components such as power supplies, pumps, blowers, fans, and motor generators, do not service these components outside of their normal operating locations.
- If an electrical accident occurs, use caution, turn off the power, and send another person to get medical aid.

Safety statements

These statements provide the caution and danger information that is used in this documentation.

Important:

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

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

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

Statement 1

DANGER

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

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

To Connect:	To Disconnect:
1. Turn everything OFF.	1. Turn everything OFF.
2. First, attach all cables to devices.	2. First, remove power cords from outlet.
3. Attach signal cables to connectors.	3. Remove signal cables from connectors.
4. Attach power cords to outlet.	4. Remove all cables from devices.
5. Turn device ON.	

Statement 2

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

Do not:
- Throw or immerse into water
- Heat to more than 100°C (212°F)
- Repair or disassemble

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

Statement 3

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

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

DANGER

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

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

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

Statement 4

≥ 18 kg (39.7 lb)   ≥ 32 kg (70.5 lb)   ≥ 55 kg (121.2 lb)

CAUTION:
Use safe practices when lifting.

Statement 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 12

CAUTION:
The following label indicates a hot surface nearby.

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.

Statement 32

CAUTION:
To avoid personal injury, before lifting the unit, remove all the blades, power supplies, and removable modules to reduce the weight.
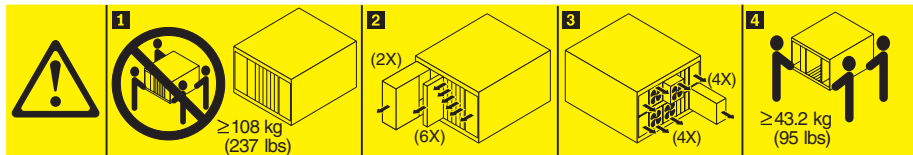
Statement 33

CAUTION:
This device does not provide a power control button. Removing power supply modules or turning off the server blades does 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.
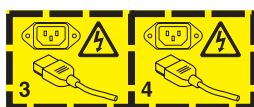
Rack Safety Information, Statement 2

DANGER

- **Always lower the leveling pads on the rack cabinet.**
- **Always install stabilizer brackets on the rack cabinet.**
- **Always install servers and optional devices starting from the bottom of the rack cabinet.**
- **Always install the heaviest devices in the bottom of the rack cabinet.**

UL regulatory information

This device is for use only with supported blade chassis.

Chapter 1. Introduction

This document provides the installation instructions for the IBM BladeCenter® PCI Express Gen 2 Expansion Blade, shown in the following illustration. Up to four PCI Express Gen 2 Expansion Blades can be attached to a blade server.

Note:

1. The illustrations in this document might differ slightly from your hardware.
2. Unless otherwise stated, references to the BladeCenter unit apply to all IBM BladeCenter and BladeCenter T units.
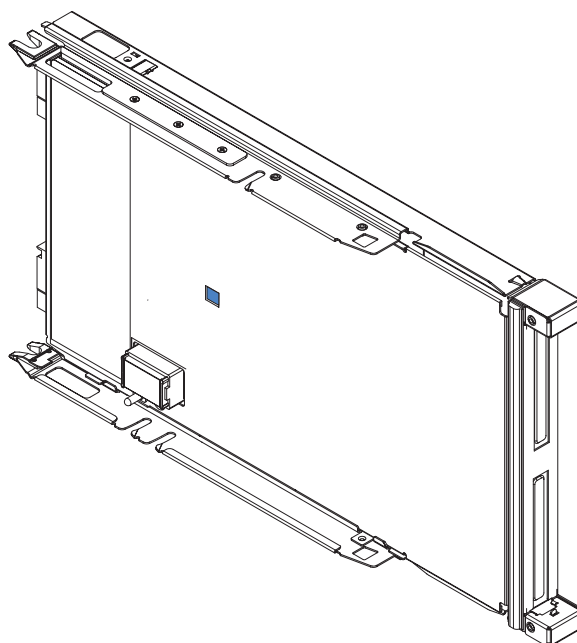
The expansion blade comes with a one-year limited warranty. For information about your warranty, see the *Warranty Information* document for your device on the IBM *Documentation* CD. You can obtain up-to-date information about the expansion blade and other IBM BladeCenter products at http://www.ibm.com/systems/bladecenter/.

If you participate in the IBM client reference program, you can share information about your use of technology, best practices, and innovative solutions; build a professional network; and gain visibility for your business. For more information about the IBM client reference program, see http://www.ibm.com/ibm/clientreference/.

This *Installation Guide* and the most recent versions of other documents that provide detailed information about the BladeCenter unit, blade server, and available optional devices are provided in Portable Document Format (PDF) at http://www.ibm.com/systems/support/.

Related documentation

This *Installation Guide* contains instructions for installing and configuring the expansion blade. This document is provided on the CD that comes with the expansion blade. The most recent versions of this *Installation Guide* and all other BladeCenter documentation are at http://www.ibm.com/systems/support/.

See the *Installation and User's Guide* and *Problem Determination and Service Guide* that come with your blade server and BladeCenter unit. These documents list specific information that applies to installing the expansion blade in your blade server and BladeCenter unit.

IBM Redbooks publications are developed and published by the IBM International Technical Support Organization (ITSO). The ITSO develops and delivers skills, technical know-how, and materials to IBM technical professionals, Business Partners, clients, and the marketplace in general. For IBM Redbooks publications for your BladeCenter, go to http://www.redbooks.ibm.com/portals/bladecenter.

The IBM Documentation CD

The IBM *Documentation* CD contains documentation for the expansion blade 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 XP, Windows 2000, or Red Hat Linux
- 100 MHz microprocessor
- 32 MB of RAM
- Adobe Acrobat Reader 3.0 (or later) or xpdf, which comes with Linux operating systems

Using the Documentation Browser

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

Use one of the following procedures to start the Documentation Browser:
- If Autostart is enabled, insert the CD into the CD or DVD drive. The Documentation Browser starts automatically.
- If Autostart is disabled or is not enabled for all users, use one of the following procedures:
  - If you are using a Windows operating system, insert the CD into the CD or DVD drive and click **Start --> Run**. In the **Open** field, type
    ```
    e:\win32.bat
    ```

where *e* is the drive letter of the CD or DVD drive, and click **OK**.
– If you are using a Linux operating system, insert the CD into the CD or DVD drive; then, run the following command from the /mnt/cdrom directory:

```
sh runlinux.sh
```

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

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

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

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

Notices and statements in this document

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

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

Chapter 2. Expansion blade LEDs

Use this information for details about the LEDs on the expansion blade.

The following illustration identifies the fault LED on the front of the expansion blade.
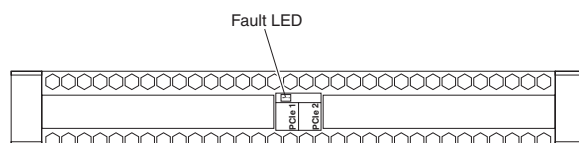
Fault LED

Fault LED: When this amber LED is lit, it indicates that an error has occurred in the expansion blade. The expansion blade error LED turns off only after the error is corrected. If an error occurs in the expansion blade, the fault LED on the blade device on which the expansion blade is installed is also lit. Additional information about the error is provided by the light-path LEDs in the expansion blade (see "Light path diagnostics" on page 21 for additional information)

Chapter 3. Installing options

You can install up to two PCI Express adapters and one horizontal-compact-form-factor (CFFh) high speed expansion card in the expansion blade. Install these components *before* you install the expansion blade on a blade device. Up to four PCI Express Gen 2 Expansion Blades can be attached to a blade server.

For a list of PCI Express adapters and CFFh expansion cards that your blade server and the IBM BladeCenter PCI Express Gen 2 Expansion Blade support, see the ServerProven® list at http://www.ibm.com/servers/eserver/serverproven/compat/us/.

Installation guidelines

Before you begin installing the expansion blade on a blade device, read the following information:

- See http://www.ibm.com/servers/eserver/serverproven/compat/us/ for a list of supported optional devices for your blade server and the expansion blade.
- Take the opportunity to download and apply the most recent firmware updates to the blade server. This step will help to ensure that any known issues are addressed and that the server is ready to function at maximum levels of performance. To download firmware updates for the server, complete the following steps.

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

  1. Go to http://www.ibm.com/systems/support/.
  2. Under **Product support**, click **BladeCenter**.
  3. Under **Popular links**, click **Software and device drivers**.
  4. Click the name of the applicable blade server to display the matrix of downloadable files for the server.

  For additional information about tools for updating, managing, and deploying firmware, see the System x and BladeCenter Tools Center at http://publib.boulder.ibm.com/infocenter/toolsctr/v1r0/index.jsp.
- Observe good housekeeping in the area where you are working. Place removed covers and other parts in a safe place.
- Back up all important data before you make changes to disk drives.
- Before you remove a blade server from the BladeCenter unit, you must shut down the operating system and turn off the blade server. You do not have to shut down the BladeCenter unit itself.
- Blue on a component indicates touch points, where you can grip the component to remove it from or install it in the blade server, or open or close a latch.
- Orange on a component or an orange label on or near a component indicates that the component can be hot-swapped, which means that you can remove or install the component while the BladeCenter unit is running. (Orange can also indicate touch points on hot-swap components.) See the instructions for removing or installing a specific hot-swap component for any additional procedures that you might have to perform before you remove or install the component.

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

System reliability guidelines

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

- You do not operate the BladeCenter unit without a blade device, expansion unit, expansion blade, or filler blade installed in each blade bay. See the documentation for your BladeCenter unit type for additional information.
- Each of the PCI slots on the expansion blade contains either a PCI Express adapter or an expansion-slot cover.

Handling static-sensitive devices

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

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

- If your BladeCenter unit is equipped with electrostatic discharge (ESD) connectors, use an ESD wrist strap, especially when you will be handling modules, optional devices, 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 other end).
- Limit your movement. Movement can cause static electricity to build up around you.
- Handle the device carefully, holding it by its edges or its frame.
- Do not touch solder joints, pins, or exposed printed circuitry.
- Do not leave the device where others can handle and damage it.
- While the device is still in its static-protective package, touch it to an *unpainted* metal part of the BladeCenter unit or any *unpainted* metal surface on any other grounded rack component in the rack in which you are installing the device for at least 2 seconds. This drains static electricity from the package and from your body.
- Remove the device from its package and install it directly into the blade server without setting down the device. If it is necessary to set down the device, put it back into its static-protective package. Do not place the device on your BladeCenter unit or on a metal surface.
- Take additional care when you handle devices during cold weather. Heating reduces indoor humidity and increases static electricity.
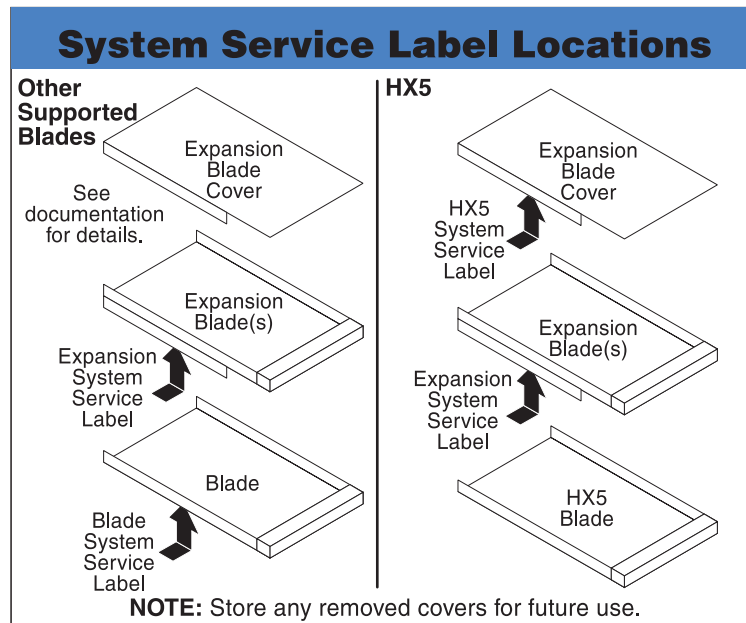
Installing an expansion blade

After you install devices into the expansion blade, install the expansion blade on the blade server.

Notes:
1. See the documentation for your blade server for additional information about installing an expansion blade on your blade server.

2. All devices should be installed in an expansion blade before attaching it to the blade server (see "Installing a PCI Express adapter" on page 15 or "Installing a horizontal-compact-form-factor expansion card" on page 19 for instructions).

3. Up to four PCI Express Gen 2 Expansion Blades can be attached to a blade server.

4. After you install one or more expansion blades on your blade server, the combined blade server and expansion blades together occupy adjacent blade bays in the BladeCenter unit.

5. You can find the system service label as the following illustration shows.

System Service Label Locations

NOTE: Store any removed covers for future use.

6. Enough power modules must be installed in the BladeCenter unit to power the blade bays in which you install the blade server and expansion blades. For example, in the BladeCenter H Type 8852, when any blade server or optional device is in blade bay 8 through 14, power modules must be installed in all four power bays. See your BladeCenter unit documentation for information about the distribution of power to the blade bays.

7. Download and apply the latest blade-server firmware and management-module firmware updates from http://www.ibm.com/systems/support/.

8. The expansion blade can be installed on various types of blade servers. The illustrations in this document might differ slightly from your hardware.

To install an expansion blade on a blade server, or an additional expansion blade on another expansion blade, complete the following steps:

1. Read the safety information that begins on "Safety" on page v and "Installation guidelines" on page 7.

2. Shut down the operating system, turn off the blade server, and remove the blade server or combined blade server and expansion blades from the BladeCenter unit (see the documentation that comes with the blade server for more information).

   Note: The illustrations of the blade server in this procedure might differ from your blade server.

3. Remove the cover from the blade server or expansion blade where you are installing this expansion blade, as shown in the following illustration, and

store the cover in a safe place (see "Removing the expansion blade cover" on page 13 for instructions).

Blade server cover

Cover pins

Blade server cover release
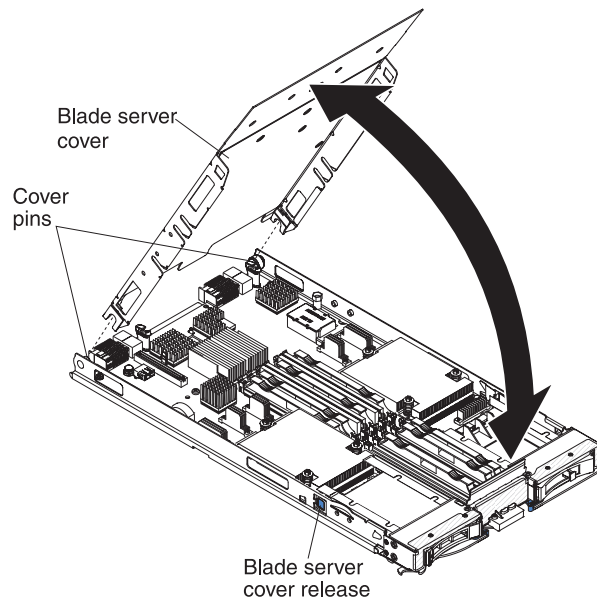
4. Locate the blade expansion connector on the blade server system board or expansion blade and remove the blade expansion connector cover, if one is installed, as shown in the following illustration.

Blade expansion connector cover

Blade expansion connector
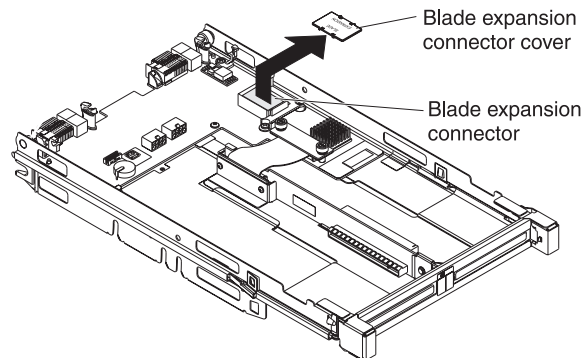
5. Touch the static-protective package that contains the expansion blade to any *unpainted* metal surface on the BladeCenter unit or any *unpainted* metal surface on any other grounded rack component in the rack in which you are installing the expansion blade for at least 2 seconds. Then, remove the expansion blade from the package.

Note: Make sure that all devices are installed in the expansion blade before attaching it to the blade server (see "Installing a PCI Express adapter" on page 15 or "Installing a horizontal-compact-form-factor expansion card" on page 19 for instructions).

6. Install the expansion blade:

a. Orient the expansion blade in the same position as the cover, as shown in the following illustration.

Expansion blade

Blade server
cover release

Blade server
cover release
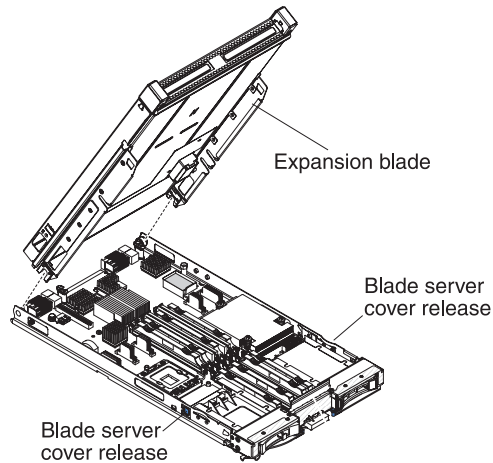
b. Lower the expansion blade so that the slots at the rear slide down onto the cover pins at the rear of the blade server or expansion blade.

c. Pivot the expansion blade closed, and press it firmly into place until the cover releases click. The connector on the expansion blade automatically aligns with and connects to the blade expansion connector on the system board or expansion blade.

Notes:

a. When any blade server or optional device is in blade bay 7 through 14 (in a BladeCenter unit) or blade bay 5 through 8 (in a BladeCenter T unit), power modules must be installed in all four power bays.

b. When a BladeCenter PCI Express Gen 2 Expansion Blade is installed on a blade device, it cannot be combined with other expansion unit types.

c. For complete instructions, see the documents that came with your BladeCenter unit.

d. See the documentation for your blade server and BladeCenter unit for additional device-specific installation information.

7. Up to four IBM BladeCenter PCI Express Gen 2 Expansion Blades can be attached to a blade server. If additional expansion blades are being installed, repeat steps 4 on page 10 through 6 on page 10 for each expansion blade; otherwise continue with step 8.

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.

8. If this is the last expansion blade being installed, install the cover that comes with the expansion blade (see "Installing the expansion blade cover" on page 14 for instructions).

Cover

Cover
release

Cover
release
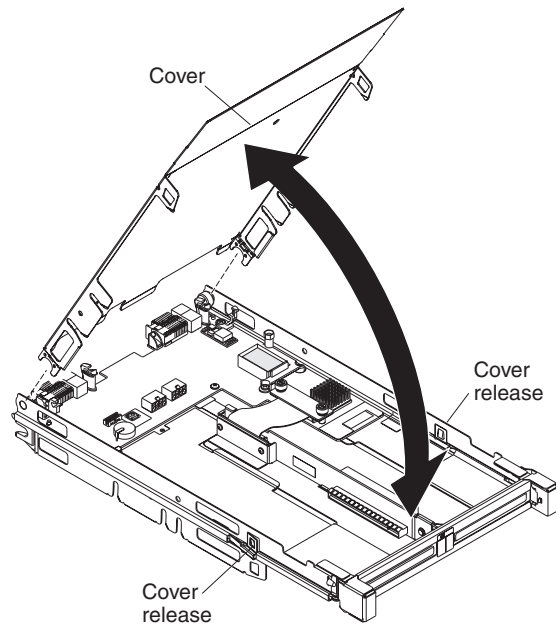
9. Insert the combined blade server and expansion blades into adjacent blade bays in the BladeCenter unit.

10. If you installed PCI Express adapters that require cables, see the PCI Express adapter documentation for installation instructions.

11. Turn on the blade server (see the documentation that comes with the blade server for more information).

12. If you installed the blade server in a BladeCenter unit that has a bezel, reinstall the bezel assembly (see the documentation for your BladeCenter unit for instructions).

Removing the expansion blade

The following illustration shows how to remove the expansion blade.

Expansion blade

Blade server
cover release

Blade server
cover release
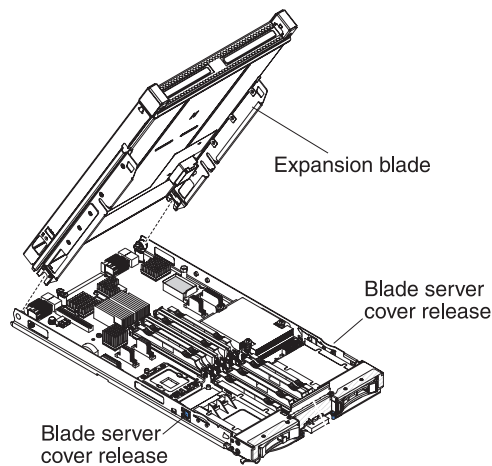
Note: If more than one expansion blade is installed, remove each expansion blade, one at a time.

To remove an expansion blade, complete the following steps:

1. Read the Safety information beginning on page "Safety" on page v and "Installation guidelines" on page 7.
2. If the host blade server and expansion blades are installed in a BladeCenter unit, shut down the operating system and turn off the blade server; then, remove the combined blade server and expansion blades from the BladeCenter unit (see the documentation that comes with the blade server for more information).
3. Carefully lay the combined unit down on a flat, static-protective surface, with the cover side up.
4. Press the cover release on each side of the blade server or the expansion blade below the expansion blade that you are removing and lift the expansion blade from the blade server.
5. Rotate the expansion blade open; then, lift the expansion blade from the blade server.
6. If additional expansion blades need to be removed, repeat steps 4 and 5.

   Statement 21

   ⚠️ ⚡

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

Removing the expansion blade cover

The following illustration shows how to remove the expansion blade cover.

To remove the expansion blade cover, complete the following steps:

1. Read the Safety information beginning on page "Safety" on page v and "Installation guidelines" on page 7.

2. If the host blade server and expansion blades are installed in a BladeCenter unit, shut down the operating system and turn off the blade server; then, remove the combined blade server and expansion blades from the BladeCenter unit (see the documentation that comes with the blade server for more information).

3. Carefully lay the combined unit down on a flat, static-protective surface, with the cover side up.

4. Press the cover release on each side of the expansion blade and lift the cover open.

5. Lift the cover from the expansion blade and store it for future use.

   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 the expansion blade cover

The following illustration shows how to install the expansion blade cover.

To install the expansion blade cover, complete the following steps:

1. Read the Safety information beginning on page "Safety" on page v and .

2. Orient the cover over the expansion blade.

3. Lower the cover so that the slots at the rear slide down onto the pins at the rear of the expansion blade.

4. Pivot the cover closed and press it firmly into place until the cover-release latches click.
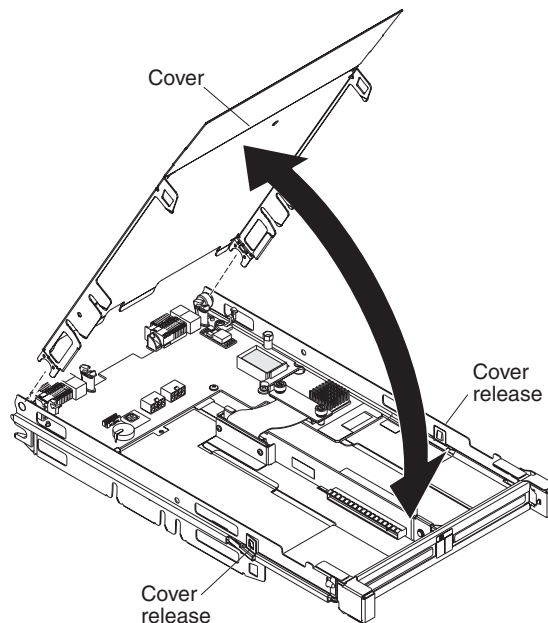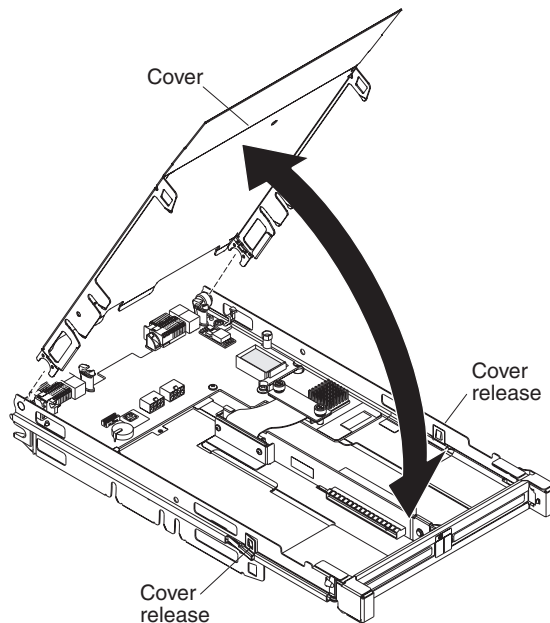
   Statement 21

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

Installing a PCI Express adapter

To install a PCI Express adapter in the expansion blade, complete the following steps:

1. Read the safety information that begins on page "Safety" on page v and "Installation guidelines" on page 7.

2. If the cover or another expansion blade is installed on the expansion blade in which you are installing the PCI Express adapter, remove it (see "Removing the expansion blade cover" on page 13 or "Removing the expansion blade" on page 12).

3. If the expansion blade is installed on a blade server or another expansion blade, remove it (see "Removing the expansion blade" on page 12).

4. Remove the expansion-blade riser assembly from the expansion blade:

   a. Loosen the screws and disconnect the cable from the expansion-blade system board, as shown in the following illustration.
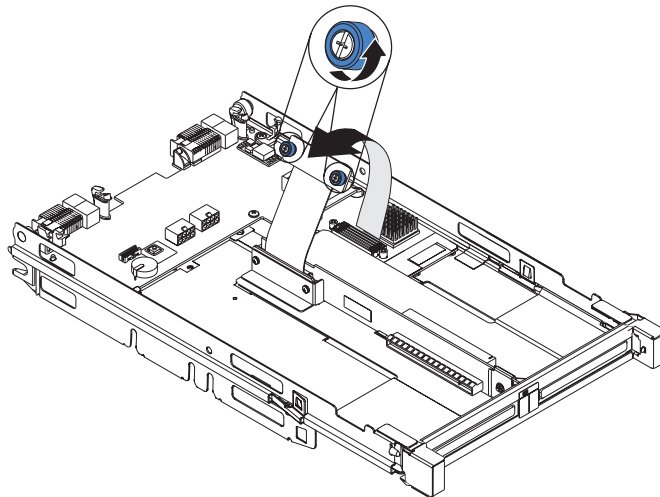
   b. Locate the tray-release button on the bottom of the expansion blade, as shown in the following illustration.

Tray release
button
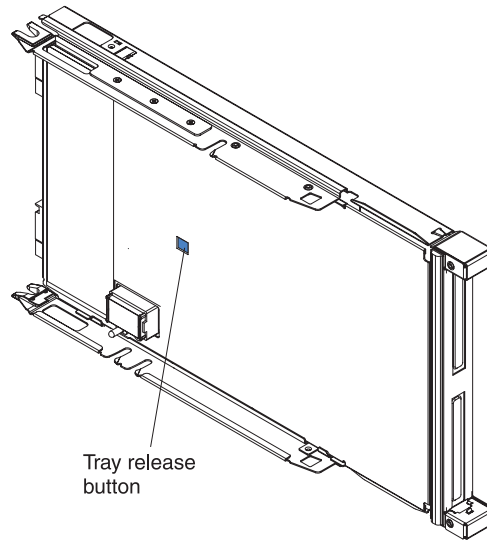
c. Press in and hold the tray-release button; then, pull the expansion-blade
riser assembly out of the expansion-blade system board, as shown in the
following illustration.
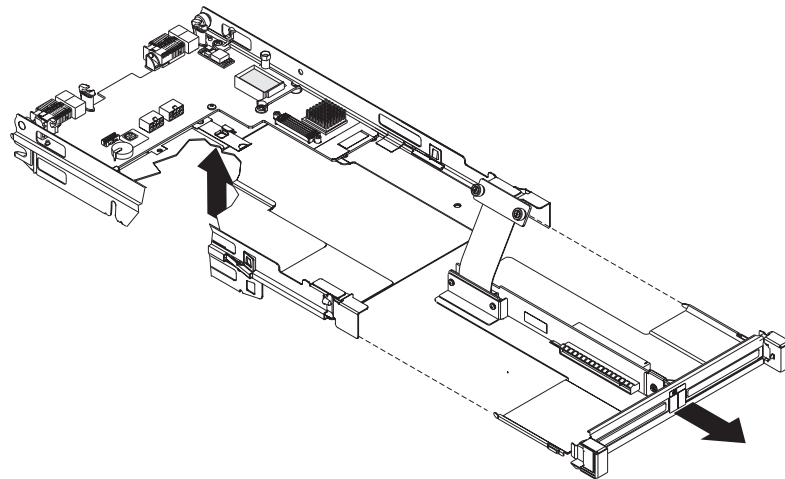
5. Remove the expansion-slot cover from one of the adapter slots, as shown in
the following illustration. (You should install the adapter in slot 1 before the
adapter in slot 2.)

Expansion-slot cover

Adapter-retention latch
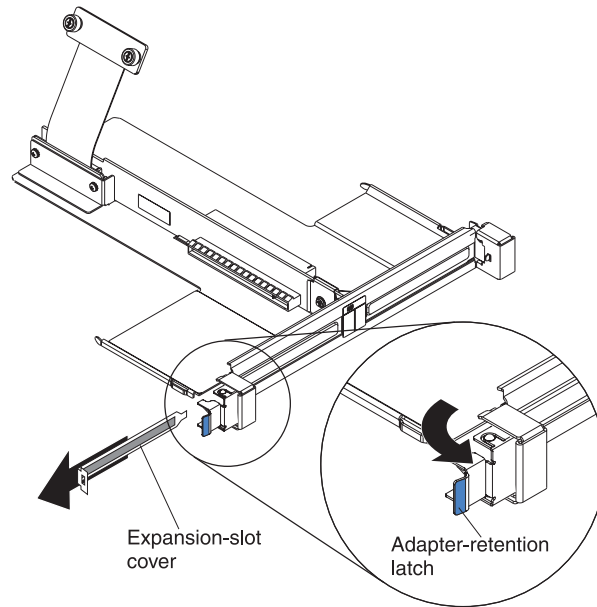
    a. Rotate the adapter-retention latch away from the expansion-blade riser assembly.

    b. Pull the expansion-slot cover away from the expansion-blade riser assembly.

6. Touch the static-protective package that contains the PCI Express adapter to any *unpainted* metal surface on the BladeCenter unit or any *unpainted* metal surface on any other grounded rack component in the rack in which you are installing the expansion blade for at least 2 seconds. Then, remove the PCI Express adapter from the package.

7. Align the PCI Express adapter with the slot and press the adapter into position, as shown in the following illustration. As you install the adapter, apply counter-pressure to the riser board to help prevent any flexing or warping of the riser board.

    Note: The PCI Express adapter slots in the expansion blade are arranged so that the PCI Express adapter brackets overlap when they are installed. To ensure a proper fit, insert the adapter bracket or expansion-slot cover in adapter slot 1 first, and place it in front of the adapter bracket or slot cover in adapter slot 2.

Riser board

PCI express adapter 2

Bracket

PCI Express adapter 1

Bracket

Adapter-retention latch
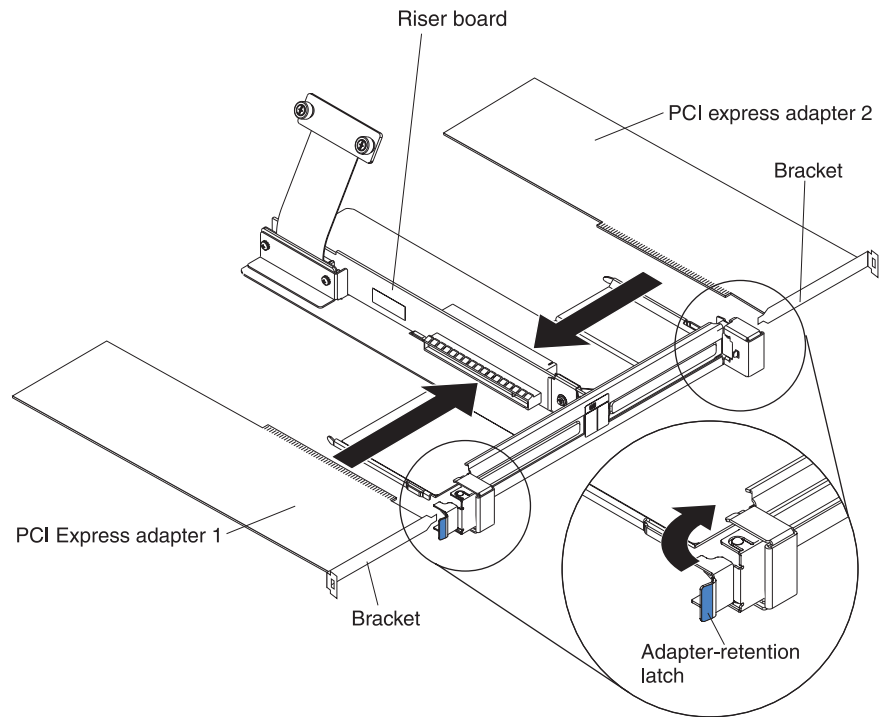
8. Secure the PCI Express adapter by closing and locking the adapter-retention latch into position.

9. If you are installing a second PCI Express adapter, repeat steps 5 on page 16 through 8.

10. Install the expansion-blade riser assembly in the expansion blade, as shown in the following illustration:
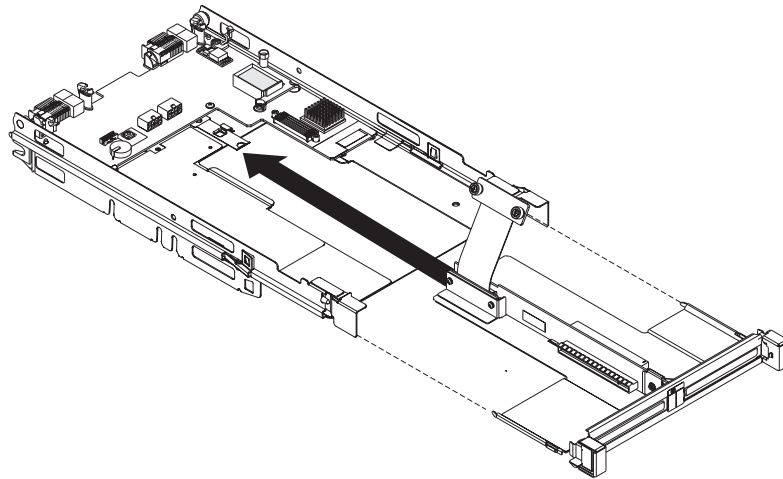
a. Carefully reposition the expansion-blade riser assembly, aligning it with the expansion-blade system-board-assembly rails.

b. Make sure that both adapter-retention latches are fully closed.

c. Firmly slide the assemblies together until the tray-release button securely locks the panels.

d. Connect the cable to the expansion-blade system board and tighten the screws, as shown in the following illustration.
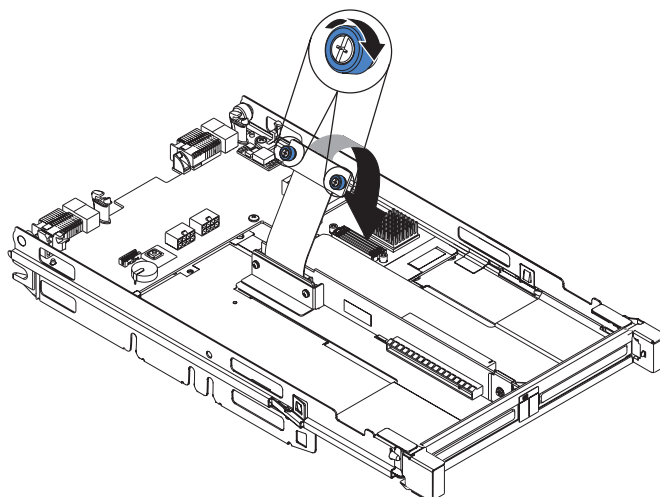
11. If you have other devices to install in the expansion blade, do so now; otherwise, go to "Completing the installation" on page 20.

Installing a horizontal-compact-form-factor expansion card

You can install a horizontal-compact-form-factor (CFFh) high speed expansion card in the expansion blade to provide additional connections for communicating on a network.

Note:
1. CFFh expansion cards are *not* supported by all BladeCenter unit types.
2. When more than one expansion blade is installed, a CFFh expansion card can only be installed in the last (top) expansion blade.

Before installing a CFFh expansion card, consider the following information:

- Only a high-speed card can be installed in the blade expansion connector. If a high-speed card is installed, you cannot attach another expansion blade; the card and the expansion blade use the same connector.
- The network-interface type of the I/O-expansion card must be supported by the corresponding I/O modules in the BladeCenter unit. The high-speed cards provide a connection to BladeCenter unit I/O bays 7 through 10 (if the BladeCenter unit has these I/O module bays).

The following illustration shows how to install a CFFh expansion card.

Expansion card

Blade expansion connector cover

Blade expansion connector

Expansion card standoff
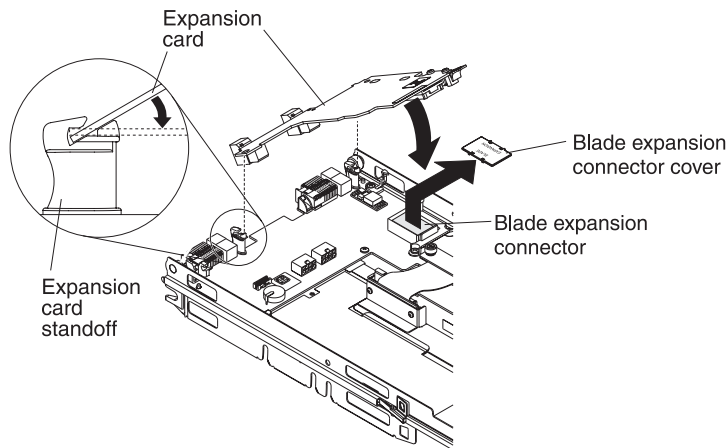
To install a CFFh expansion card, complete the following steps:

1. Read the Safety information beginning on page "Safety" on page v and "Installation guidelines" on page 7.

2. If the host blade server and expansion blades are installed in a BladeCenter unit, shut down the operating system and turn off the blade server; then, remove the combined blade server and expansion blades from the BladeCenter unit (see the documentation that comes with the blade server for more information).

3. Carefully lay the combined unit down on a flat, static-protective surface, with the cover side up.

4. If a cover is installed on the expansion blade, remove it (see "Removing the expansion blade cover" on page 13).

5. If the expansion blade is installed on a blade server or another expansion blade, remove it (see "Removing the expansion blade" on page 12).

6. Touch the static-protective package that contains the expansion card to any *unpainted* metal surface on the BladeCenter unit or any *unpainted* metal surface on any other grounded rack component; then, remove the expansion card from the package.

7. Locate the blade expansion connector and remove the cover, if one is installed; then, orient the expansion card above the connector.

8. Slide the slots at the back end of the card onto the pins on the expansion card standoff; then, gently pivot the card into the blade expansion connector.

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

10. See the documentation that comes with the expansion card for device-driver and configuration information needed to complete the installation.

11. If you have other devices to install in the expansion blade, do so now; otherwise, go to "Completing the installation."

Completing the installation

To complete the installation, complete the following steps:

1. Install any expansion blades that were removed and the expansion blade cover (see "Installing an expansion blade" on page 8 and "Installing the expansion blade cover" on page 14).

2. Insert the combined blade server and expansion blades into the BladeCenter unit (see the documentation for your blade server and BladeCenter unit for additional installation information).

   Note: Make sure that the BladeCenter unit has the required number of power modules present to supply power to the blade bay in which the expansion blade is installed. For additional information, see the documentation that comes with the BladeCenter unit.
3. Turn on the blade server (see the documentation that comes with the blade server for more information).
4. If you installed the blade server in a BladeCenter unit that has a bezel, reinstall the bezel assembly (see the documentation for your BladeCenter unit for instructions).

Light path diagnostics

Light path diagnostics is a system of LEDs on the system board of the expansion blade. When an error is indicated by the fault LED on the front of the expansion blade, these LEDs inside the expansion blade can be lit to help identify the source of the error. The fault LED on the blade device on which the expansion blade is installed is also lit. If the blade device supports transfer of error and LED information, fault-related information will be shown by the BladeCenter advanced management module (see the *BladeCenter Advanced Management Module User's Guide* for additional information). If you cannot locate and correct a problem by using the information in this section, see "Getting help and technical assistance," on page 27 for more information.

To view the light path LEDs:
1. Remove the combined blade server and expansion blades from the BladeCenter unit (see "Removing the expansion blade" on page 12).
2. Place the expansion blade on a flat, static-protective surface.
3. Remove the expansion blade cover and other expansion blades, if applicable, to expose the expansion blade that has the lit fault LED (see "Removing the expansion blade cover" on page 13).
4. Press and hold the light path diagnostics switch for a maximum of 25 seconds. The light path diagnostics (LP) LED will be lit to indicate that there is enough power present to light the error LEDs, and LEDs indicating additional failure information also will be lit.

The following illustration shows the locations of the light path LEDs and the light path diagnostics switch on the expansion blade system board.

BPE4

Ck Nxt

CFFh

LP

PCIe slot 1
error LED

PCIe slot 2
error LED
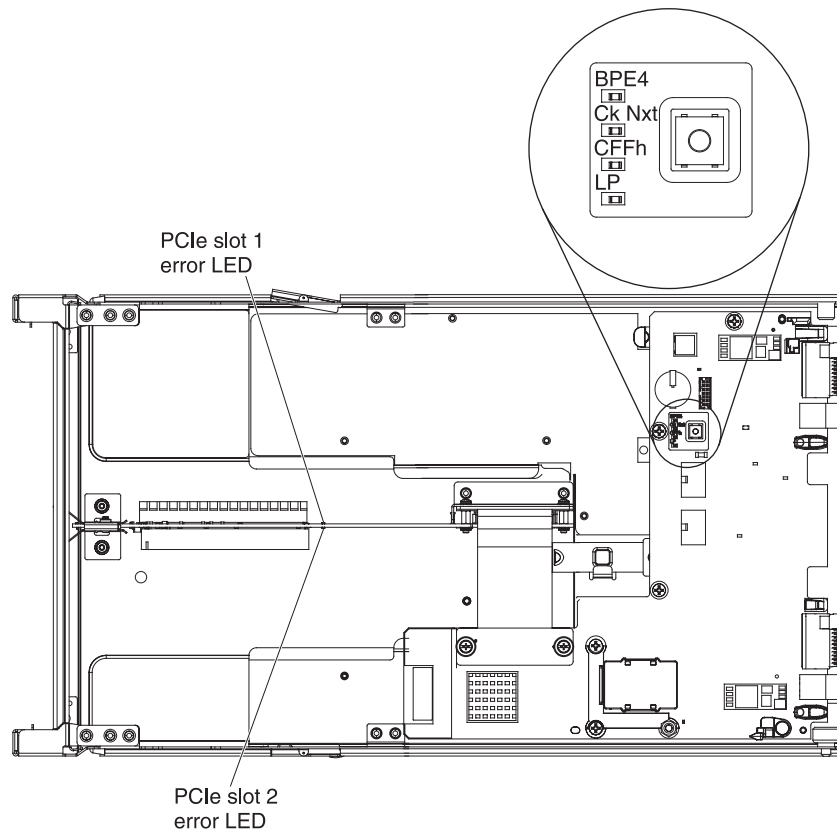
The following table describes the LEDs on the expansion blade system board and suggested actions to correct the detected problems. Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.

Lit light path diagnostics LED	Description	Action
None	An error has occurred and cannot be isolated.	1. Make sure that the light path diagnostics LED is lit to ensure that there is enough power in the blade server to light the rest of the LEDs. 2. Check the blade device and BladeCenter advanced management module event logs for information about an error that is not represented by a light path diagnostics LED.
PCIe1	An error has occurred with PCIe connector one.	1. Make sure that the adapter installed in PCIe connector one is supported. 2. Reseat the adapter installed in PCIe connector one. 3. Replace the adapter installed in PCIe connector one. 4. Replace the expansion blade.

Lit light path diagnostics LED	Description	Action
PCIe2	An error has occurred with PCIe connector two.	1. Make sure that the adapter installed in PCIe connector two is supported. 2. Reseat the adapter installed in PCIe connector two. 3. Replace the adapter installed in PCIe connector two. 4. Replace the expansion blade.
LP	The light path LEDs have power.	Check for error LEDs that are lit in the expansion blade.
CFFh	An error has occurred with the CFFh adapter.	1. Make sure that the adapter installed in the CFFh connector is supported. 2. Reseat the adapter installed in the CFFh connector. 3. Replace the adapter installed in the CFFh connector. 4. Replace the expansion blade.
BPE4	An error has occurred in the expansion blade.	1. Check for other specific error LEDs that are lit in the expansion blade. 2. If no other error LEDs are lit, replace the expansion blade.
Ck Next	An error has occurred in an expansion blade installed below this expansion blade in the stack.	Remove this expansion blade and check for error LEDs that are lit in the expansion blade beneath it.

Chapter 4. Parts listing

The following replaceable components are available for the IBM BladeCenter PCI Express Gen 2 Expansion Blade.

Replaceable components are of three types:

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

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

Component	CRU No. (Tier 1)	CRU No. (Tier 2)	FRU No.
IBM BladeCenter PCI Express Gen 2 Expansion Blade	68Y7498		
Top cover	68Y8691		

Appendix. Getting help and technical assistance

If you need help, service, or technical assistance or just want more information about IBM products, you will find a wide variety of sources available from IBM to assist you.

Use this information to obtain additional information about IBM and IBM products, determine what to do if you experience a problem with your IBM system or optional device, and determine 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.

If you believe that you require IBM to perform warranty service on your IBM product, the IBM service technicians will be able to assist you more efficiently if you prepare before you call.

- 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.
- Check for updated firmware and operating-system device drivers for your IBM product. The IBM Warranty terms and conditions state that you, the owner of the IBM product, are responsible for maintaining and updating all software and firmware for the product (unless it is covered by an additional maintenance contract). Your IBM service technician will request that you upgrade your software and firmware if the problem has a documented solution within a software upgrade.
- If you have installed new hardware or software in your environment, check http://www.ibm.com/systems/info/x86servers/serverproven/compat/us/ to make sure that the hardware and software is supported by your IBM product.
- Go to http://www.ibm.com/supportportal/ to check for information to help you solve the problem.
- Gather the following information to provide to IBM Support. This data will help IBM Support quickly provide a solution to your problem and ensure that you receive the level of service for which you might have contracted.
  - Hardware and Software Maintenance agreement contract numbers, if applicable
  - Machine type number (IBM 4-digit machine identifier)
  - Model number
  - Serial number
  - Current system UEFI and firmware levels
  - Other pertinent information such as error messages and logs
- Go to http://www.ibm.com/support/entry/portal/Open_service_request/ to submit an Electronic Service Request. Submitting an Electronic Service Request will start the process of determining a solution to your problem by making the pertinent information available to IBM Support quickly and efficiently. IBM service technicians can start working on your solution as soon as you have completed and submitted an Electronic Service Request.

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

Using the documentation

Information about your IBM system and preinstalled software, if any, or optional device is available in the documentation that comes with the product. That documentation can include printed documents, online documents, readme files, and help files.

See the troubleshooting information in your system documentation for instructions for using the diagnostic programs. The troubleshooting information or the diagnostic programs might tell you that you need additional or updated device drivers or other software. IBM maintains pages on the World Wide Web where you can get the latest technical information and download device drivers and updates. To access these pages, go to http://www.ibm.com/supportportal/.

Getting help and information from the World Wide Web

Up-to-date information about IBM products and support is available on the World Wide Web.

On the World Wide Web, up-to-date information about IBM systems, optional devices, services, and support is available at http://www.ibm.com/supportportal/. IBM System x information is at http://www.ibm.com/systems/x/. IBM BladeCenter information is at http://www.ibm.com/systems/bladecenter/. IBM IntelliStation information is at http://www.ibm.com/systems/intellistation/.

How to send DSA data to IBM

Use the IBM Enhanced Customer Data Repository to send diagnostic data to IBM.

Before you send diagnostic data to IBM, read the terms of use at http://www.ibm.com/de/support/ecurep/terms.html.

You can use any of the following methods to send diagnostic data to IBM:
- **Standard upload:** http://www.ibm.com/de/support/ecurep/send_http.html
- **Standard upload with the system serial number:** http://www.ecurep.ibm.com/
- **Secure upload:** http://www.ibm.com/de/support/ecurep/send_http.html#secure
- **Secure upload with the system serial number:** https://www.ecurep.ibm.com/

Creating a personalized support web page

You can create a personalized support web page by identifying IBM products that are of interest to you.

To create a personalized support web page, go to http://www.ibm.com/support/mynotifications/. From this personalized page, you can subscribe to weekly email

notifications about new technical documents, search for information and downloads, and access various administrative services.

Software service and support

Through IBM Support Line, you can get telephone assistance, for a fee, with usage, configuration, and software problems with your IBM products.

For information about which products are supported by Support Line in your country or region, see http://www.ibm.com/services/supline/products/.

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

Hardware service and support

You can receive hardware service through your IBM reseller or IBM Services.

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

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

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台北市松仁路 7 號 3 樓
電話：0800-016-888

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Important notes

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

CD or DVD drive speed is the variable read rate. Actual speeds vary and are often less than the possible maximum.

When referring to processor storage, real and virtual storage, or channel volume, KB stands for 1024 bytes, MB stands for 1,048,576 bytes, and GB stands for 1,073,741,824 bytes.

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

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

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

Particulate contamination

Attention: Airborne particulates (including metal flakes or particles) and reactive gases acting alone or in combination with other environmental factors such as humidity or temperature might pose a risk to the device that is described in this document.

Risks that are posed by the presence of excessive particulate levels or concentrations of harmful gases include damage that might cause the device to malfunction or cease functioning altogether. This specification sets forth limits for particulates and gases that are intended to avoid such damage. The limits must not be viewed or used as definitive limits, because numerous other factors, such as temperature or moisture content of the air, can influence the impact of particulates or environmental corrosives and gaseous contaminant transfer. In the absence of specific limits that are set forth in this document, you must implement practices that maintain particulate and gas levels that are consistent with the protection of human health and safety. If IBM determines that the levels of particulates or gases in your environment have caused damage to the device, IBM may condition provision of repair or replacement of devices or parts on implementation of appropriate remedial measures to mitigate such environmental contamination. Implementation of such remedial measures is a customer responsibility.

Table 1. Limits for particulates and gases

Contaminant	Limits
Particulate	• The room air must be continuously filtered with 40% atmospheric dust spot efficiency (MERV 9) according to ASHRAE Standard 52.2[1]. • Air that enters a data center must be filtered to 99.97% efficiency or greater, using high-efficiency particulate air (HEPA) filters that meet MIL-STD-282. • The deliquescent relative humidity of the particulate contamination must be more than 60%[2]. • The room must be free of conductive contamination such as zinc whiskers.
Gaseous	• Copper: Class G1 as per ANSI/ISA 71.04-1985[3] • Silver: Corrosion rate of less than 300 Å in 30 days
1. ASHRAE 52.2-2008 - Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size. Atlanta: American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc.	
2. The deliquescent relative humidity of particulate contamination is the relative humidity at which the dust absorbs enough water to become wet and promote ionic conduction.	
3. ANSI/ISA-71.04-1985. Environmental conditions for process measurement and control systems: Airborne contaminants. Instrument Society of America, Research Triangle Park, North Carolina, U.S.A.	

Documentation format

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Information Development
IBM Corporation
205/A015

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P.O. Box 12195
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Telecommunication regulatory statement

This product is not intended to be connected directly or indirectly by any means whatsoever to interfaces of public telecommunications networks, nor is it intended to be used in a public services network.

Electronic emission notices

When you attach a monitor to the equipment, you must use the designated monitor cable and any interference suppression devices that are supplied with the monitor.

Federal Communications Commission (FCC) statement

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

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

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

Avis de conformité à la réglementation d'Industrie Canada

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

Australia and New Zealand Class A statement

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

European Union EMC Directive conformance statement

This product is in conformity with the protection requirements of EU Council Directive 2004/108/EC on the approximation of the laws of the Member States relating to electromagnetic compatibility. IBM cannot accept responsibility for any failure to satisfy the protection requirements resulting from a nonrecommended modification of the product, including the fitting of non-IBM option cards.

Attention: This is an EN 55022 Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

Responsible manufacturer:

> International Business Machines Corp.
> New Orchard Road
> Armonk, New York 10504
> 914-499-1900

European Community contact:

> IBM Deutschland GmbH
>   Technical Regulations, Department M372
> IBM-Allee 1, 71139 Ehningen, Germany
> Telephone: +49 7032 15 2941
> Email: lugi@de.ibm.com

Germany Class A statement

Deutschsprachiger EU Hinweis: Hinweis für Geräte der Klasse A EU-Richtlinie zur Elektromagnetischen Verträglichkeit

Dieses Produkt entspricht den Schutzanforderungen der EU-Richtlinie 2004/108/EG zur Angleichung der Rechtsvorschriften über die elektromagnetische Verträglichkeit in den EU-Mitgliedsstaaten und hält die Grenzwerte der EN 55022 Klasse A ein.

Um dieses sicherzustellen, sind die Geräte wie in den Handbüchern beschrieben zu installieren und zu betreiben. Des Weiteren dürfen auch nur von der IBM empfohlene Kabel angeschlossen werden. IBM übernimmt keine Verantwortung für die Einhaltung der Schutzanforderungen, wenn das Produkt ohne Zustimmung der IBM verändert bzw. wenn Erweiterungskomponenten von Fremdherstellern ohne Empfehlung der IBM gesteckt/eingebaut werden.

EN 55022 Klasse A Geräte müssen mit folgendem Warnhinweis versehen werden: "Warnung: Dieses ist eine Einrichtung der Klasse A. Diese Einrichtung kann im Wohnbereich Funk-Störungen verursachen; in diesem Fall kann vom Betreiber verlangt werden, angemessene Maßnahmen zu ergreifen und dafür aufzukommen."

Deutschland: Einhaltung des Gesetzes über die elektromagnetische Verträglichkeit von Geräten

Dieses Produkt entspricht dem "Gesetz über die elektromagnetische Verträglichkeit von Geräten (EMVG)". Dies ist die Umsetzung der EU-Richtlinie 2004/108/EG in der Bundesrepublik Deutschland.

Zulassungsbescheinigung laut dem Deutschen Gesetz über die elektromagnetische Verträglichkeit von Geräten (EMVG) (bzw. der EMC EG Richtlinie 2004/108/EG) für Geräte der Klasse A

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

Verantwortlich für die Einhaltung der EMV Vorschriften ist der Hersteller:

> International Business Machines Corp.
> New Orchard Road
> Armonk, New York 10504
> 914-499-1900

Der verantwortliche Ansprechpartner des Herstellers in der EU ist:

IBM Deutschland GmbH
Technical Regulations, Abteilung M372
IBM-Allee 1, 71139 Ehningen, Germany
Telephone: +49 7032 15 2941
Email: lugi@de.ibm.com

Generelle Informationen:

Das Gerät erfüllt die Schutzanforderungen nach EN 55024 und EN 55022 Klasse A.

Japan VCCI Class A statement

この装置は、クラス A 情報技術装置です。この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。　　　VCCI-A

This is a Class A product based on the standard of the Voluntary Control Council for Interference (VCCI). If this equipment is used in a domestic environment, radio interference may occur, in which case the user may be required to take corrective actions.

Japan Electronics and Information Technology Industries Association (JEITA) statement

高調波ガイドライン準用品

Japan Electronics and Information Technology Industries Association (JEITA) Confirmed Harmonics Guidelines with Modifications (products greater than 20 A per phase)

Korea Communications Commission (KCC) statement

이 기기는 업무용(A급)으로 전자파적합기기로
서 판매자 또는 사용자는 이 점을 주의하시기
바라며, 가정외의 지역에서 사용하는 것을 목
적으로 합니다.

This is electromagnetic wave compatibility equipment for business (Type A). Sellers and users need to pay attention to it. This is for any areas other than home.

Russia Electromagnetic Interference (EMI) Class A statement

ВНИМАНИЕ! Настоящее изделие относится к классу А.
В жилых помещениях оно может создавать радиопомехи, для
снижения которых необходимы дополнительные меры

People's Republic of China Class A electronic emission statement

中华人民共和国 "A类" 警告声明

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

Taiwan Class A compliance statement

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

Index

A
accessible documentation   33
assistance, getting   27
Australia Class A statement   35

B
BladeCenter documentation   2

C
CD, documentation   2
CFFh expansion card
    installing   19
China Class A electronic emission
    statement   37
Class A electronic emission notice   34
client reference program   1
contamination, particulate and
    gaseous   33
creating a personalized support web
    page   28
custom support web page   28

D
documentation   1
    using   28
Documentation Browser   2
Documentation CD   2
documentation format   33
documentation, related   2
DSA, sending data to IBM   28

E
electrical equipment, servicing   vii
electronic emission Class A notice   34
Electronic emission notices   34
error LEDs   21
error, locations   21
European Union EMC Directive
    conformance statement   35
expansion blade
    removing   12
expansion blade cover
    installing   14
    removing   13

F
FCC Class A notice   34

G
gaseous contamination   33
Germany Class A statement   35
getting help   28

guidelines
    servicing electrical equipment   vii
    trained service technicians   vi

H
handling static-sensitive devices   8
hardware service and support telephone
    numbers   29
help
    getting   27
help, sending diagnostic data to IBM   28
help, World Wide Web   28

I
I/O-expansion card
    installing   19
IBM documentation   2
IBM Taiwan product service   29
important notices   32
Industry Canada Class A emission
    compliance statement   34
information center   28
inspecting for unsafe conditions   vi
installing
    CFFh expansion card   19
    guidelines   7
    I/O-expansion card   19
    PCI Express adapter cables   8
    PCI Express Gen 2 Expansion
        Blade   8
installing the cover, expansion blade   14

J
Japan Electronics and Information
    Technology Industries Association
    statement   36
Japan VCCI Class A statement   36
Japan Voluntary Control Council for
    Interference Class A statement   36
JEITA statement   36

K
Korea Communications Commission
    statement   37

L
LEDs   21
light path diagnostics   21
light path LED locations   21
light path, locations   21

N
New Zealand Class A statement   35
notes, important   32
notices   31
    electronic emission   34
    FCC, Class A   34

P
particulate contamination   33
parts listing   25
PCI Express adapters
    compatability   7
    installing   7
People's Republic of China Class A
    electronic emission statement   37
product service, IBM Taiwan   29
publications, related   2

R
related documentation   2
removing the cover, expansion blade   13
removing the expansion blade   12
Russia Class A electromagnetic
    interference statement   37
Russia Electromagnetic Interference (EMI)
    Class A statement   37

S
safety   v
safety statements   v, viii
sending diagnostic data to IBM   28
service and support
    before you call   27
    hardware   29
    software   29
servicing electrical equipment   vii
software service and support telephone
    numbers   29
support web page, custom   28
system reliability   8

T
Taiwan Class A compliance statement   37
telecommunication regulatory
    statement   34
trademarks   31
trained service technicians, guidelines   vi

U
United States electronic emission Class A
    notice   34
United States FCC Class A notice   34
unsafe conditions, inspecting for   vi

W

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