

BladeCenter GPU Expansion Blade



Installation Guide

Note: Before using this information and the product it supports, read the general information in [“Appendix B. Notices” on page 35](#), the *Safety Information* and *Environmental Notices and User Guide* documents on the IBM *Documentation* CD, and the *Warranty Information* document that comes with the product.

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Safety

Before installing this product, read the Safety Information.

قبل تركيب هذا المنتج، يجب قراءة الملاحظات الأمنية

Ajntes 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

Each caution and danger statement in this document 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," begins with a number 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 document before you perform the procedures. Read any additional safety information that comes with the server or optional device before you install the device.

Statement 1:



DANGER:

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

To avoid a shock hazard:

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

Statement 21:



CAUTION:

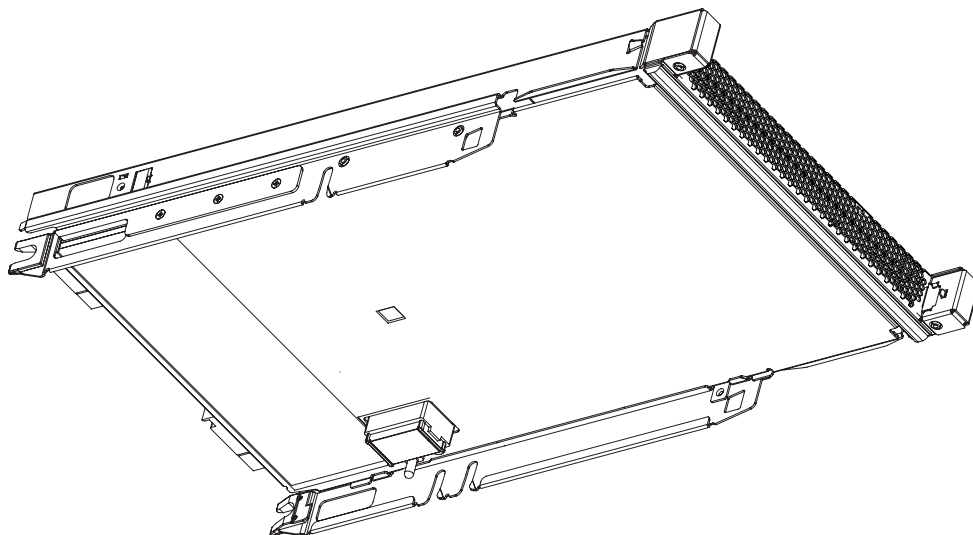
Hazardous energy is present when the blade server is connected to the power source. Always replace the blade-server cover before installing the blade server.

Chapter 1. Introduction

This document provides the installation instructions for the IBM® BladeCenter® GPU Expansion Blade, shown in the following illustration. Up to four expansion blades can be attached to a blade server.

Notes:

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 card 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 the following address: <http://www.ibm.com/systems/support/>.

For service or assistance, see “Appendix A. Getting help and technical assistance” on page 32.

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 card 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 the following:
`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 card from the **Product** menu. The **Available Topics** list displays all the documents for your expansion card. 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 Ctrl+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.

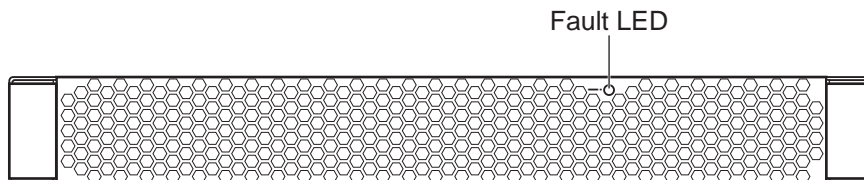
The following notices and statements are used in this document:

- **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: 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 27](#) for additional information).

Chapter 3. Installing options

You can install one horizontal-compact-form factor (CFFh) high speed expansion card in the expansion blade. Install optional components *before* you install the expansion blade on a blade device. Up to four GPU Expansion Blades can be attached to a blade server.

For a list of CFFh expansion cards that your blade server and the IBM BladeCenter GPU Expansion Blade support, see the ServerProven[®] list at

<http://www.ibm.com/systems/info/x86servers/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/system/info/x86servers/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 the following address:

<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 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.

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 horizontal-compact-form-factor expansion card” on page 18](#) for instructions).

Up to four GPU Expansion Blades can be attached to a blade server.

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.

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.

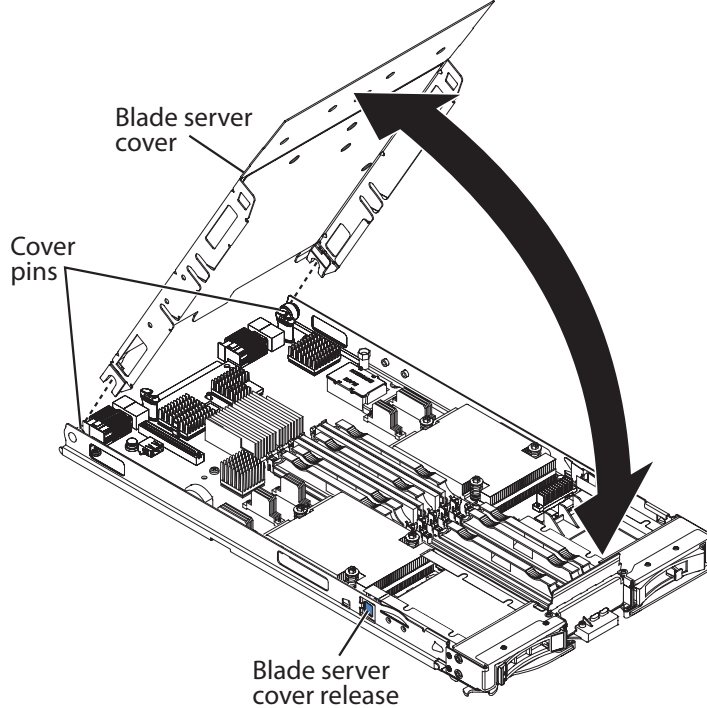
Download and apply the latest blade-server firmware and management-module firmware updates from <http://www.ibm.com/systems/support/>.

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

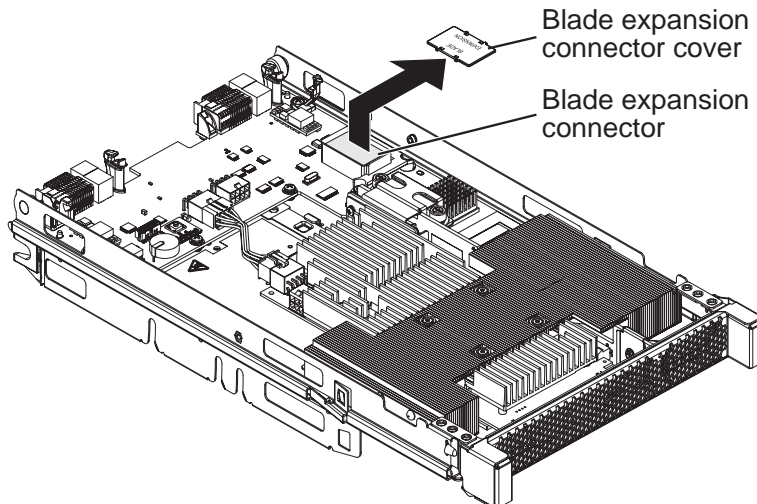
1. Read the safety information that begins on [“Safety” on page v](#) and [“Installation guidelines” on page 6](#).
2. Shut down the operating system, turn off the blade server, and remove the blade server or combined blade server and expansion blades from the BladeCenter unit (see the documentation that comes with the blade server for more information).
3. Carefully lay the blade server or combined blade server and expansion blades on a flat, static-protective surface.

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

4. 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 15](#) for instructions).



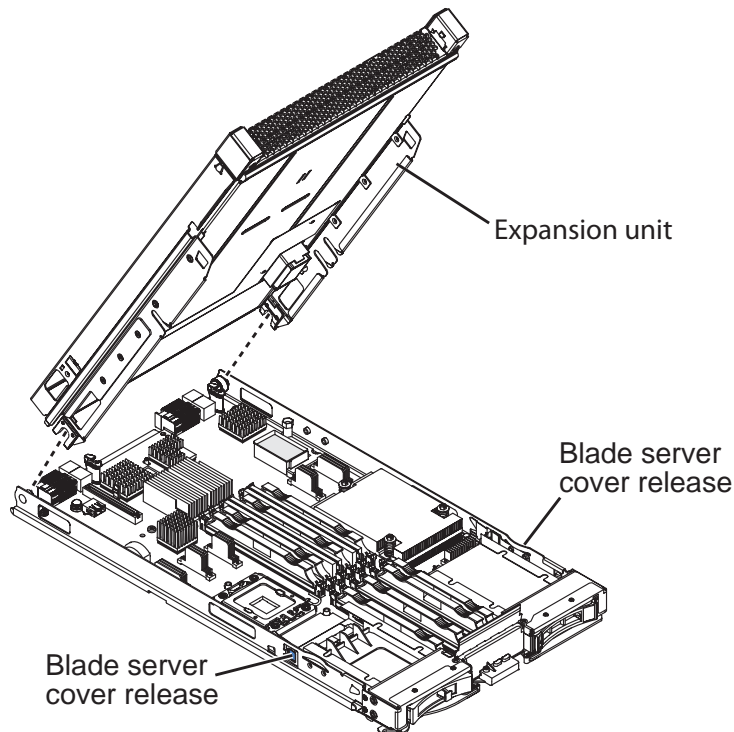
5. Locate the blade expansion connector on the blade server system board or expansion blade and remove the blade expansion connector cover if one is installed, as shown in the following illustration.



6. 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 horizontal-compact-form-factor expansion card” on page 18](#) for instructions).

7. Install the expansion blade:
 - a. Orient the expansion blade in the same position as the cover, as shown in the following illustration.



- 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:

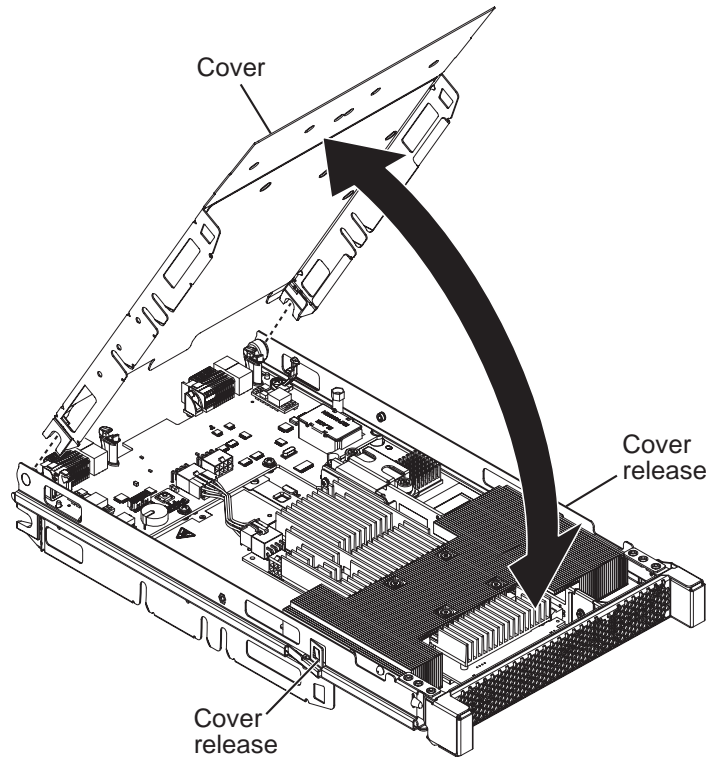
- a. When any blade server or optional device is in blade bay 7 through 14 (in a BladeCenter E unit) or blade bay 5 through 8 (in a BladeCenter T unit), power modules must be installed in all four power bays.
 - b. When a BladeCenter GPU Expansion Blade is installed on a blade device, it cannot be combined 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.
8. Up to four IBM BladeCenter GPU Expansion Blades can be attached to a blade server. If additional expansion blades are being installed, repeat steps 5 through 7 for each expansion blade; otherwise continue with step 9.

Statement 21:**CAUTION:**

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

9. If this is the last expansion blade being installed, install the cover that was removed in step 4, as shown in the following illustration (see [“Installing the expansion blade cover”](#) on [page 17](#) for instructions).

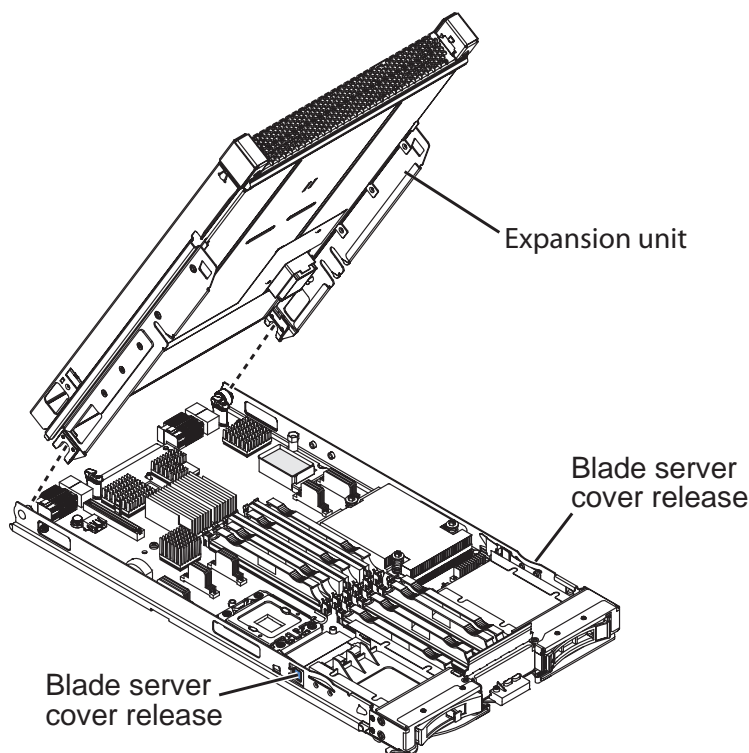
Attention: Be sure to install the cover provided with this expansion unit.



10. Insert the combined blade server and expansion blades into adjacent blade bays in the BladeCenter unit.
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.



Note: If more than one expansion blade is installed, remove each expansion blade one at a time (see steps 4 and 5).

To remove an expansion blade, complete the following steps:

1. Read the Safety information beginning on [page 3](#) and “Installation guidelines” on [page 6](#).
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:

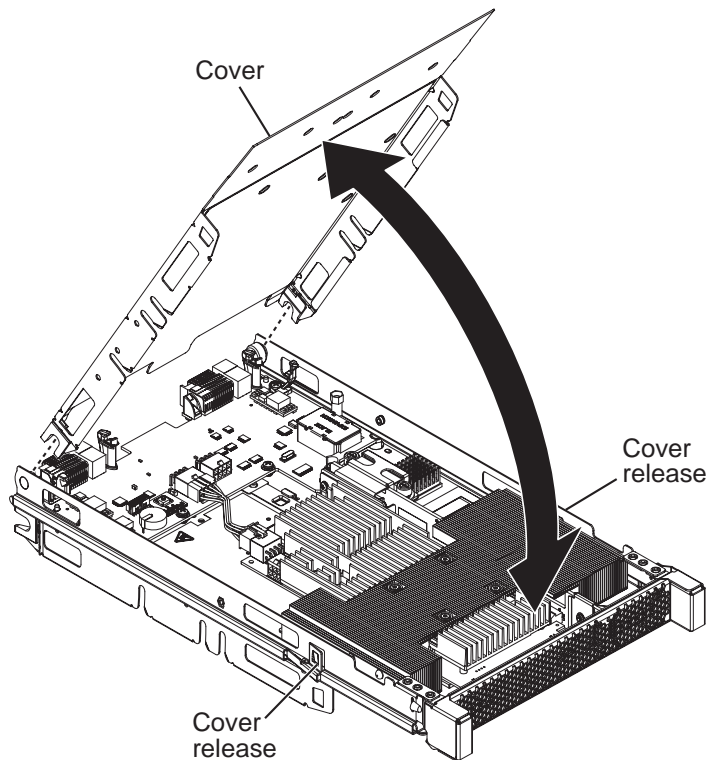


CAUTION:

Hazardous energy is present when the blade server is connected to the power source. Always replace the blade-server 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 v](#) and “[Installation guidelines](#)” on [page 6](#).
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 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:

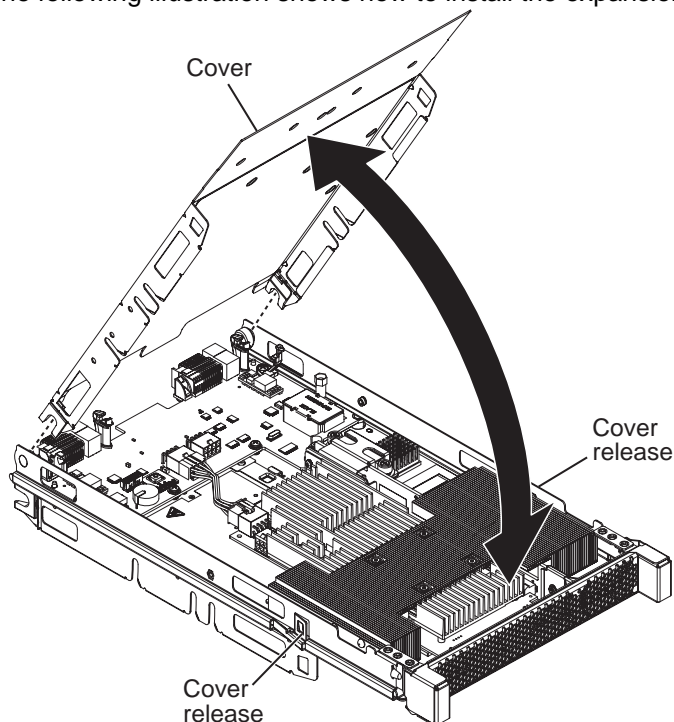


CAUTION:

Hazardous energy is present when the blade server is connected to the power source. Always replace the blade-server 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:

Attention: Be sure to install the cover provided with this expansion unit.

1. Read the Safety information beginning on [page v](#) and “Installation guidelines” on [page 6](#).
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 server is connected to the power source. Always replace the blade-server cover before installing the blade server.

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.

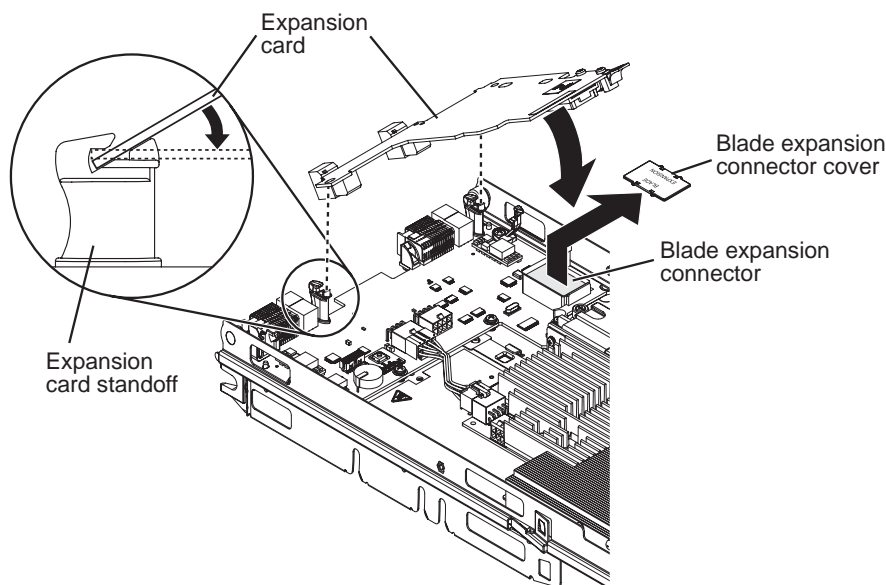
Notes:

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.



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

1. Read the Safety information beginning on [page v](#) and [“Installation guidelines” on page 6](#).
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 15](#)).
5. 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.
6. Locate the blade expansion connector and remove the cover, if one is installed; then, orient the expansion card above the connector.
7. 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.
8. Firmly press on the indicated locations to seat the expansion card.
9. See the documentation that comes with the expansion card for device-driver and configuration information needed to complete the installation.
10. Go to the following section, “Completing the installation.”

Completing the installation

To complete the installation, perform the following steps:

Attention: Be sure to install the cover provided with this expansion unit.

1. Install any expansion blades that were removed and the expansion blade cover (see [“Installing an expansion blade” on page 9](#) and [“Installing the expansion blade cover” on page 17](#)).
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).

Replacing a GPU adapter

If you need to replace a GPU adapter, use the following procedures:

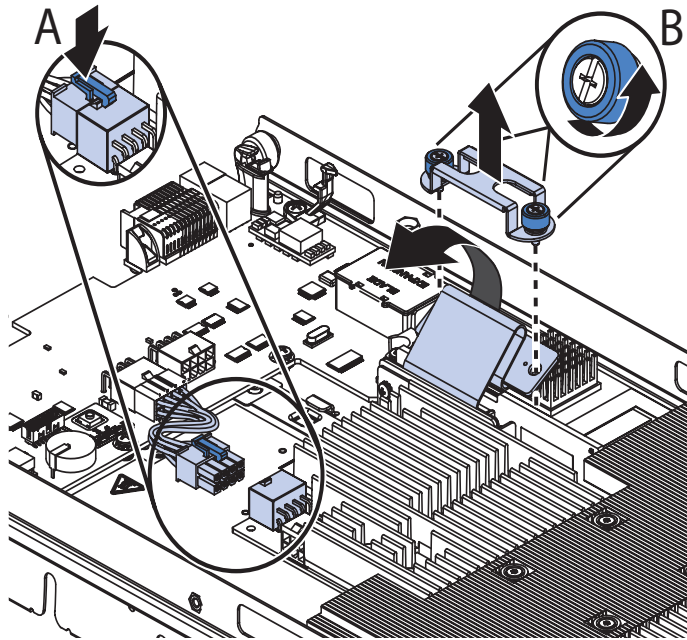
- [“Removing a GPU adapter” on page 20](#)
- [“Installing a GPU adapter” on page 24](#)

Removing a GPU adapter

To remove a GPU adapter from the expansion blade, complete the following steps:

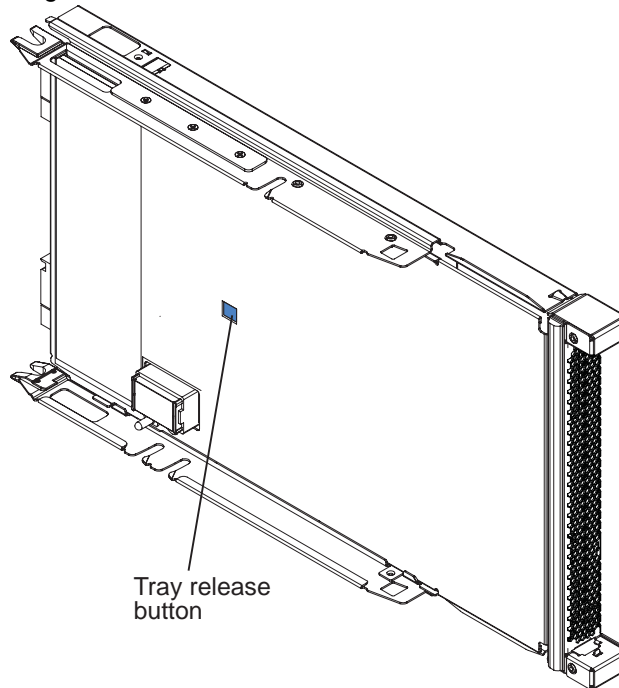
1. Read the Safety information beginning on [page v](#) and [“Installation guidelines” on page 6](#).
2. If the cover or another expansion blade is installed on the expansion blade, remove it (see [“Removing the expansion blade cover” on page 15](#) or [“Removing the expansion blade” on page 14](#)).
3. If the expansion blade is installed on a blade server or another expansion blade, remove it (see [“Removing the expansion blade” on page 14](#)).

4. Remove the expansion-blade riser assembly from the expansion blade:
 - a. Disconnect the auxiliary power cable (A) from the GPU adapter, as shown in the following illustration.

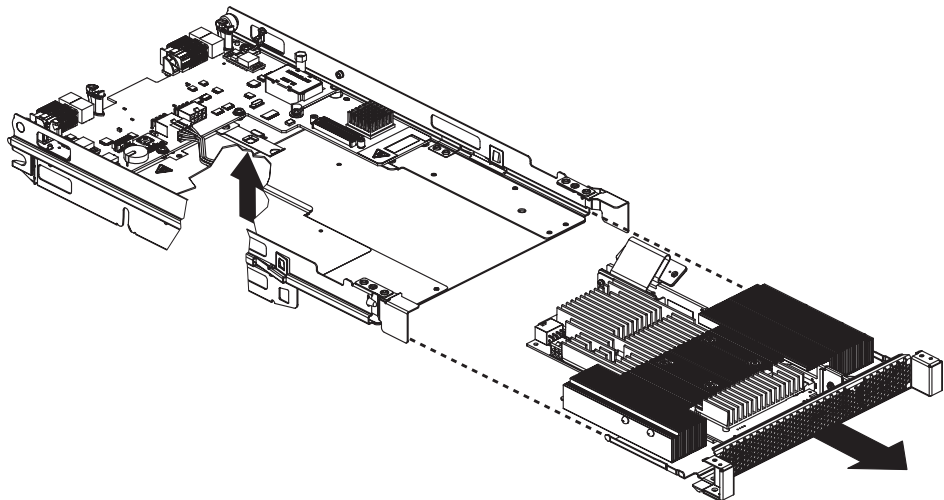


- b. Loosen the screws and remove the retention bracket, then disconnect the cable from the expansion-blade system board (B), as shown in the illustration above.

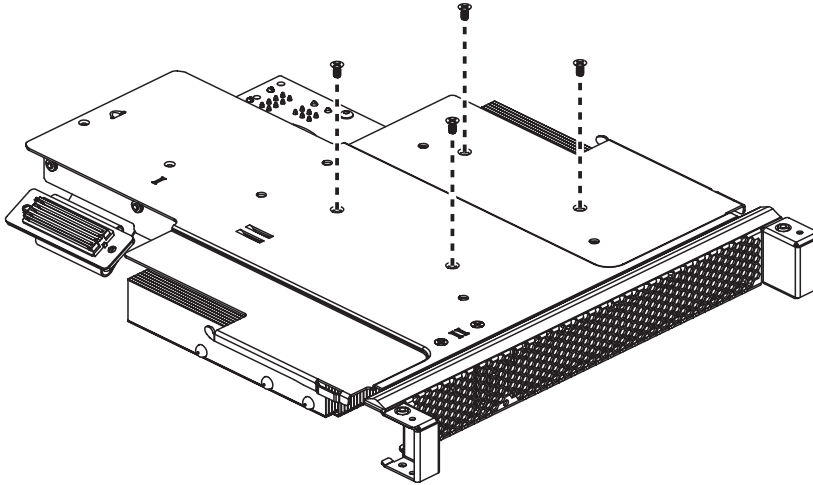
- c. Locate the tray-release button on the bottom of the expansion blade, as shown in the following illustration.



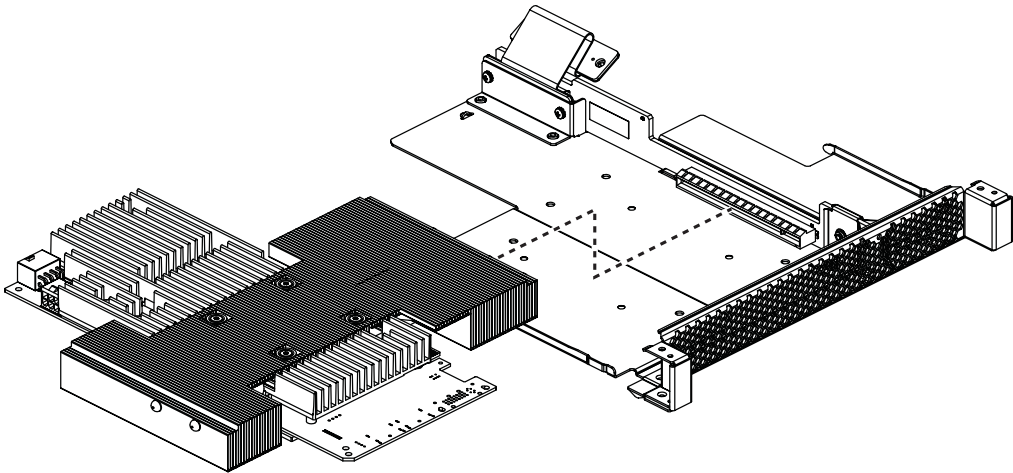
- d. Press in and hold the tray-release button; then, pull the expansion-blade riser assembly out of the expansion-blade system board, as shown in the following illustration.



5. Carefully turn over the expansion-blade riser assembly, and use a Phillips screwdriver to remove the four non-captive retaining screws, as shown in the following illustration. Store the screws in a safe location.



6. Carefully turn the expansion-blade riser assembly back over. Unplug the GPU adapter from the PCIe connector in the riser assembly and lift it out of the riser assembly, as shown in the following illustration.

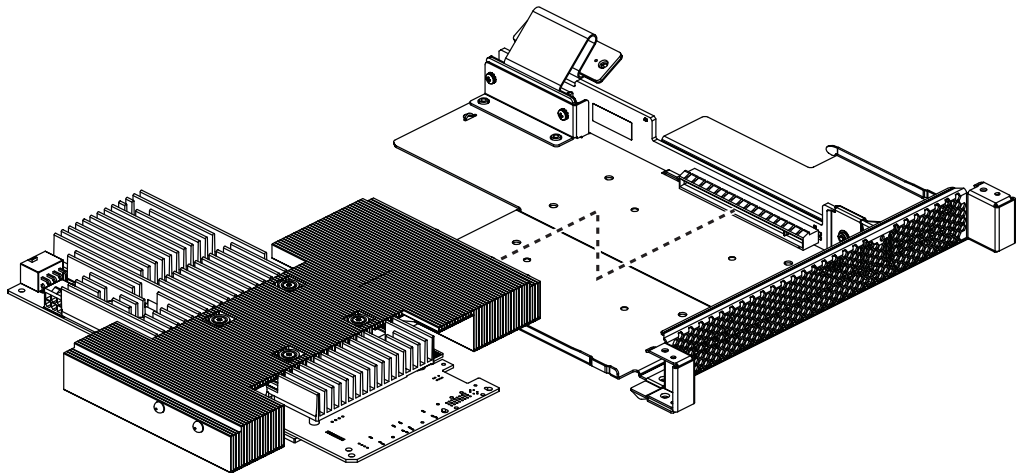


7. To install a new GPU adapter, go to the next section, [“Installing a GPU adapter” on page 24](#).

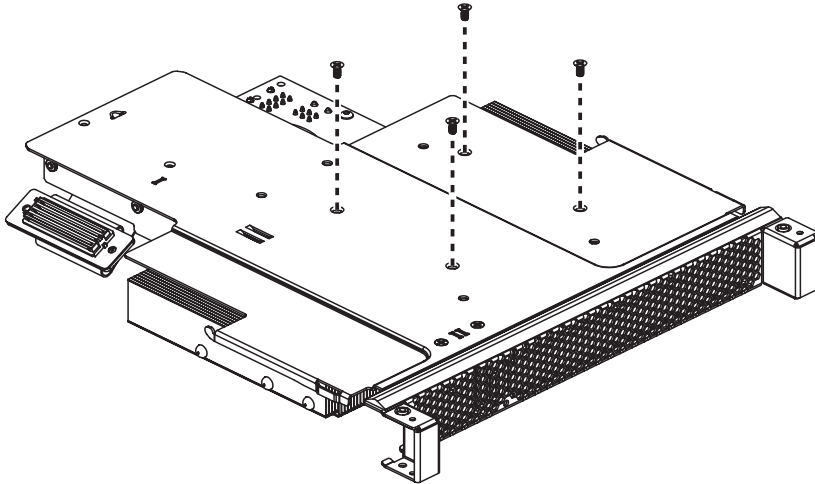
Installing a GPU adapter

This procedure assumes that you have performed the steps in the previous section, [“Removing a GPU adapter” on page 20](#). To install a GPU adapter in the expansion blade, complete the following steps:

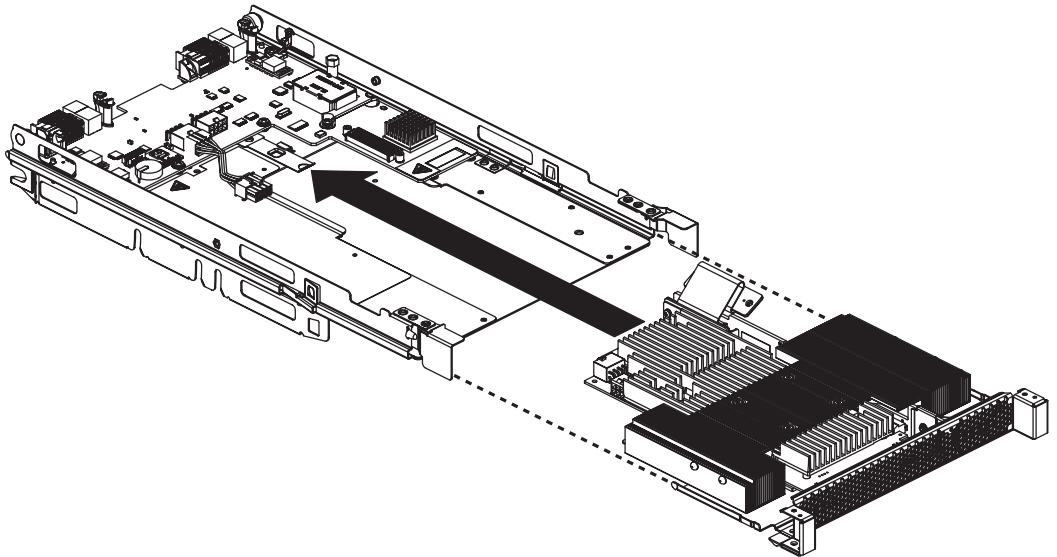
1. Touch the static-protective package that contains the GPU adapter to any *unpainted* metal surface on any grounded rack component in the rack in which you are installing the expansion blade, for at least two seconds. Then remove the GPU adapter from the package.
2. Connect the GPU adapter to the PCIe connector in the expansion-blade riser assembly, as shown in the following illustration.



3. Carefully turn over the expansion-blade riser assembly, and use a Phillips screwdriver to install the four non-captive retaining screws, as shown in the following illustration.

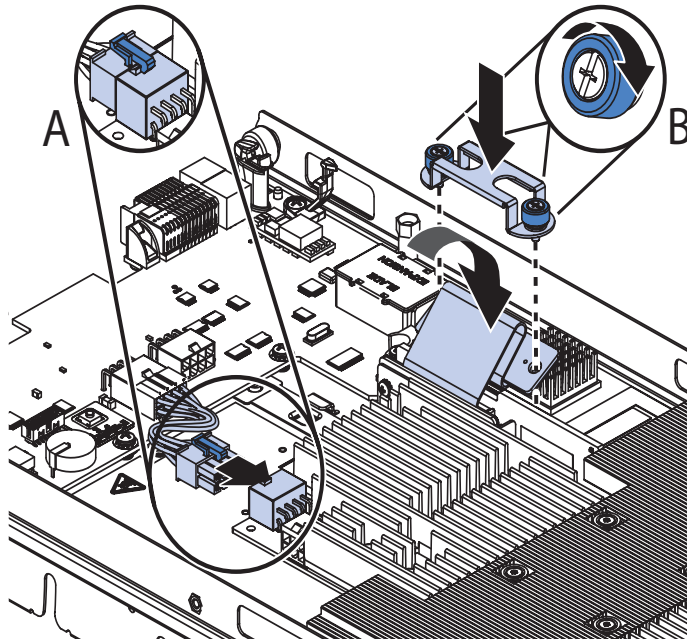


4. Turn over the expansion-blade riser assembly and install the riser assembly into the expansion blade system board, as shown in the following illustration:



- a. Carefully reposition the expansion-blade riser assembly, aligning it with the expansion-blade system-board-assembly rails.
- b. Firmly slide the assemblies together until the tray-release button securely locks the panels.

- c. Connect the auxiliary power cable (A), as shown in the following illustration.



- d. Connect the cable to the expansion-blade system board. Replace the retention bracket and tighten the screws (B), as shown in the illustration above.
5. Go to [“Completing the installation” on page 19](#).

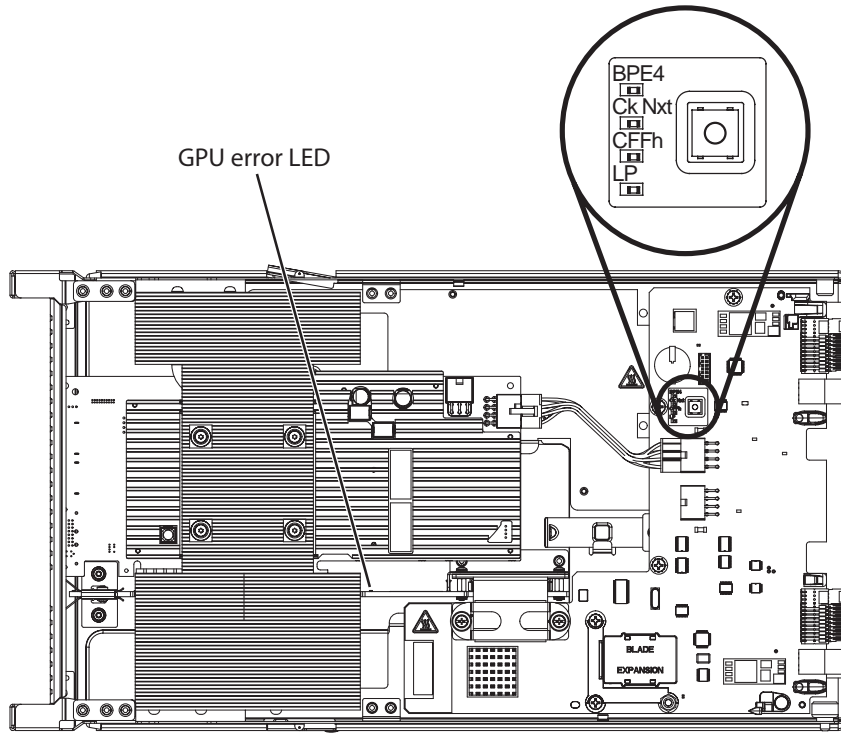
Light path diagnostics

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 [“Appendix A. Getting help and technical assistance” on page 32](#) 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 14](#)).
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 15](#)).
4. Press and hold the light path diagnostics switch for a maximum of 25 seconds. The light path diagnostics (LP) LED will be lit (green) 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.



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
LP	The light path LEDs have power.	<p>If LP LED is green, check for error LEDs that are lit in the expansion blade.</p> <p>If LP is off, install the expansion blade into the base blade and install the entire assembly into the BladeCenter for 5-10 minutes to recharge the LEDs.</p>
None	An error has occurred and cannot be isolated.	<ol style="list-style-type: none"> 1. Make sure that the light path diagnostics (LP) 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.
GPU	An error has occurred with the GPU adapter.	<ol style="list-style-type: none"> 1. Make sure that the GPU adapter installed in the PCIe connector is supported. 2. Check the auxiliary power cable. 3. Replace the adapter installed in the PCIe connector. 4. Replace the expansion blade.

Lit Light Path Diagnostics LED	Description	Action
CFFh	An error has occurred with the CFFh adapter.	<ol style="list-style-type: none"> 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.	<ol style="list-style-type: none"> 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 Nxt	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 GPU 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 and Support Information* document.

Component	CRU Number (Tier 1)	CRU Number (Tier 2)	FRU Number
IBM BladeCenter GPU Expansion Blade	NA	NA	68Y7442
GPU Adapter	NA	NA	43V5929 43V5947
Auxiliary power cable	NA	NA	44X0850
Kit, Non-captive retaining screws	NA	NA	68Y7473
Flex cable retention bracket	NA	NA	68Y7474

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 section contains information about where to go for additional information about IBM and IBM products, what to do if you experience a problem with your system, and whom to call for service, if it is necessary.

Before you call

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

- Check all cables to make sure that they are connected.
- Check the power switches to make sure that the system 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 *Problem Determination and Service Guide* on the IBM *Documentation* CD that comes with your system.
- Go to the IBM support website at <http://www.ibm.com/systems/support/> to check for technical information, hints, tips, and new device drivers or to submit a request for information.

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 pre-installed 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/systems/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 on the World Wide Web

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You can find service information for IBM systems and optional devices at <http://www.ibm.com/systems/support/>.

Software service and support

Through IBM Support Line, you can get telephone assistance, for a fee, with usage, configuration, and software problems with System x and x Series servers, BladeCenter products, IntelliStation workstations, and appliances. 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 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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台灣國際商業機器股份有限公司
台北市松仁路 7 號 3 樓
電話：0800-016-888

IBM Taiwan product service contact information:

IBM Taiwan Corporation
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Taipei, Taiwan
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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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Contaminant	Limits
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Gaseous	<ul style="list-style-type: none">• Copper: Class G1 as per ANSI/ISA 71.04-1985³• Silver: Corrosion rate of less than 300 Å in 30 days
<p>¹ ASHRAE 52.2-2008 - <i>Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size</i>. Atlanta: American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc.</p> <p>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.</p> <p>³ ANSI/ISA-71.04-1985. <i>Environmental conditions for process measurement and control systems: Airborne contaminants</i>. Instrument Society of America, Research Triangle Park, North Carolina, U.S.A.</p>	

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European Community contact:

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Telephone: +49 7032 15-2937
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