

BladeCenter HT Type 8740 and 8750



# Problem Determination and Service Guide



BladeCenter HT Type 8740 and 8750



# Problem Determination and Service Guide

**Note**

Before using this information and the product it supports, read the general information in Appendix B, "Notices," on page 125, and the *IBM Safety Information* and *IBM Systems 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/systems/supportportal/>.

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## Safety

Before installing this product, read the Safety Information.

قبل تركيب هذا المنتج، يجب قراءة الملاحظات الأمنية

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

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

安裝本產品之前，請先閱讀「安全資訊」。

Prije instalacije ovog produkta obavezno pročitajte Sigurnosne Upute.

Před instalací tohoto produktu si přečtěte příručku bezpečnostních instrukcí.

Læs sikkerhedsforskrifterne, før du installerer dette produkt.

Lees voordat u dit product installeert eerst de veiligheidsvoorschriften.

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

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

Vor der Installation dieses Produkts die Sicherheitshinweise lesen.

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

לפני שתתקינו מוצר זה, קראו את הוראות הבטיחות.

A termék telepítése előtt olvassa el a Biztonsági előírásokat!

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

製品の設置の前に、安全情報をお読みください。

본 제품을 설치하기 전에 안전 정보를 읽으십시오.

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

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

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

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

Перед установкой продукта прочтите инструкции по технике безопасности.

Pred inštaláciou tohto zariadenia si pečítajte Bezpečnostné predpisy.

Pred namestitvijo tega proizvoda preberite Varnostne informacije.

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

Läs säkerhetsinformationen innan du installerar den här produkten.

Bu ürünü kurmadan önce güvenlik bilgilerini okuyun.

بۇ ئۈرۈنۈ كۇرماڧن ئۆنچە گۈۋەنلىك بىلگىلىرىنى ئوقۇيۇن.

ཐོན་རྐྱེས་འདི་བདེ་སྐྱོད་མ་བྱས་གོང་། རྫོང་གྱི་ཡིད་གཟབ་  
བྱ་འདྲ་མིན་ཡོད་པའི་འོད་སྟེར་བལྟ་དགོས།

مەزكۇر مەھسۇلاتنى ئورنىتىشتىن بۇرۇن بىخەتەرلىك ئۇچۇرلىرىنى ئوقۇپ چىقىڭ.

Youq mwngz yungh canjbinj neix gaxgonq, itdingh aeu doeg aen  
canjbinj soengq cungj vahgangj ancien siusik.

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## Guidelines for trained service technicians

This section contains information for trained service technicians.

### Inspecting for unsafe conditions

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

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

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

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

1. Make sure that the power is off and the power 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 any access covers.
5. Check for any obvious non-IBM alterations. Use good judgment as to the safety of any non-IBM alterations.
6. Check inside the computer for any obvious unsafe conditions, such as metal filings, contamination, water or other liquid, or signs of fire or smoke damage.
7. Check for worn, frayed, or pinched cables.

8. Make sure that the power-supply cover fasteners (screws or rivets) have not been removed or tampered with.

## Guidelines for servicing electrical equipment

Observe the following guidelines when servicing electrical equipment:

- Check the area for electrical hazards such as moist floors, nongrounded power extension cords, and missing safety grounds.
- Use only approved tools and test equipment. Some hand tools have handles that are covered with a soft material that does not provide insulation from live electrical current.
- Regularly inspect and maintain your electrical hand tools for safe operational condition. Do not use worn or broken tools or testers.
- Do not touch the reflective surface of a dental mirror to a live electrical circuit. The surface is conductive and can cause personal injury or equipment damage if it touches a live electrical circuit.
- Some rubber floor mats contain small conductive fibers to decrease electrostatic discharge. Do not use this type of mat to protect yourself from electrical shock.
- Do not work alone under hazardous conditions or near equipment that has hazardous voltages.
- Locate the emergency power-off (EPO) switch, disconnecting switch, circuit breakers, 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 all power cords. If you cannot disconnect the power cords, 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 are working with powered-on electrical equipment, use only one hand. Keep the other hand in your pocket or behind your back to avoid creating a complete circuit that could cause an electrical shock.
  - When using a tester, set the controls correctly and use the approved probe leads and accessories for that tester.
  - Stand on a suitable rubber mat to insulate you from grounds such as metal floor strips and equipment frames.
- Use extreme care when measuring high voltages.
- To ensure proper grounding of components such as power supplies, pumps, 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

**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," 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 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 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 29:**



**CAUTION:**

This equipment is designed to permit the connection of the earthed conductor of the dc supply circuit to the earthing conductor at the equipment. If this connection is made, all of the following conditions must be met:

- This equipment shall be connected directly to the dc supply system earthing electrode conductor or to a bonding jumper from an earthing terminal bar or bus to which the dc supply system earthing electrode conductor is connected.
- This equipment shall be located in the same immediate area (such as, adjacent cabinets) as any other equipment that has a connection between the earthed conductor of the same dc supply circuit and the earthing conductor, and also the point of earthing of the dc system. The dc system shall not be earthed elsewhere.
- The dc supply source shall be located within the same premises as this equipment.
- Switching or disconnecting devices shall not be in the earthed circuit conductor between the dc source and the point of connection of the earthing electrode conductor.

Statement 31:



**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 power source.**
- **Connect to properly wired power sources 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 ac power cords, dc power sources, network connections, telecommunications systems, and serial cables before you open the device covers, unless instructed otherwise in the installation and configuration procedures.**
- **Connect and disconnect cables as described in the following table when installing, moving, or opening covers on this product or attached devices.**

**To Connect:**

1. Turn OFF all power sources and equipment to be attached to this product.
2. Attach all cables to the devices.
3. Attach signal cables to the connectors.
4. Attach power cords to power sources. For dc systems, ensure correct polarity of -48VDC connections: RTN is (+) and -48VDC is (-). Earth ground should use a two-hole lug for safety.
5. Turn ON all the power sources.

**To Disconnect:**

1. Turn OFF all power sources and equipment to be attached to this product.
  - For ac systems, remove all power cords from the chassis power receptables or interrupt power at the ac power distribution unit.
  - For dc systems, disconnect dc power sources at the breaker panel or by turning off the power source, then remove the dc cables.
2. Remove the signal cables from the connectors.
3. Remove all cables from the devices.

Statement 32:



**CAUTION:**

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

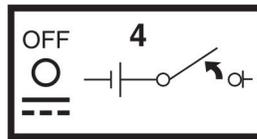
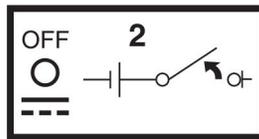
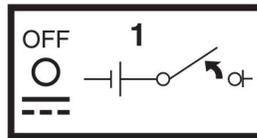
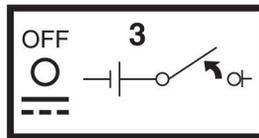
Statement 33:



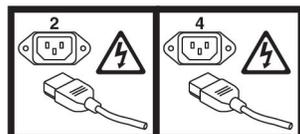
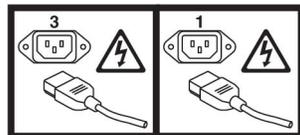
**CAUTION:**

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.

BladeCenter HT Type 8740:



BladeCenter HT Type 8750:



**Statement 34:**



**CAUTION:**

To reduce the risk of electric shock or energy hazards:

- This equipment must be installed by trained service personnel in a restricted-access location, as defined by the NEC and IEC 60950-1, First Edition, The Standard for Safety of Information Technology Equipment.
- Connect the equipment to a properly grounded safety extra low voltage (SELV) source. A SELV source is a secondary circuit that is designed so that normal and single fault conditions do not cause the voltages to exceed a safe level (60 V direct current).
- Incorporate a readily available approved and rated disconnect device in the field wiring.
- See the specifications in the product documentation for the required circuit-breaker rating for branch circuit overcurrent protection.
- Use copper wire conductors only. See the specifications in the product documentation for the required wire size.
- See the specifications in the product documentation for the required torque values for the wiring-terminal nuts.

---

## Chapter 1. Introduction

This *Problem Determination and Service Guide* contains information to help you solve problems that might occur in your IBM® BladeCenter® HT Type 8740 and 8750 unit. It describes the diagnostic tools that come with the BladeCenter HT unit, error codes and suggested actions, and instructions for replacing failing components.

Replaceable components are of three types:

- **Tier 1 customer replaceable unit (CRU):** Replacement of Tier 1 CRUs is your responsibility. If IBM installs a Tier 1 CRU at your request, you will be charged for the installation.
- **Tier 2 customer replaceable unit:** You can 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 computer.
- **Field replacement 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 on the IBM Documentation CD.

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## Related documentation

In addition to this document, the following related documentation is provided in Portable Document Format (PDF) on the *BladeCenter Documentation CD* that comes with your BladeCenter HT unit:

- *BladeCenter HT Installation and User's Guide*  
This printed document contains instructions for setting up the BladeCenter HT unit and general information about the BladeCenter HT unit, including information about features, and how to configure the BladeCenter HT unit. It also contains detailed instructions for installing, removing, and connecting optional devices that the BladeCenter HT unit supports.
- *BladeCenter HT 2-Post Rack Installation Instructions*  
This document is in Portable Document Format (PDF) on the IBM Documentation CD. It contains instructions for installing the BladeCenter HT unit in a 2-post rack.
- *BladeCenter HT 4-Post Rack Installation Instructions*  
This document is in Portable Document Format (PDF) on the IBM Documentation CD. It contains instructions for installing the BladeCenter HT unit in a 4-post rack.
- *IBM BladeCenter HT Advanced Management Module Interposer and Flex Cable Assembly Installation Instructions*  
This document provides the installation instructions and warranty information for an IBM BladeCenter HT Advanced Management Module Interposer and Flex Cable Assembly.
- *BladeCenter Advanced Management Module Installation Guide*  
This document contains instructions for installing the management module in the BladeCenter HT unit and creating the initial configuration.
- *BladeCenter Management Module User's Guide*  
This document provides general information about the management module for your BladeCenter HT unit, including information about features, how to configure the management module, and how to get help.

- *BladeCenter Management Module Command-Line Interface Reference Guide*  
This document explains how to use the management-module command-line interface to directly access BladeCenter management functions as an alternative to using the Web-based user interface. The command-line interface also provides access to the text-console command prompt on each blade server through a serial over LAN (SOL) connection.
- *Safety Information*  
This document contains translated caution and danger statements. Each caution and danger statement that appears in the documentation has a number that you can use to locate the corresponding statement in your language in the *Safety Information* document.
- *Warranty and Support Information*  
This document contains information about the terms of the warranty and getting service and assistance.
- *IBM BladeCenter HT Redundant Media Tray Installation Instructions*  
This document provides the installation instructions and warranty information for an IBM BladeCenter HT Redundant Media Tray.
- *BladeCenter HT CompactFlash Module*  
This document provides the installation instructions and warranty information for an IBM BladeCenter HT CompactFlash Module.
- *IBM BladeCenter HT AC Power Supply Modules Installation Instructions*  
This document provides the installation instructions and warranty information for an IBM BladeCenter HT AC Power Supply Module.
- *IBM BladeCenter HT DC Power Supply Modules Installation Instructions*  
This document provides the installation instructions and warranty information for an IBM BladeCenter HT dc Power Supply Module.
- *IBM BladeCenter HT Interposer for Gb Switch/Bridge Bays and IBM BladeCenter HT Interposer for Gb Switch/Bridge Bays with Interswitch Links (ISL) Installation Instructions*  
This document provides the installation instructions and warranty information for the IBM BladeCenter HT Interposer for Gb Switch/Bridge Bays and the IBM BladeCenter HT Interposer for Gb Switch/Bridge Bays with Interswitch Links (ISL).
- *IBM BladeCenter HT Interposer for HS Switch Bay Installation Instructions*  
This document provides the installation instructions and warranty information for an IBM BladeCenter HT Interposer for HS Switch Bay.
- *IBM BladeCenter HT Bezel Installation Instructions*  
This document provides the installation instructions and warranty information for the IBM BladeCenter HT Bezel option.
- *IBM BladeCenter HT Bezel Filter 4-Pack Option*  
This document provides warranty information for the IBM BladeCenter HT Bezel Filter 4-Pack Option.

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

The BladeCenter HT unit might have features that are not described in the documentation that comes with the BladeCenter HT unit. The documentation might be updated occasionally to include information about those features, or technical updates might be available to provide additional information that is not included in

the BladeCenter HT unit documentation. These updates are available from the IBM Web site. To check for updated documentation and technical updates, go to <http://www.ibm.com/support/>.

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## 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 potential damage to programs, devices, or data. An attention notice is placed just before the instruction or situation in which damage could occur.
- **Caution:** These statements indicate situations that can be potentially hazardous to you. A caution statement is placed just before the description of a potentially hazardous procedure step or situation.
- **Danger:** These statements indicate situations that can be potentially lethal or extremely hazardous to you. A danger statement is placed just before the description of a potentially lethal or extremely hazardous procedure step or situation.

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## Deployment scenarios

The IBM BladeCenter HT unit can be deployed to support a variety of networking goals and environments, such as:

- **Central Office (CO) environment**

IBM BladeCenter HT is ideally suited for network telecommunications facilities or carrier-grade environments that require maximum equipment operability.

- **Server consolidation**

The IBM BladeCenter HT unit can be used by organizations with multiple server locations that need to centralize or physically consolidate servers to increase flexibility, reduce maintenance costs, and reduce human resources.

- **e-business infrastructure**

The IBM BladeCenter HT unit can be used by companies that need to deploy new e-commerce and e-business applications and infrastructure quickly to minimize time to market, while at the same time ensuring flexibility, scalability, and availability.

- **Enterprise infrastructure**

The IBM BladeCenter HT unit can support an enterprise infrastructure through:

- **File and print:** For organizations with decentralized or departmental file and print servers that need to reduce the cost of ownership, increase reliability, and provide flexibility for growth.
- **Collaboration:** For customers needing a cost-effective way and reliable corporate solution for e-mail, calendar, and other collaboration capabilities.

- **High-performance computing**

The IBM BladeCenter HT unit can be used by customers with compute-intensive applications needing highly available clustered solutions to achieve significantly higher degrees of scalability and performance, all managed at a low cost.

- **Any location where the National Electric Code (NEC) applies.**

The IBM BladeCenter HT unit can be installed in any location where NEC requirements are used.

## Features and specifications

The following table provides a summary of the features and specifications of the BladeCenter HT unit. Depending on the model, some features might not be available, or some specifications might not apply.

<p><b>Media tray (on front):</b></p> <ul style="list-style-type: none"> <li>• Minimum: One hot-swap media tray</li> <li>• Maximum: Two hot-swap media trays</li> </ul> <p>Each media tray consists of:</p> <ul style="list-style-type: none"> <li>• Two internal CompactFlash slots</li> <li>• Two USB v2.0 ports (output power: 500 mA maximum)</li> <li>• Front system LED panel</li> </ul> <p><b>Blade bays (on front):</b> Twelve hot-swap blade server bays</p> <p><b>Module bays (on front):</b></p> <ul style="list-style-type: none"> <li>• Four hot-swap power-module bays</li> <li>• Four hot-swap high-speed I/O-module bays</li> <li>• Four hot-swap I/O-module bays</li> <li>• Two hot-swap management-module bays</li> <li>• Two hot-swap media trays</li> </ul> <p><b>Module bays (on rear):</b></p> <ul style="list-style-type: none"> <li>• Two hot-swap multiplexer expansion-module bays</li> <li>• One hot-swap alarm panel module bay <ul style="list-style-type: none"> <li>– Telco alarm connector</li> <li>– Direct serial connector for blade servers</li> <li>– Rear system LED panel</li> </ul> </li> <li>• Four hot-swap fan modules</li> </ul> <p><b>Power modules:</b></p> <p>BladeCenter HT Type 8740:</p> <ul style="list-style-type: none"> <li>• Minimum: Two dc hot-swap power modules that are configured for redundant operation</li> <li>• Maximum: Four dc hot-swap power modules that provide redundancy to all BladeCenter HT components</li> </ul> <p>BladeCenter HT Type 8750:</p> <ul style="list-style-type: none"> <li>• Minimum: Two ac hot-swap power modules that are configured for redundant operation</li> <li>• Maximum: Four ac hot-swap power modules that provide redundancy to all BladeCenter HT components</li> </ul>	<p><b>Management module:</b></p> <ul style="list-style-type: none"> <li>• Minimum: One hot-swap advanced management module</li> <li>• Maximum: Two hot-swap advanced management modules: one active, one hot stand-by</li> </ul> <p><b>Redundant cooling:</b> Four hot-swap fan-module bays (N+1 redundant)</p> <p><b>Upgradeable microcode:</b></p> <ul style="list-style-type: none"> <li>• Management-module firmware</li> <li>• I/O-module firmware (not all I/O module types)</li> <li>• Blade server firmware</li> </ul> <p><b>Security features:</b></p> <ul style="list-style-type: none"> <li>• Login password for remote connection</li> <li>• Secure Sockets Layer (SSL) security for remote management access</li> <li>• ANSI T1.276 enhanced security features</li> </ul> <p><b>Predictive Failure Analysis (PFA) alerts:</b></p> <ul style="list-style-type: none"> <li>• Fans</li> <li>• Blade-dependent features</li> </ul> <p><b>Size (12 U):</b></p> <ul style="list-style-type: none"> <li>• Height: 533.40 mm (21 in. or 12 U), minus 8 mm for clearance</li> <li>• Depth: <ul style="list-style-type: none"> <li>– Without optional bezel: 617 mm (24.29 in.)</li> <li>– With optional bezel: 706 mm (27.80 in.)</li> </ul> </li> <li>• Width: 442 mm (17.4 in.)</li> <li>• Weight: <ul style="list-style-type: none"> <li>– Full configured weight with blade servers: Approximately 158.8 kg (350 lb)</li> <li>– Empty chassis without modules or blade servers: Approximately 65.32 kg (144 lb)</li> </ul> </li> </ul>	<p><b>Environment (per Telcordia GR-63-CORE):</b></p> <ul style="list-style-type: none"> <li>• Operational: <ul style="list-style-type: none"> <li>– Altitude: -60 m to 1800 m (-197 ft to 6000 ft), 5° C to 40° C (41° F to 104° F):</li> <li>– Altitude: 1800 m to 4000 m (6000 ft to 13000 ft) 5° C to 30° C (41° F to 86° F)</li> <li>– Humidity: 5% to 85%</li> </ul> </li> <li>• Short term operational: <ul style="list-style-type: none"> <li>– Altitude: -60 m to 1800 m (-197 ft to 6000 ft), -5° C to 55° C (23° F to 131° F)</li> <li>– Altitude: 1800 m to 4000 m (6000 ft to 13000 ft), -5° C to 45° C (23° F to 113° F)</li> <li>– Humidity: 5% to 90% not to exceed 0.024 water/kg of dry air</li> </ul> </li> <li>• Shipping/Storage: <ul style="list-style-type: none"> <li>– Unit off: -40° C to 70° C (-40° F to 158° F), 30° C/hr maximum rate of change</li> <li>– Humidity: Uncontrolled</li> <li>– Acclimation of the system might be required after a period of high-humidity storage</li> </ul> </li> </ul> <p><b>Acoustics:</b> Declared sound power level: 7.8 bels, 25° C, sea level</p> <p><b>Electrical input (N+N redundant):</b></p> <p>BladeCenter HT Type 8740 input voltage (four inputs at 60 A rating each):</p> <ul style="list-style-type: none"> <li>• Minimum: -40 V dc</li> <li>• Maximum: -72 V dc</li> <li>• DC isolated</li> </ul> <p>BladeCenter HT Type 8750 input voltage (four inputs at 16 A rating each):</p> <ul style="list-style-type: none"> <li>• Minimum: 180 V ac</li> <li>• Maximum: 265 V ac</li> <li>• Sine-wave input (50/60 Hz single-phase)</li> </ul> <p><b>Heat output:</b> Approximate heat output in British thermal units (Btu) per hour:</p> <ul style="list-style-type: none"> <li>• BladeCenter HT Type 8740: <ul style="list-style-type: none"> <li>– Minimum configuration: 4270 Btu per hour (1251 watts)</li> <li>– Maximum configuration: 19680 Btu per hour (5766 watts)</li> </ul> </li> <li>• BladeCenter HT Type 8750: <ul style="list-style-type: none"> <li>– Minimum configuration: 4175 Btu per hour (1223 watts)</li> <li>– Maximum configuration: 21850 Btu per hour (6400 watts)</li> </ul> </li> </ul>
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**Note:** The intra-building ports of the equipment or subassembly are suitable for connection to intra-building or unexposed wiring or cabling only. The intra-building ports of the equipment or subassembly must not be metallically connected to interfaces that connect to the outside plant (OSP) or its wiring. These interfaces are designed for use as intra-building interfaces only (type 2 or type 4 ports as described in GR-1089-CORE, Issue 4) and require isolation from the exposed OSP cabling. The addition of primary protectors is not sufficient protection in order to connect these interfaces metallically to OSP wiring.

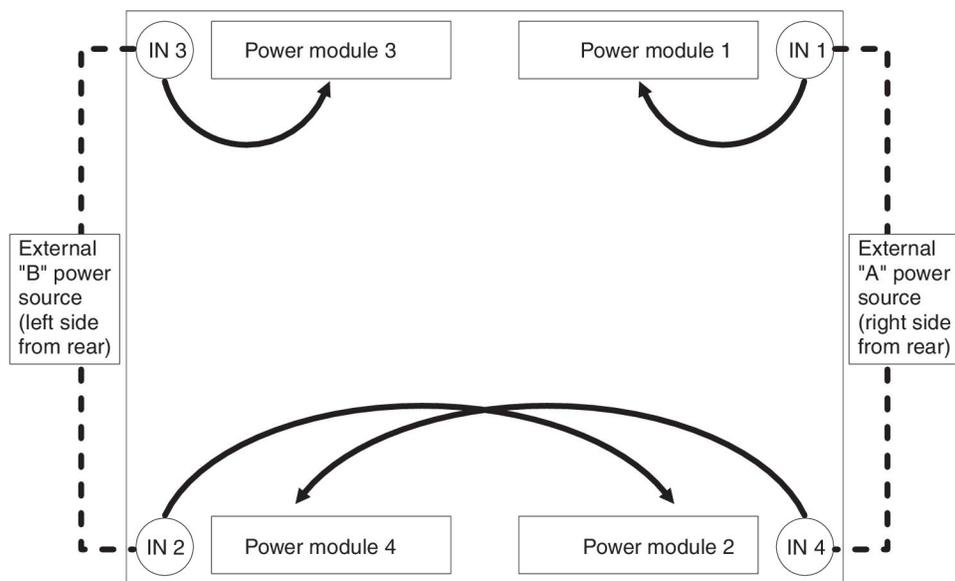
## BladeCenter HT unit power, controls, and indicators

This section describes the controls and light-emitting diodes (LEDs) and how to start and shut down the BladeCenter HT unit.

### Supplying power to the BladeCenter HT unit

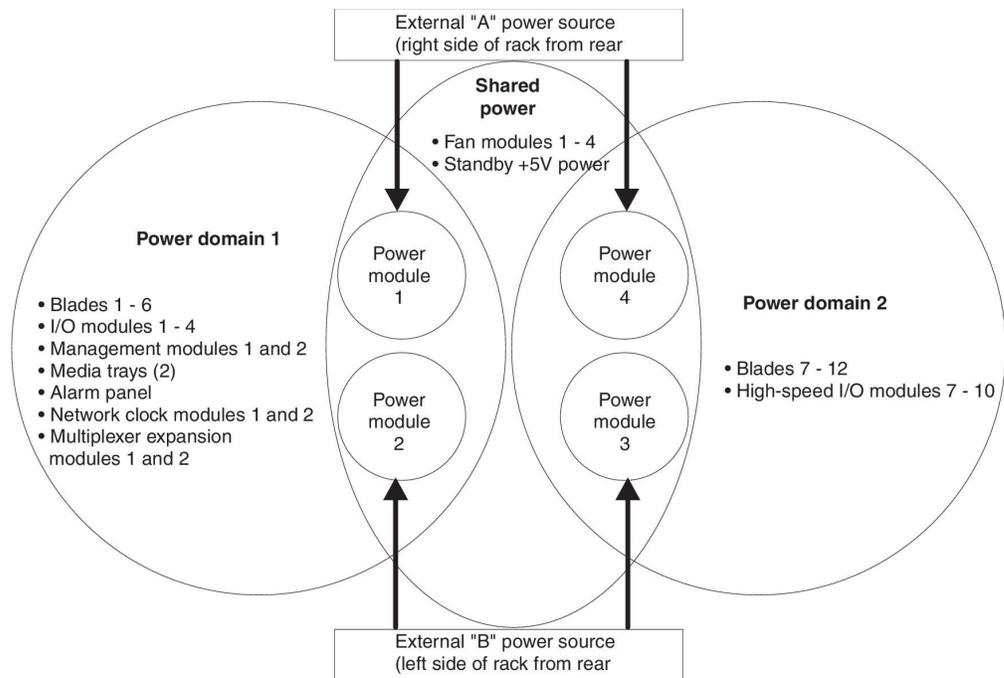
The BladeCenter HT unit does not have a power switch. The BladeCenter HT unit has four power connectors; each powers a power module. As viewed from the rear of the BladeCenter HT unit, power connector 1 (top-right connector) supplies power to power-module bay 1, power connector 2 (bottom-left connector) supplies power to power module 2, power connector 3 (top-left connector) supplies power to power module 3, and power connector 4 (bottom-right connector) supplies power to power module 4.

#### Physical view



Power modules 1 and 2 are redundant and provide power to blade bays 1 through 6; power modules 3 and 4 are redundant and provide power to blade bays 7 through 12. To ensure power redundancy, supply power to power connectors 1 and 4 from one power source location, and supply power to power connectors 2 and 3 from another power source location.

## Logical view

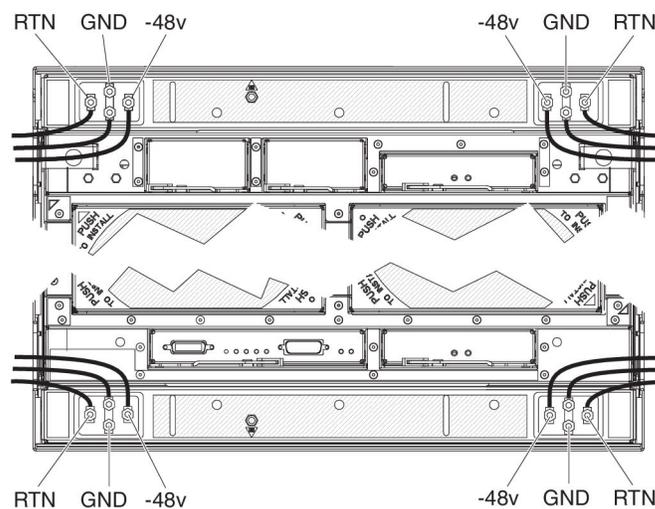


**Important:** Each release handle on the fan shuttle has a safety switch that disables power output from the power boxes. If the release handles are not secured to the chassis with the thumbscrews, the BladeCenter HT unit will not power-on.

## Connecting the BladeCenter HT type 8740 to dc-power

The BladeCenter HT dc-power inputs are configured for dc isolated return (DC-I). The dc return terminal or conductor is not connected to the equipment frame or the grounding means of the equipment.

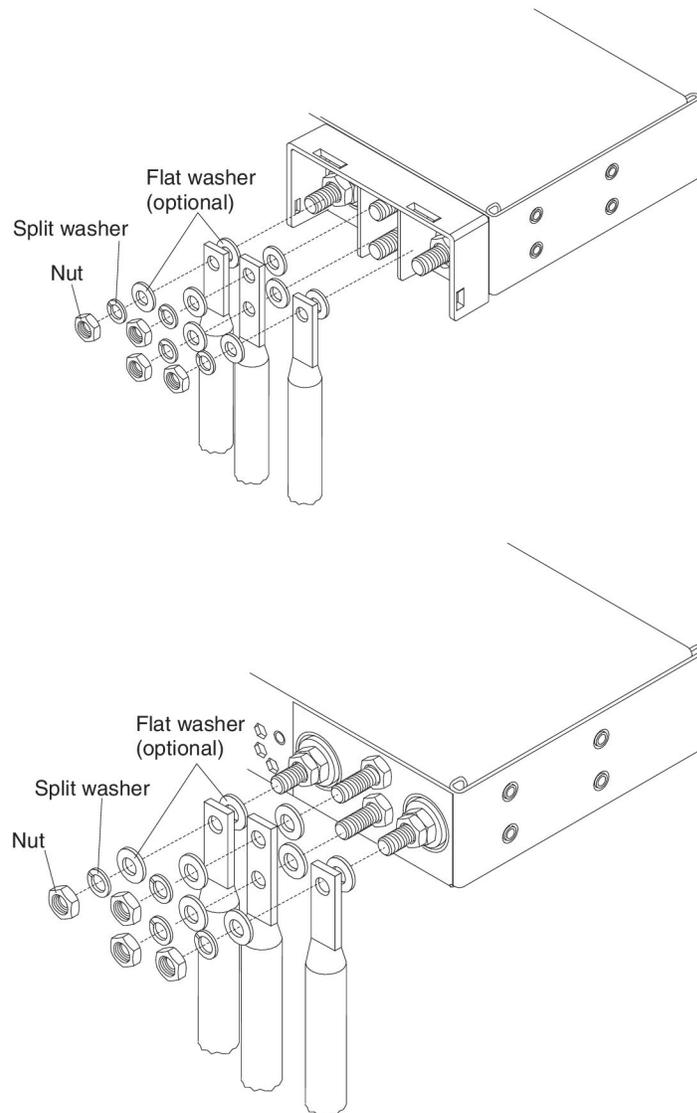
**Attention:** Only trained service personnel, other than IBM service technicians, are authorized to make the connections to and disconnections from the -48 volt dc power source. IBM service technicians are not certified or authorized to install or remove the -48 volt power cable. The customer is responsible for ensuring that only trained service personnel install or remove the -48 volt power cable.



The BladeCenter HT unit has four dc-power terminal connectors. Each dc terminal has four #M6 (0.25-inch) studs, one for -48 V dc, one for RETURN, and two for

connecting the safety ground wire. Each terminal has a terminal cover. Remove the terminal cover before connecting cables to each terminal and reinstall the terminal cover on each terminal before supplying power to the BladeCenter HT unit. For more information on removing and installing a terminal cover, see “Removing a dc terminal cover” on page 86 and “Installing a dc terminal cover” on page 88 for more information.

There are two types of terminal covers, depending on date of manufacture. The following illustrations show both types of terminal boxes for the two types of terminal covers.



When connecting a wire to each stud, install a flat washer (optional) on the stud, install the wire, install a flat washer (optional), install a split washer and then install the nut.

The following guidelines are provided for connecting a 60 A BladeCenter HT unit to a -48 V dc power source:

- The power source must have a minimum of 80 A overcurrent protection. See article 240, paragraph 3, table 310-16 of the National Electric Code for more information about electrical wiring requirements.

- The overcurrent protective device or circuit breaker must be accessible to service personnel to prevent the power from being turned on by someone other than technician servicing the BladeCenter HT unit.
- The BladeCenter HT unit has a dc wire rating of 4 AWG (circular mil area of 33100-52600) and rated 90 degree C.

**Note:** The actual wire gauge and ring terminal will be determined by the current draw and the length of wire run or as specified by the customer premises guidelines.

- Flexible dc wiring is recommended to allow for minimum bend radius.
- The supply wiring to the power connectors must be terminated in UL recognized insulated ring terminals, sized for a M6 stud, 4 AWG wire (circular mil area of 33100-52600) and a wire insulation diameter of 12.8 to 13.1 mm. An example of this type of ring terminal is Amp Plasti-Grip type 52043-1 using Tyco Electronics Hydraulic Crimping Tool part number 1490749-1.

- For NEBS compliance, the protective earthing conductor must use copper conductors with a size minimum of 6 AWG (circular mil area of 20800–33100) and must be terminated in a UL recognized two hole lug sized for a M6 stud. Chassis ground studs are on 5/8-inch centers. An example of this type of two hole lug is the Thomas and Betts part number 54205 using the Thomas and Betts crimping tool model TBM-25S.
- Torque the wiring-terminal nuts to 1.5 newton-meters (13.3 inch-pounds)

For more information, see Statement 34 in “Safety” on page vii.

### **Connecting the BladeCenter HT type 8750 to ac-power**

The BladeCenter HT unit has four ac-power C20 input connectors. Two C20/C19 type ac jumper cords are supplied with the BladeCenter HT unit. To supply power to the BladeCenter HT unit, connect one end of each power cord to a power connector on the rear of the BladeCenter HT unit and the other end of each power cord to a 200-240 volt 20 amp power distribution unit or appropriate electrical outlet. An external Surge Protective Device (SPD) is not required at the ac-power input of the BladeCenter HT unit.

The blade servers in the BladeCenter HT unit are connected to power but are not turned on. After the BladeCenter HT unit has power, depending on the configuration settings, the blade servers might have to be individually turned on.

## Disconnecting power from the BladeCenter HT unit

You can shut down the BladeCenter HT unit by turning off the blade servers and disconnecting the BladeCenter HT unit from the power source.

To disconnect power from the BladeCenter HT unit, complete the following steps:

1. Shut down each blade server. See the documentation that comes with your blade servers for the procedure for shutting down the operating system.
2. Disconnect power from the BladeCenter HT unit.

**Note:** After you disconnect the BladeCenter HT unit from power, wait at least 5 seconds before you connect the BladeCenter HT unit to power again.

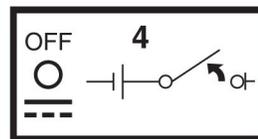
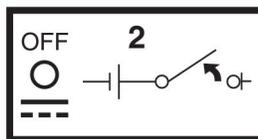
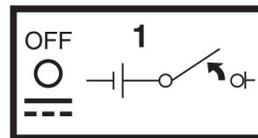
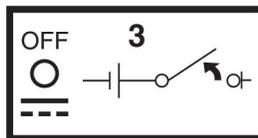
- BladeCenter HT type 8740:
  - a. Make sure the blade servers are powered off.

### Statement 33:



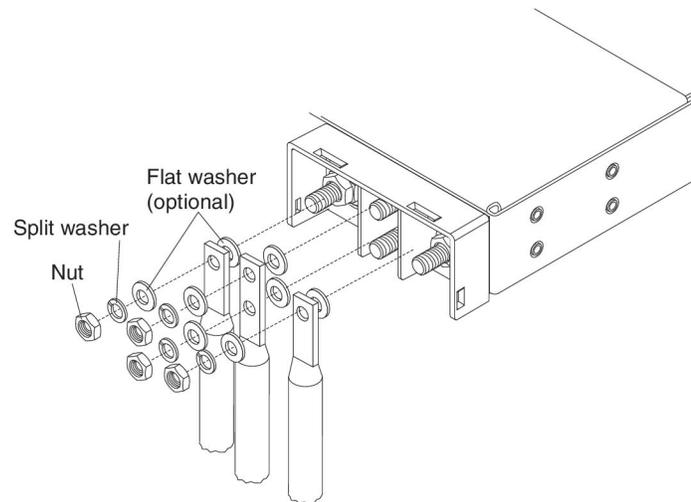
### CAUTION:

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.



**Attention:** Only trained service personnel, other than IBM service technicians, are authorized to make the connections to and disconnections from the -48 volt dc power source. IBM service technicians are not certified or authorized to install or remove the -48 volt power cable. The customer is responsible for ensuring that only trained service personnel install or remove the -48 volt power cable.

- b. Turn off the power source.
- c. Remove the dc terminal cover for each power terminal. See “Removing a dc terminal cover” on page 86 for more information.



- d. Remove the nut, split washer, flat washer, and power cord from each terminal post.
- e. Remove the power cables.

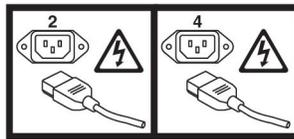
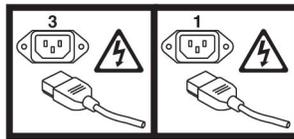
- BladeCenter HT type 8750:
  - a. Make sure the blade servers are powered off.

**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.**



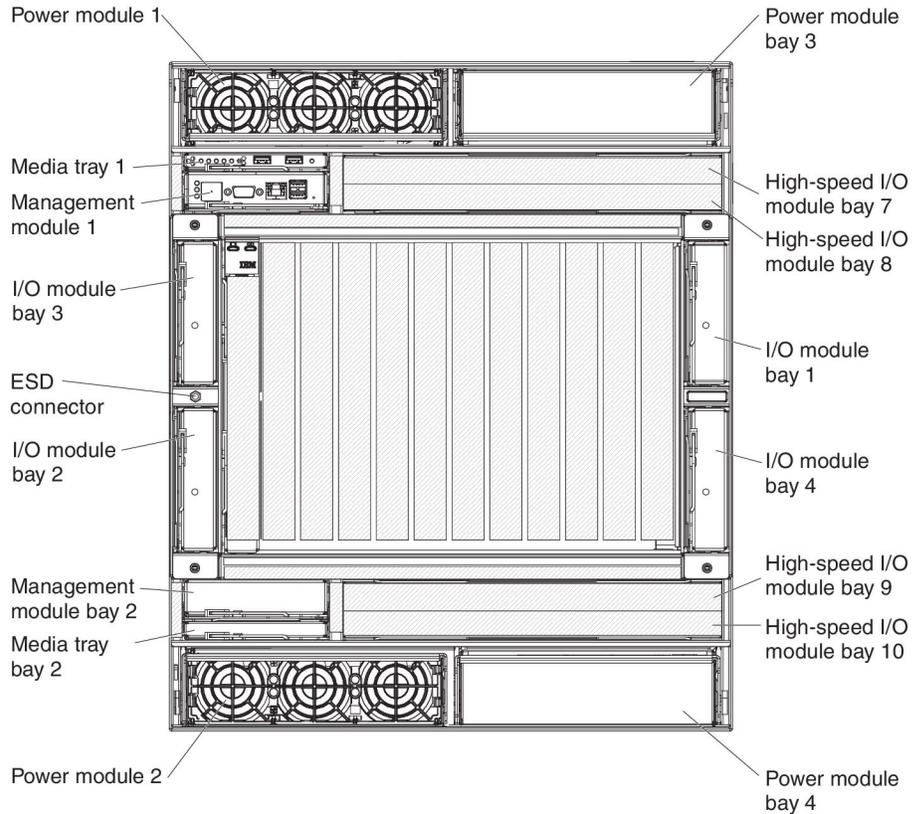
- b. Disconnect all power cords on the BladeCenter HT unit from the power connectors.

# BladeCenter HT components, controls, and LEDs

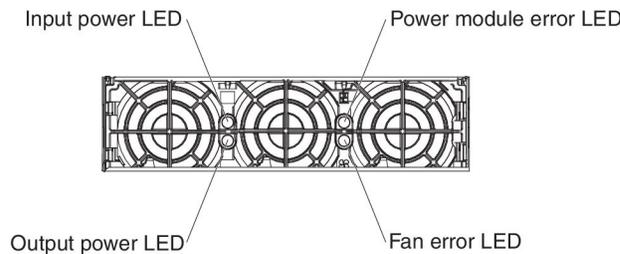
This section identifies the components, controls, and LEDs on the front and rear of the BladeCenter HT unit.

## Front view

This section identifies the components, controls, and LEDs on the front of the BladeCenter HT unit.



**Power modules:** The following illustration shows the LEDs on each power module.



The LEDs on each power module indicate the condition of the power module and fan pack.

**Note:** The orientation of the power module shown in the illustration is for one of the top power-modules. The orientation for modules in the bottom power-module bays is rotated 180°.

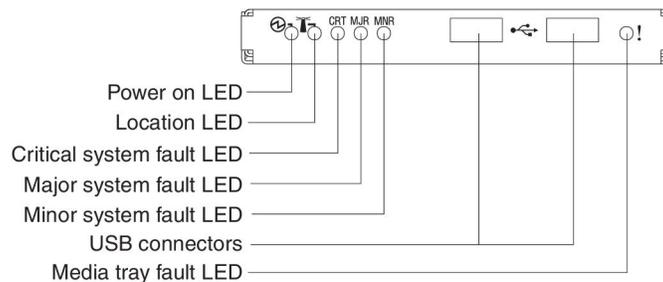
- **Input power LED:** When this green LED is lit, the input from the external power source connected to the power module is present and within specifications. During typical operation, both the input power and output power LEDs are lit.

- **Power module error LED:** When this amber LED is lit, a power module failure has occurred, and it is not operating within specifications.
- **Fan error LED:** When this amber LED is lit, a fan pack has failed and is not operating within specifications.
- **Output power LED:** When this green LED is lit, the output from the power module to the other components and blade servers is present and within specifications. During typical operation, both the input power and output power LEDs are lit.

**Media tray:** The media tray contains the following:

- **LED panel**

The LEDs on the LED panel provide status information for your BladeCenter HT unit.



**Note:** You can turn off the location LED and the information LED through the management module.

- **Power-on:** When this green LED is lit, power is present in the BladeCenter HT unit. When this LED is off, the power subsystem, the power module, or the LED has failed.

**Attention:** If the power-on LED is off, it does not mean that electrical current is not present in the BladeCenter HT unit. The LED might be defective. To remove all electrical current from the BladeCenter HT unit, you must disconnect all power cords from all power input connectors.

- **Location:** When this blue LED is lit or flashing, it has been turned on by the system administrator to aid in visually locating the BladeCenter HT unit. If a blade server requires attention, the location LED on the blade server usually will also be lit. After the BladeCenter HT unit has been located, you can have the system administrator turn off the location LED.
- **Critical system fault:** When this LED is lit, the BladeCenter HT unit has a critical system fault. A critical system fault is an error or event that is detected by the system with a significant impact to the system. In this case, the system cannot continue to operate or is operating in a non-redundant power configuration or a non-redundant cooling configuration.

**Note:** The color of this LED can be set to amber or red through the management module.

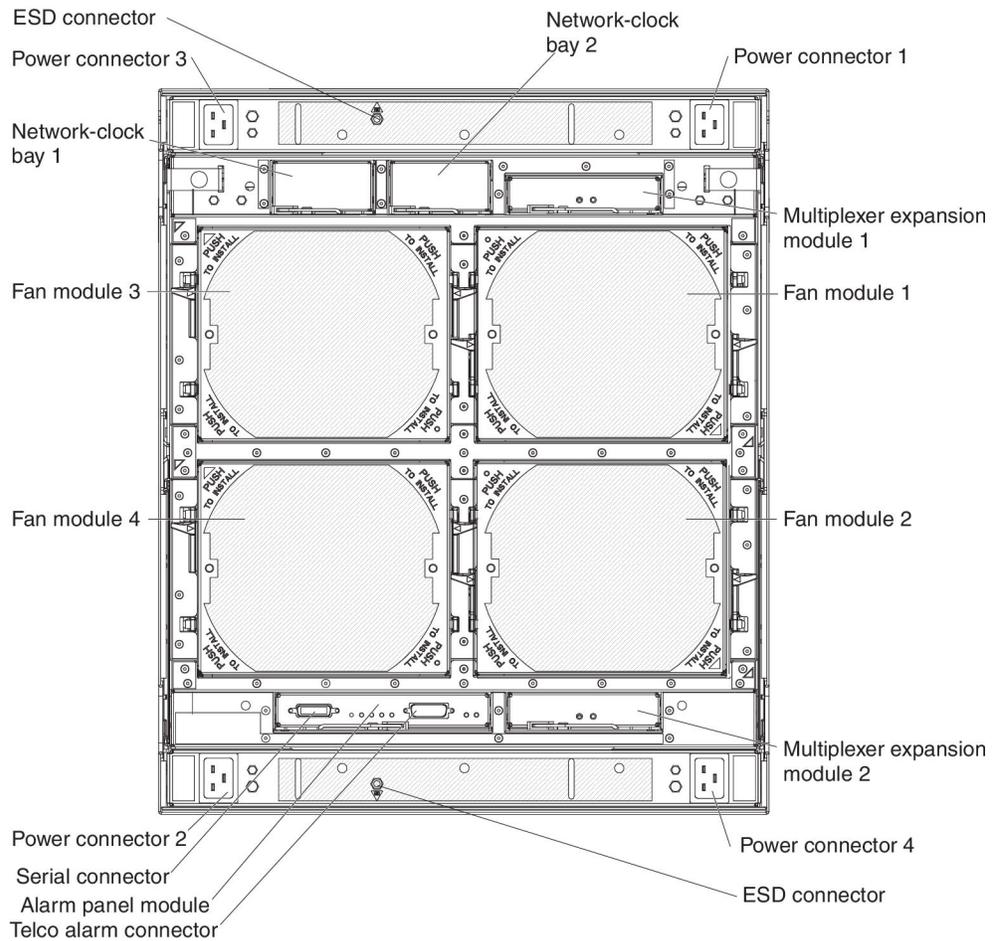
- **Major system fault:** When this LED is lit, the BladeCenter HT unit has a major system fault. The system can continue to operate but might lose some function and performance.

**Note:** The color of this LED can be set to amber or red through the management module.

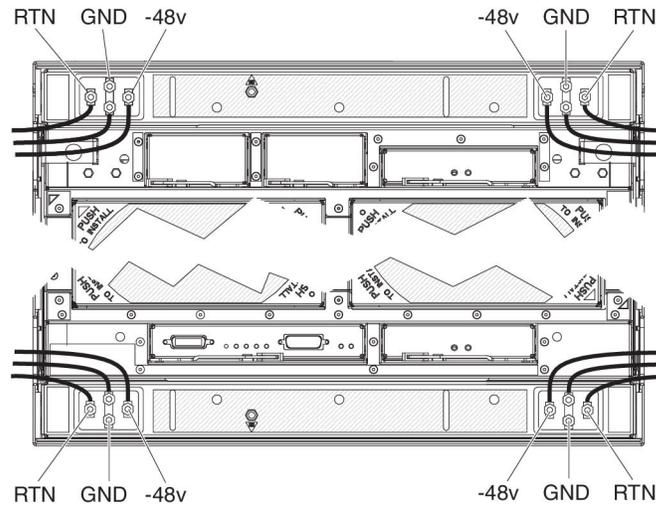
- **Minor system fault:** When this amber LED is lit, the BladeCenter HT unit has a minor system fault. The system can continue to operate, usually without noticeable loss of functionality or performance.
- **Media tray fault:** When this amber LED is lit, there is a fault on the media tray. The system can continue to operate, usually without the use of the components on the media tray.
- **USB connectors:** Use these connectors to attach USB v2.0, or earlier, compatible devices with 2.5 m (8.2 ft.) cables.

## Rear view

This section identifies the components, connectors, and LEDs on the rear of the BladeCenter HT unit.

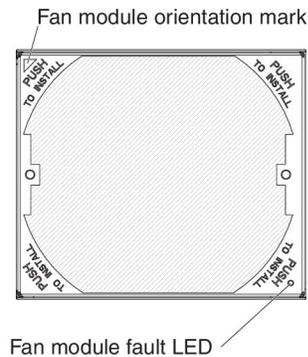


The following illustration shows a BladeCenter HT Type 8740 with dc-power connections.



**Power connectors:** The BladeCenter HT unit has four power connectors. For information on power source requirements and cabling for your BladeCenter HT unit, see “Supplying power to the BladeCenter HT unit” on page 6 for more information.

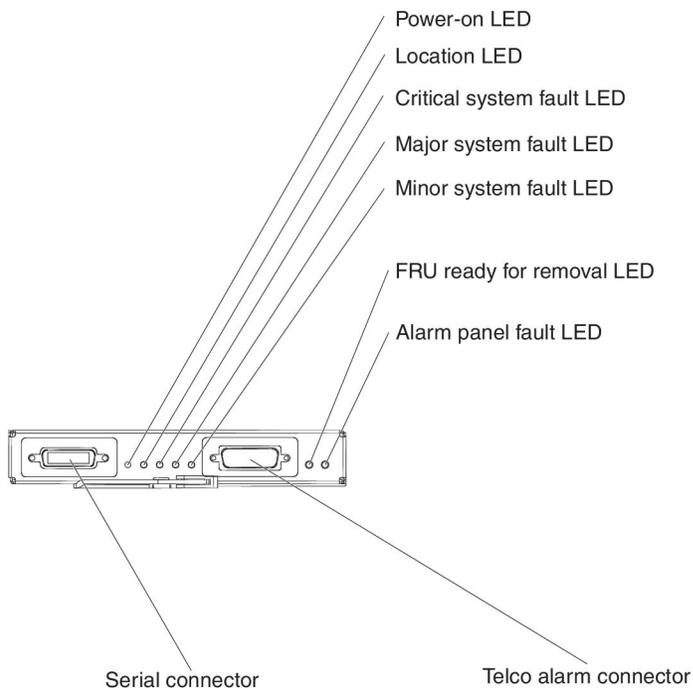
### Fan modules:



When the amber LED on a fan module is lit, an error has been detected in the fan module or power to the fan module is not present. The system-error LEDs on the BladeCenter system LED panels are also lit.

**Attention:** If more than two fan modules are removed or more than two fan modules experience a double fan failure, the blade servers will shut down within 1 to 3 seconds.

### Alarm panel module:



The alarm panel module provides telecom relays, LED alarm status, and access to the serial port on each blade server.

- **Power-on:** When this green LED is lit, power is present in the BladeCenter HT unit. When this LED is off, the power subsystem, the power module, or the LED has failed.

**Attention:** If the power-on LED is off, it does not mean that no electrical current is present in the BladeCenter HT unit. The LED might be defective. To remove all electrical current from the BladeCenter HT unit, you must disconnect all power cords from the rear power connectors.

- **Location:** When this blue LED is lit or flashing, it has been turned on by the system administrator to aid in visually locating the BladeCenter HT unit. If a

blade server requires attention, the location LED on the blade server usually will also be lit. After the BladeCenter HT unit has been located, you can have the system administrator turn off the location LED.

- **Critical system fault:** When this LED is lit, the BladeCenter HT unit has a critical system fault. A critical system fault is an error or event that is detected by the system with a significant impact to the system. In this case, the system cannot continue to operate or is operating in a non-redundant power configuration or a non-redundant cooling configuration.

**Note:** The color of this LED can be set to amber or red through the management module.

- **Major system fault:** When this LED is lit, the BladeCenter HT unit has a major system fault. The system can continue to operate but may lose some functionality and performance.

**Note:** The color of this LED can be set to amber or red through the management module.

- **Minor system fault:** When this amber LED is lit, the BladeCenter HT unit has a minor system fault. The system can continue to operate, usually without noticeable loss of functionality or performance. The minor-system-fault LED will be enabled.
- **FRU ready for removal:** When this blue LED is lit, it is safe to remove the device from the BladeCenter HT unit.
- **Alarm panel module fault:** When this amber LED is lit, there is a fault on the alarm panel module. The system can continue to operate, usually without the use of the components on the alarm panel module.
- **Serial connector:** This DB60 connector provides direct access to the serial ports on each of the 12 blade server bays. Use this connector to attach the optional serial port breakout cable and connect up to 12 local consoles. See the documentation that comes with your blade server to determine if it supports this cable.
- **Telco alarm connector:** The alarm panel module provides one DB15 connector (male) for critical, major, and minor telco alarms. Each of the alarms has a relay that enables multiple system alarm indicators to be daisy-chained together. The following table shows the pinouts for the alarm panel interface connector.

Pin #	Description	Input/Output signal
1	Minor alarm reset +	Input
2	Minor alarm reset -	Input
3	Major alarm reset +	Input
4	Major alarm reset -	Input
5	Critical alarm normally open	Output
6	Critical alarm normally closed	Output
7	Critical alarm common	Output
8	Minor alarm normally open	Output
9	Minor alarm normally closed	Output
10	Minor alarm common	Output
11	Major alarm normally open	Output
12	Major alarm normally closed	Output
13	Major alarm common	Output

Pin #	Description	Input/Output signal
14	Reserved	Reserved
15	Reserved	Reserved

The electrical specifications for the alarm panel interface connector are as follows:

– **Outputs**

- Voltage range: 0 V dc to -100 V dc (maximum current 0.3 A at 100 V dc)
- Current range: 0 A to 1 A (maximum voltage 30 V dc at 1 A)
- Worst-case VA: 1 A at -30 V dc (30 VA maximum) indefinitely

– **Inputs**

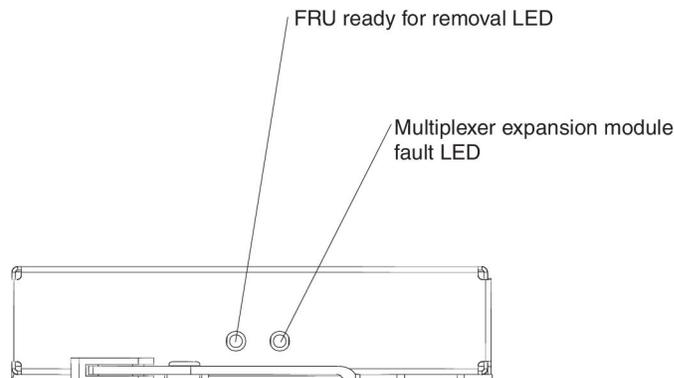
- Voltage range: 0 V dc to -100 V dc (including transients)
- Differential input voltage: 3 V dc to 72 V dc

– **Reset input activation**

Pulse width: 200 ms (minimum) to 300 ms

**Note:** The reset input only resets the state of the relay contact. The chassis alarm status does not change.

**Multiplexer expansion module:**



The multiplexer expansion module controls the USB connectors, video signals, and management module connections to the blade servers. There are two information LEDs on the multiplexer expansion module:

- **FRU ready for removal:** When this blue LED is lit, it is safe to remove the device from the BladeCenter HT unit. Under normal conditions, the blue FRR LED on the multiplexer expansion module that is associated with the active management module is off, and the blue FRR LED on the multiplexer expansion module that is associated with the standby management module is lit. If both blue FRR LEDs are lit, see “Module LEDs” on page 115 for troubleshooting information.

**Note:** When you remove the multiplexer expansion module, you must install another multiplexer expansion module in its place to maintain proper cooling in the BladeCenter HT unit.

- **Multiplexer expansion module fault:** When this amber LED is lit, there is a fault on the multiplexer module. The system can continue to operate, usually without the use of the components on the multiplexer module.

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## Chapter 2. Configuration information and guidelines

This chapter provides information about updating the firmware, configuring the BladeCenter HT unit and its components, and networking guidelines.

---

### Updating the firmware

The firmware for the management module and other BladeCenter components is periodically updated and is available for download on the Web. Go to <http://www.ibm.com/support/> to get the latest level of firmware, such as BIOS code and device drivers.

**Note:** When replacing BladeCenter components, you might have to update the management module or other components with the latest version of firmware.

---

### Configuring the BladeCenter HT unit

General configuration of the BladeCenter HT unit and installed components is performed through the management module. See the *BladeCenter Management Module User's Guide* and the *BladeCenter Management Module Command-Line Interface Reference Guide* for information and instructions. Some devices in the BladeCenter HT unit, such as I/O modules and blade servers, might also require additional configuration. See the documentation that comes with each device for information and instructions.

### Configuring the management module

All management modules are preconfigured with the same static IP address. You can use the management module to assign a new static IP address. To establish connectivity, the management module attempts to use Dynamic Host Control Protocol (DHCP) to acquire its initial IP address for the management-module Ethernet port. If DHCP is not installed or is enabled and fails, the management module uses the static IP address. Use the management module to configure other BladeCenter component settings such as user accounts, DHCP, or Wake on LAN. See the *BladeCenter Management Module User's Guide* and the *BladeCenter Management Module Command-Line Interface Reference Guide* for instructions.

### Configuring I/O modules

You must install and configure at least one external (in-band) port on an Ethernet switch module in I/O-module bay 1 or 2 to communicate with the Ethernet controllers that are integrated in each blade server. See the *BladeCenter Management Module User's Guide* and the *BladeCenter Management Module Command-Line Interface Reference Guide* for information about configuring external ports on I/O modules. For I/O-device settings, see the documentation that comes with your I/O device.

**Note:** If a pass-thru module is installed in I/O-module bay 1 or 2, you must configure the network switch that the pass-thru module is connected to; see the documentation that comes with the network switch.

## Configuring blade servers

To achieve communication redundancy on a blade server, you must configure the Ethernet controllers on the blade servers for failover. When failover occurs on a blade server, the secondary Ethernet controller takes over network communications, using the I/O module that is associated with that controller. Install a pair of Ethernet switches in I/O-module bays 1 and 2; then, configure them and your network infrastructure so that they can direct traffic to the same destinations. You can also install a pass-thru module that is connected to an external Ethernet switch in either or both of these I/O-module bays. See the documentation that comes with your blade server and operating system for instructions.

---

## BladeCenter networking guidelines

Make sure the network infrastructure is configured before you connect the BladeCenter HT unit to a LAN switch or similar network device.

Each blade server has two independent Ethernet controllers, each with its own MAC address and a dedicated 1000 Mbps link to one of the switch modules in I/O-module bays 1 and 2. Switches that support Inter Switch Link (ISL) can be configured to support switch to switch traffic on up to two internal switch link interconnections between the peer switches. These ports can be configured as a trunk group between these peer switches.

**Note:** When installing a switch module that supports ISL, a switch-module interposer that also supports ISL must be installed into the same I/O bay.

The management module has a separate internal 100 Mbps link to each switch. These links are for internal management and control only. No data packets are allowed to flow from application programs on the blade servers to the management module over this path.

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## Chapter 3. Parts listing

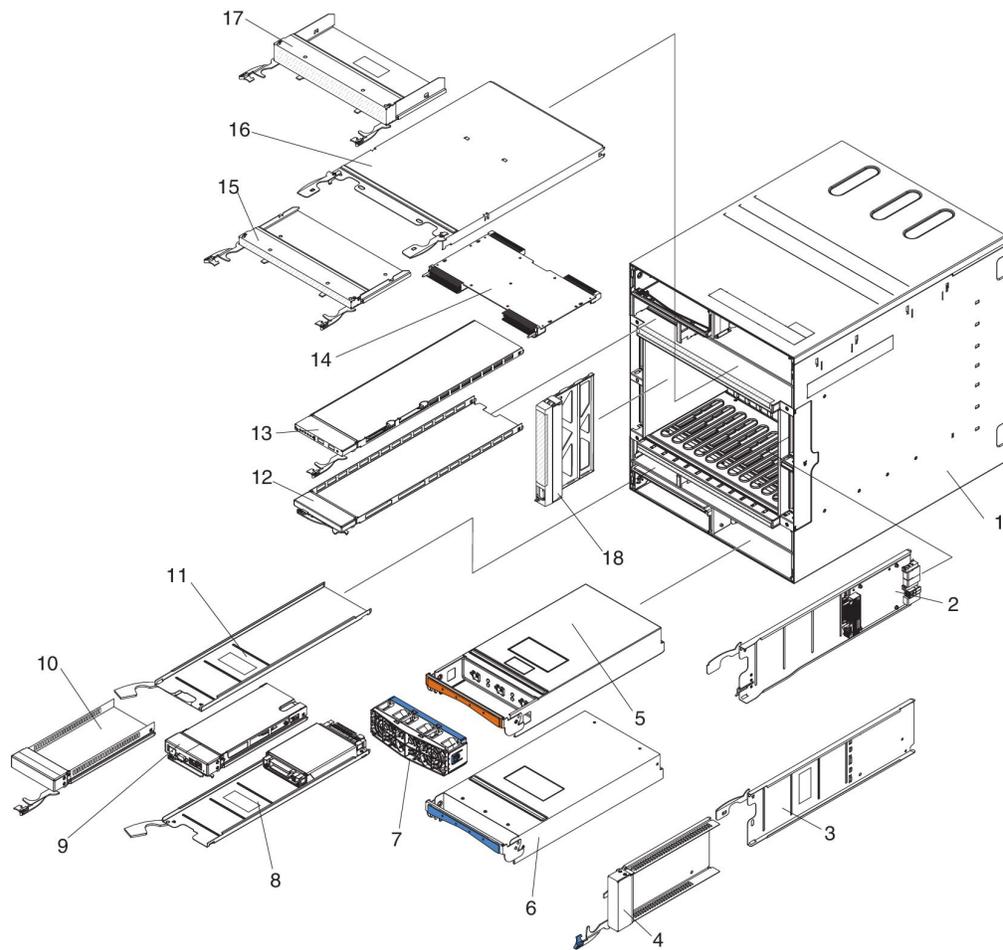
The illustrations and tables in this section identify the replaceable components that are available for the BladeCenter HT Type 8740 and 8750 unit.

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.

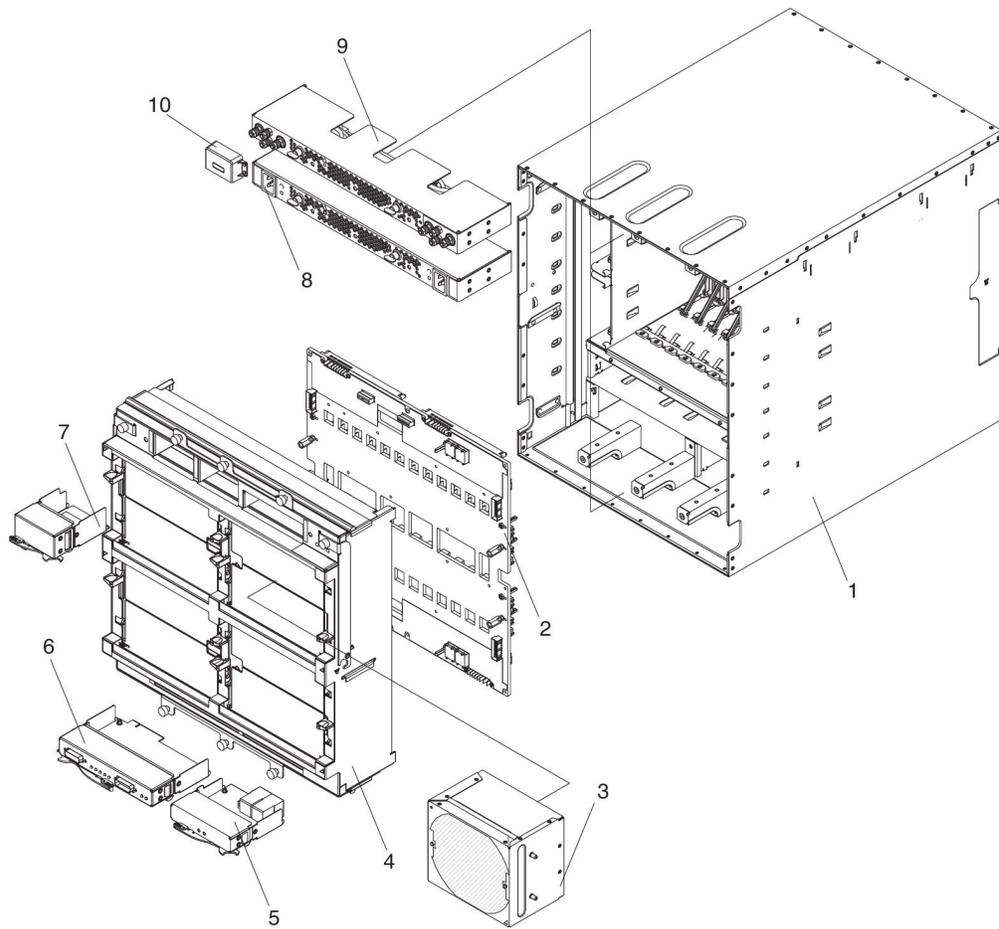
## Front view



Index	Description	CRU part number (Tier 1)	CRU part number (Tier 2)	FRU part number
1	Chassis shell (without shuttle)			42C3069
2	I/O module interposer	42C3724		
3	Filler tray, advanced management module and I/O module (use with 42C3068)	42C3070		
4	Filler, advanced management module and I/O module (use with 42C3070)	42C3068		
5	dc power module (without fan pack)	39Y7370		
	ac power module (without fan pack)	39Y7374		
6	Filler, power module	42C3079		
7	Fan pack	31R3302		
8	Advanced management module interposer	42C3098		
9	Advanced management module	39Y9661		
10	Filler, advanced management module and I/O module (use with 42C3070)	42C3068		

Index		Description	CRU part number (Tier 1)	CRU part number (Tier 2)	FRU part number
11		Filler tray, advanced management module and I/O module (use with 42C3068)	42C3070		
12		Filler, media tray	42C3083		
13		Media tray	42C3081		
14		High-speed I/O interposer card with thumbscrews	42C5407		
15		Filler, high-speed I/O module (single)	31R3303		
16		High-speed I/O interposer tray (top)	42C3078		
		High-speed I/O interposer tray (bottom)	42C3084		
17		Filler, high-speed I/O module (double)	42C3072		
18		Filler, blade server	39M3317		
		Bezel assembly with filter and collar	42C3696		
		Cable management tray (top)	42C3736		
		Cable management tray (bottom)	42C3737		
		Chassis lift handles (4)	42C3733		
		System service card	42C3729		
		Air filter	42C3739		
		Cisco Systems 4X InfiniBand Switch Module for IBM BladeCenter	23E1756		
		Switch/Bridge interposer with Inter-switch links (ISL)	42C3672		
		CompactFlash 1GB	42C5323		
		CompactFlash 4GB	42C5324		
		2-post rack mount kit		42C3688	

## Rear view



Index	Description	CRU part number (Tier 1)	CRU part number (Tier 2)	FRU part number
1	Chassis shell (without shuttle)			42C3069
2	Midplane			42C3673
3	Fan module	42C3071		
4	Fan shuttle			42C3099
5	Multiplexer expansion module	42C3723		
6	Alarm panel module	42C3726		
7	Network clock filler	42C3680		
8	ac power box (top)			42C2962
	ac power box (bottom)			42C3007
9	dc power box (top)			42C2938
9	dc power box with cover (top)			44T2260
9	dc power box (bottom)			42C2941
9	dc power box with cover (bottom)			44T2261
10	dc terminal cover with fasteners (4)	42C3076		
10	dc terminal cover for 44T2260 and 44T2261	44T2259		

<b>Index</b>	<b>Description</b>	<b>CRU part number (Tier 1)</b>	<b>CRU part number (Tier 2)</b>	<b>FRU part number</b>
	Cable, alarm panel (15 pin cable)	39M4255		
	Cable, ac jumper cord (C20/C19)	39M5456		
	Cable, serial port breakout	40K9608		

## AC power cords

FRU part number	Description	Used in these countries
39M5278	Cable, NEMA L6-20P	Antigua and Barbuda, Aruba, Bahamas, Barbados, Belize, Bermuda, Bolivia, Caicos Islands, Canada, Cayman Islands, Costa Rica, Columbia, Cuba, Dominican Republic, Ecuador, El Salvador, Guam, Guatemala, Haiti, Honduras, Jamaica, Japan, Mexico, Micronesia (Federal States of), Netherlands Antilles, Nicaragua, Panama, Peru, Philippines, United States, Venezuela
39M5282	Cable, CEE7-VII	Afghanistan, Albania, Algeria, Andorra, Angola, Armenia, Austria, Azerbaijan, Belarus, Belgium, Benin, Bosnia and Herzegovina, Bulgaria, Burkina Faso, Burundi, Cambodia, Cameroon, Cape Verde, Central African Republic, Chad, Comoros, Congo (Democratic Republic of), Congo (Republic of), Cote D'Ivoire (Ivory Coast), Croatia (Republic of), Czech Rep, Dahomey, Djibouti, Egypt, Equatorial Guinea, Eritrea, Estonia, Ethiopia, Finland, France, French Guyana, French Polynesia, Gabon, Georgia, Germany, Greece, Guadeloupe, Guinea, Guinea Bissau, Hungary, Iceland, Indonesia, Iran, Kazakhstan, Kyrgyzstan, Laos (Peoples Democratic Republic of), Latvia, Lebanon, Lithuania, Luxembourg, Macedonia (former Yugoslav Republic of), Madagascar, Mali, Martinique, Mauritania, Mauritius, Mayotte, Moldova (Republic of), Monaco, Mongolia, Morocco, Mozambique, Netherlands, New Caledonia, Niger, Norway, Poland, Portugal, Reunion, Romania, Russian Federation, Rwanda, Sao Tome and Principe, Saudi Arabia, Senegal, Serbia, Slovakia, Slovenia (Republic of), Somalia, Spain, Suriname, Sweden, Syrian Arab Replublic, Tajikistan, Tahiti, Togo, Tunisia, Turkey, Turkmenistan, Ukraine, Upper Volta, Uzbekistan, Vanuatu, Vietnam, Wallis and Futuna, Yugoslavia (Federal Republic of), Zaire

<b>FRU part number</b>	<b>Description</b>	<b>Used in these countries</b>
39M5290	Cable, SABS 164	Bangladesh, Lesotho, Macao, Maldives, Namibia, Nepal, Pakistan, Samoa, South Africa, Sri Lanka, Swaziland
39M5298	Cable, CEI 23-16Chile, Italy, Libyan Arab Jamahiriya	Worldwide except: Australia, Canada, Japan, Korea, Mexico, New Zealand, United States of America
39M5322	Cable, IEC 309-P+N+Gnd	Abu Dhabi, Bahrain, Botswana, Brunei Darussalam, Denmark, Channel Islands, Cyprus, Dominica, Gambia, Ghana, Grenada, Guyana, Hong Kong, Iraq, Ireland, Japan, Jordan, Kenya, Kuwait, Liberia, Liechtenstein, Malawi, Malaysia, Malta, Myanmar (Burma), Nigeria, Oman, Qatar, Saint Kitts & Nevis, Saint Lucia, Saint Vincent and the Grenadines, Seychelles, Sierra Leone, Singapore, Sudan, Tanzania (United Republic of), Trinidad & Tobago, United Arab Emirates (Dubai), United Kingdom, Yemen, Zambia, Zimbabwe, Uganda
39M5330	Cable, AS/NZS 3112	Australia, Fiji, Kiribati, Nauru, New Zealand, Papua New Guinea
39M5342	Cable, IRAM 2073	Argentina, Paraguay, Uruguay
39M5346	Cable, KSC 8305	Korea (Democratic Peoples Republic of), Korea (Republic of)
39M5396	Cable, IS 6538	India
39M5354	Cable, GB 2099.1	China (SAR)
39M5358	Cable, NBR 6147	Brazil
39M5366	Cable, CNS 10917-3	Taiwan
39M5310	Cable, SI 32	Israel
39M5441	Cable, SEV 1011	Switzerland



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## Chapter 4. Removing and replacing BladeCenter HT components

Replaceable components are of three types:

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

See Chapter 3, “Parts listing,” on page 23 to determine whether a component is a Tier 1 CRU, Tier 2 CRU, or FRU.

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

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### Installation guidelines

Before you remove or replace a component, read the following information:

- Read the safety information that begins on page vii and “Handling static-sensitive devices” on page 32. This information will help you work safely.
- Observe good housekeeping in the area where you are working. Place removed covers and other parts in a safe place.
- You do not have to disconnect the BladeCenter HT unit from power to install or replace any of the hot-swap modules in the BladeCenter HT unit. You must shut down the operating system and turn off a blade server before you remove the blade server, but you do not have to remove power from the BladeCenter HT unit itself.
- Do not attempt to lift an object that you think is too heavy for you. If you have to lift a heavy object, observe the following precautions:
  - Make sure that you stand safely without slipping.
  - Distribute the weight of the object equally between your feet.
  - Use a slow lifting force. Never move suddenly or twist when you lift a heavy object.
  - To avoid straining the muscles in your back, lift by standing or by pushing up with your leg muscles.
- Make sure that you have an adequate number of properly grounded electrical outlets for the BladeCenter HT unit.
- Back up all important data before you make changes to disk drives.
- Have a 3/16 in. flat-blade screwdriver available.
- Have a phillips-head #1 screwdriver available.
- 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 HT 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.

- Blue on a component indicates touch points, where you can grip the component to remove it from or install it in the BladeCenter HT unit, open or close a latch, and so on.
- For a list of supported options for the BladeCenter HT unit, see <http://www.ibm.com/servers/eserver/serverproven/compat/us/>.

## System reliability guidelines

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

- Each of the module bays on the front and rear of the BladeCenter HT unit has either a module or a module filler installed.
- Each of the blade bays on the front of the BladeCenter HT unit has either a blade server or a blade filler installed.
- Each of the drive bays in a blade server storage expansion option has either a hot-swap drive or a filler panel installed.
- You have followed the cabling instructions that come with optional adapters.
- A removed hot-swap module, blade server, or drive is replaced within 1 minute of removal.
- Cables for the optional modules are routed according to the illustrations and instructions in this document.
- A failed fan module is replaced as soon as possible, to restore cooling redundancy.
- The airflow from the fan modules is not blocked.

## Handling static-sensitive devices

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

Electrostatic discharge (ESD) is the release of stored static electricity that can damage electric circuits. Static electricity is often stored in your body and discharged when you come in contact with an object with a different potential. Use an ESD wrist strap and the ESD connectors on the BladeCenter HT unit. See “Front view” on page 14 and “Rear view” on page 16 for the locations of the ESD connectors on your BladeCenter HT unit. The ESD wrist strap safely channels the electricity from your body to a proper ground (the BladeCenter HT unit). To work properly, the wrist strap must have a good contact at both ends (touching your skin at one end and connected to the ESD connector on the front or back of the BladeCenter HT unit). Use an ESD wrist strap whenever you are working on the BladeCenter HT unit and BladeCenter HT components.

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

- Use an ESD wrist strap whenever you are working on the BladeCenter HT unit and BladeCenter HT components.
- Limit your movement. Movement can cause static electricity to build up around you.
- The use of a grounding system is recommended. For example, wear an electrostatic-discharge wrist strap, if one is available.
- Handle the device carefully, holding it by its edges or its frame.
- Do not touch solder joints, pins, or exposed 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 HT unit or rack 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 immediately without setting down the device. If it is necessary to set down the device, put it back into its static-protective package.
- Take additional care when handling devices during cold weather. Heating reduces indoor humidity and increases static electricity.

## **Returning a device or component**

If you are instructed to return a device or component, follow all packaging instructions and use any packaging materials for shipping that are supplied to you.

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## Removing and replacing Tier 1 CRUs

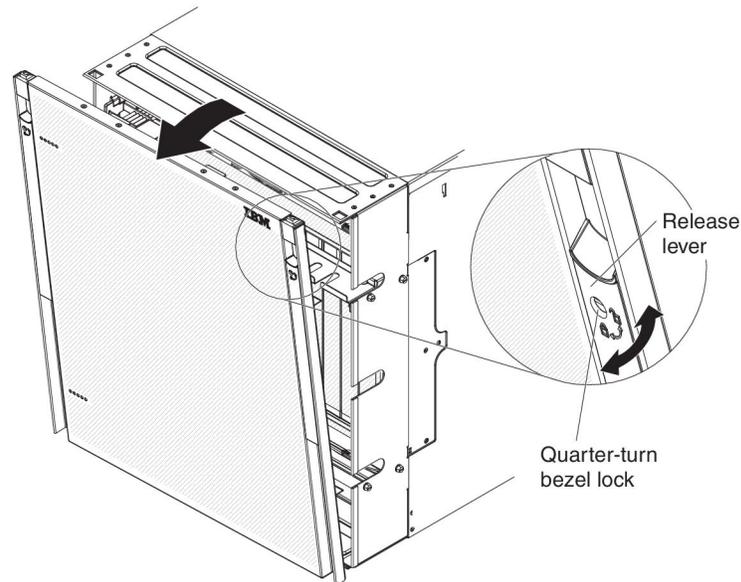
Replacement of Tier 1 CRUs is your responsibility. If IBM installs a Tier 1 CRU at your request, you will be charged for the installation.

The illustrations in this document might differ from your hardware.

### Removing a bezel

If the BladeCenter HT bezel option is installed on your BladeCenter HT unit, you must first remove the bezel to access any devices installed into the front of your BladeCenter HT unit.

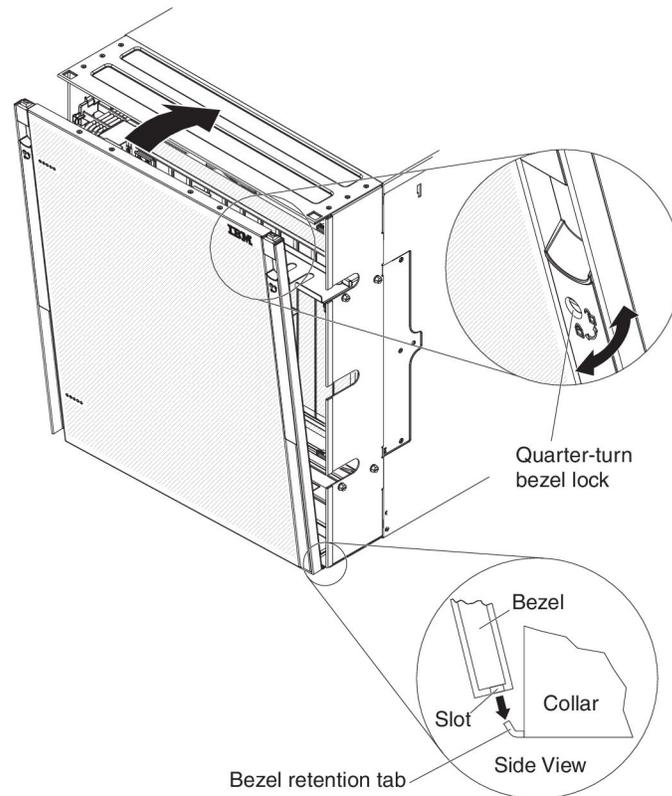
To remove the bezel, complete the following steps.



1. Read the safety information that begins on page vii and “Installation guidelines” on page 31.
2. Use your hands to hold the bezel and press the blue release button on each side of the bezel.
3. Pull the bezel away from the BladeCenter HT unit.
4. If you are instructed to return the bezel, follow all packaging instructions and use any packaging materials for shipping that are supplied to you.

## Installing a bezel

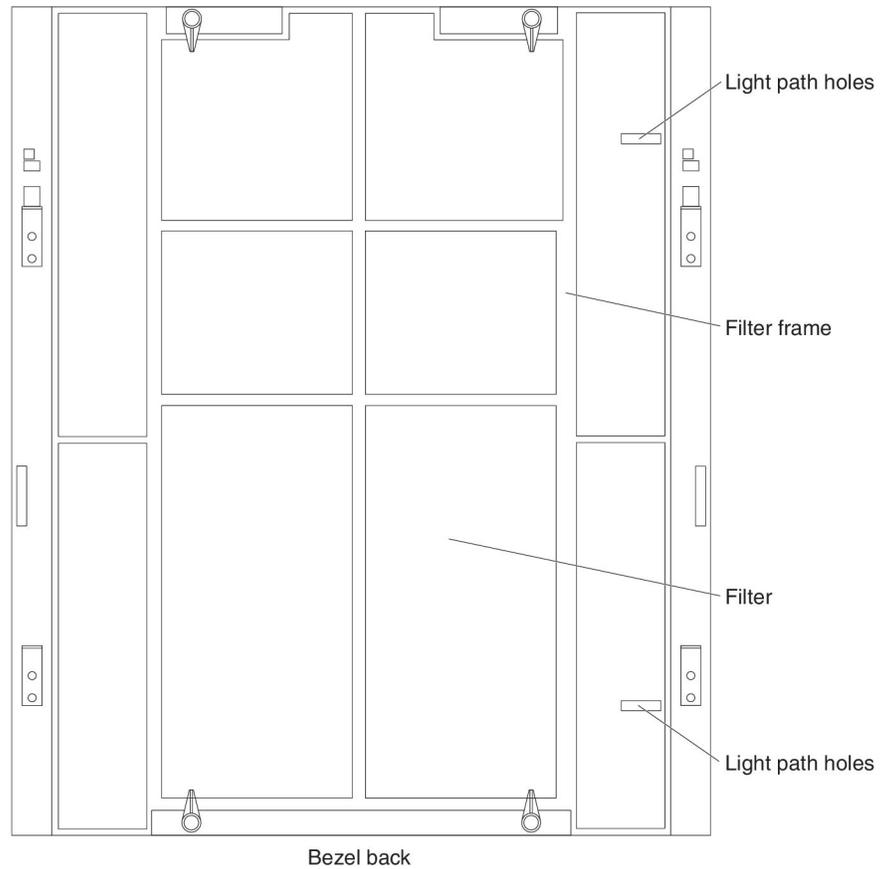
To install the bezel, complete the following steps.



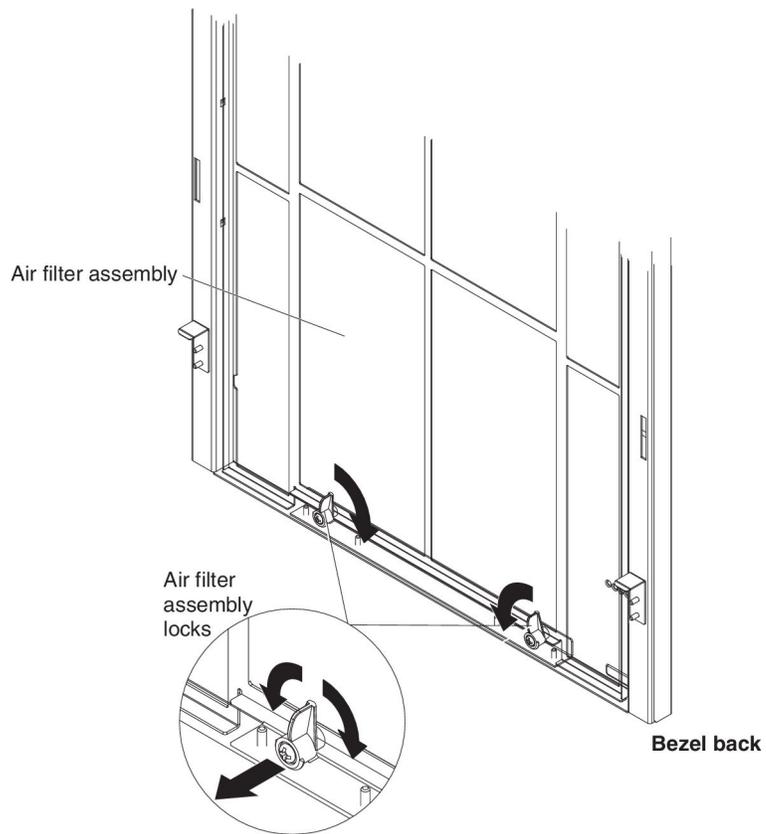
1. Read the safety information that begins on page vii and “Installation guidelines” on page 31.
2. Holding the sides of the bezel, orient the bezel so the IBM logo is at the top and right corner.
3. Place the bottom edge of the bezel on the bezel retention tab.
4. Rotate the top of the bezel toward the BladeCenter HT unit until the bezel clicks into place.
5. Turn the quarter-turn bezel locks to the locked position.

## Removing a bezel filter

1. Read the safety information that begins on page vii and “Installation guidelines” on page 31.
2. Remove the bezel (see “Removing a bezel” on page 34).



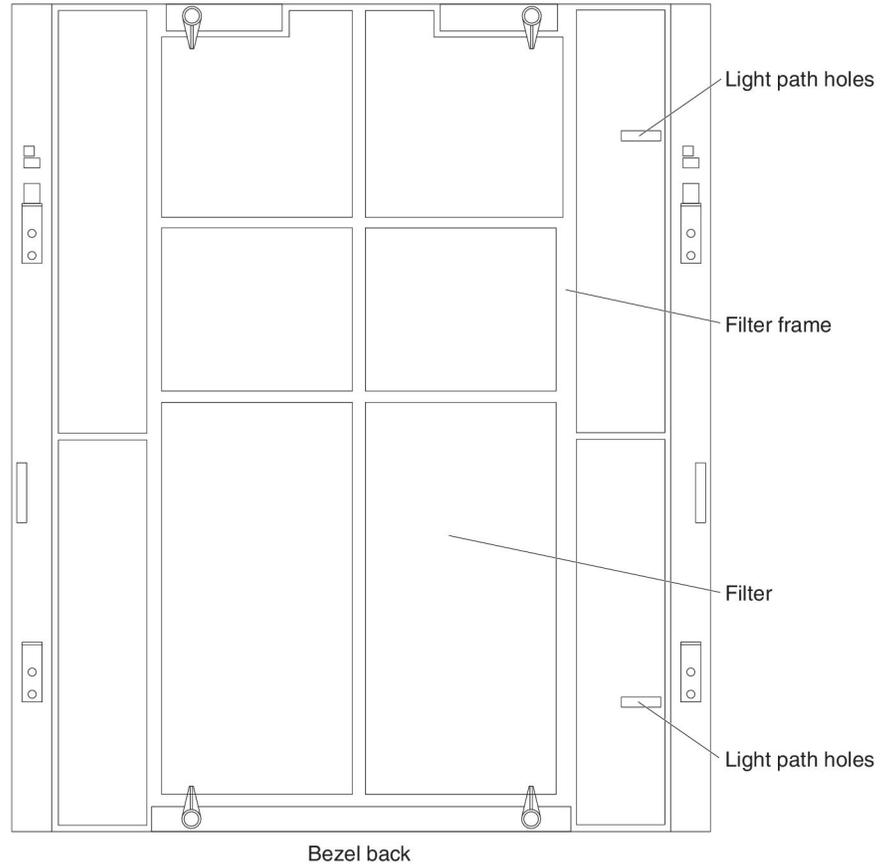
3. Lay the bezel on a flat work surface and orient it so that the bottom of the bezel is closest to you and the light path holes are to the right. The large rectangles in the filter frame should be closest to you.



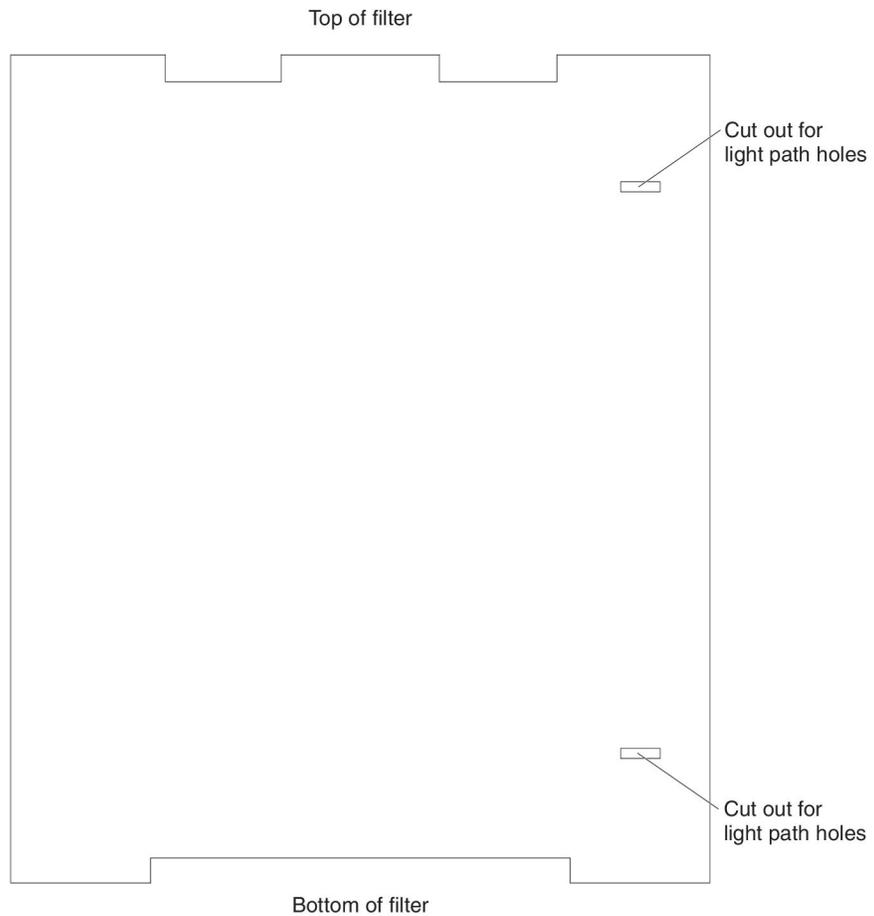
4. Remove the air filter assembly from the filter frame by pulling out and rotating the air filter assembly locks until they no longer engage the air filter assembly.
5. Remove the air filter assembly; then, remove the old filter from the filter frame and dispose of it.

## Installing a bezel filter

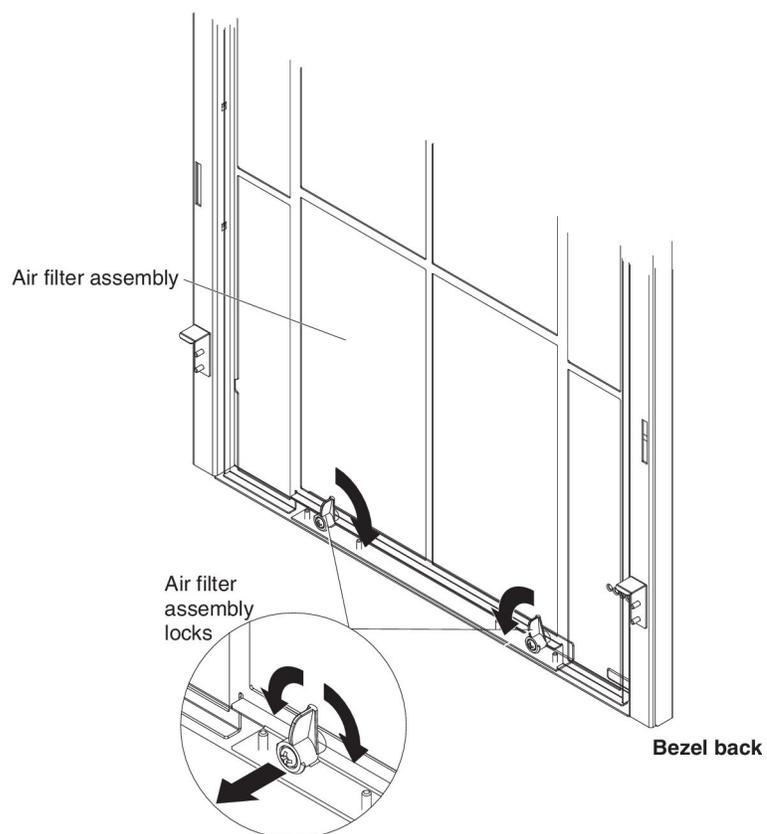
1. Read the safety information that begins on page vii and “Installation guidelines” on page 31.



2. Lay the bezel on a flat work surface and orient it so that the bottom of the bezel is closest to you and the light path holes are to the right. The large rectangles in the filter frame should be closest to you.



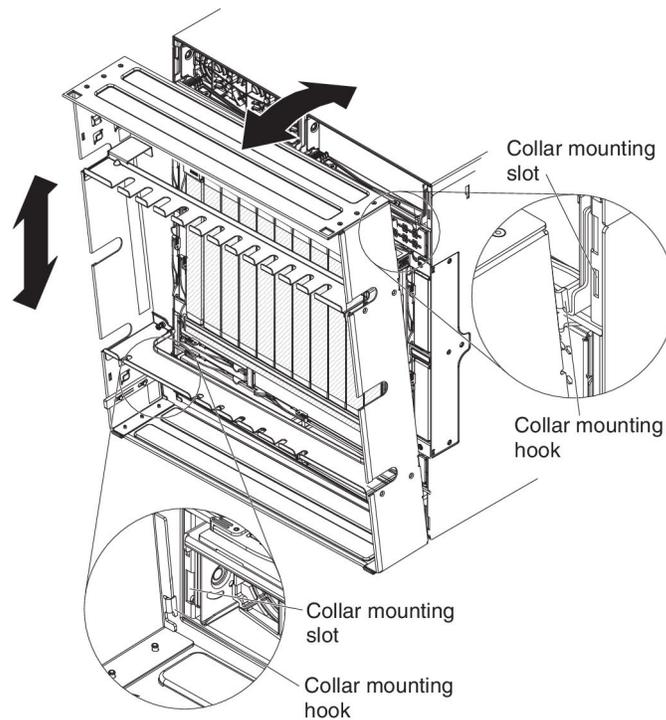
3. Lay the new filter on a clean flat surface and orient it so that the cutouts for the light path extension assemblies are to the right and the large cutout at the bottom of the filter is closest to you.
4. Orient the filter frame to the filter and place the filter frame on top of the filter; then, pick up the filter assembly and install it into the bezel.



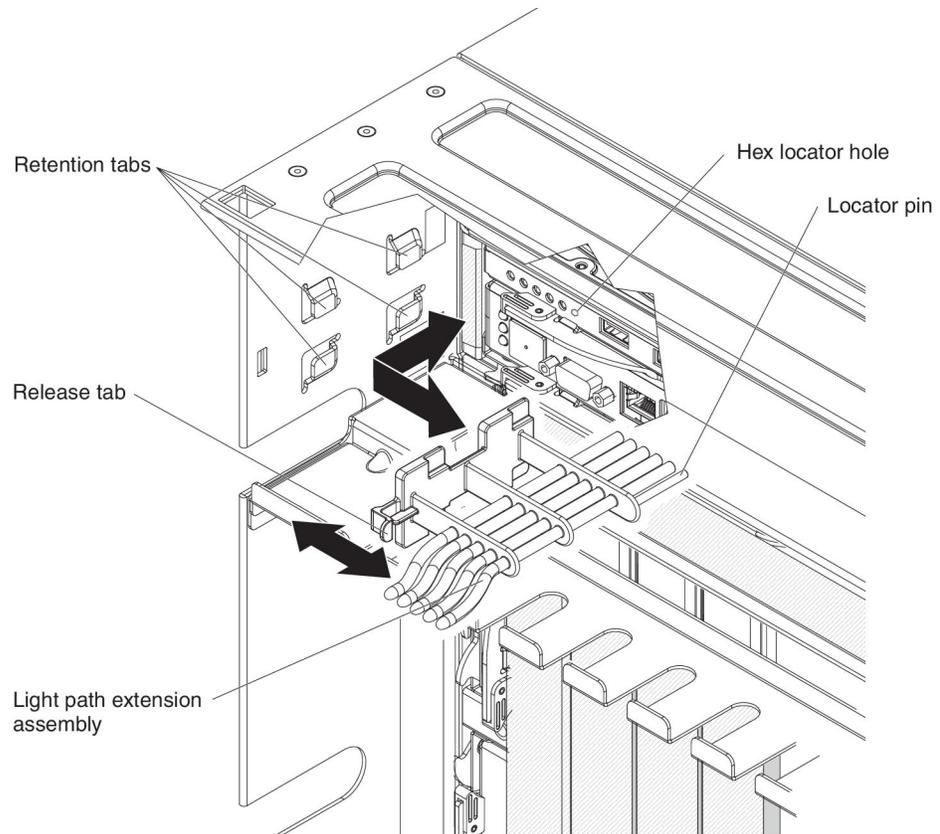
5. Secure the air filter assembly by pulling out and rotating the air filter assembly locks until they engage the air filter assembly.
6. Install the bezel on the BladeCenter HT unit (see “Installing a bezel” on page 35).

## Removing a bezel collar

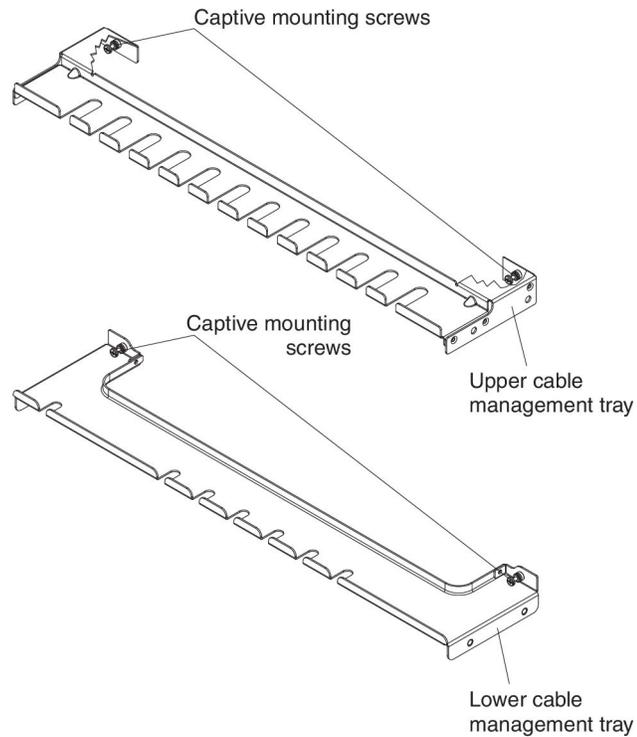
Complete the following steps to install the BladeCenter HT bezel collar.



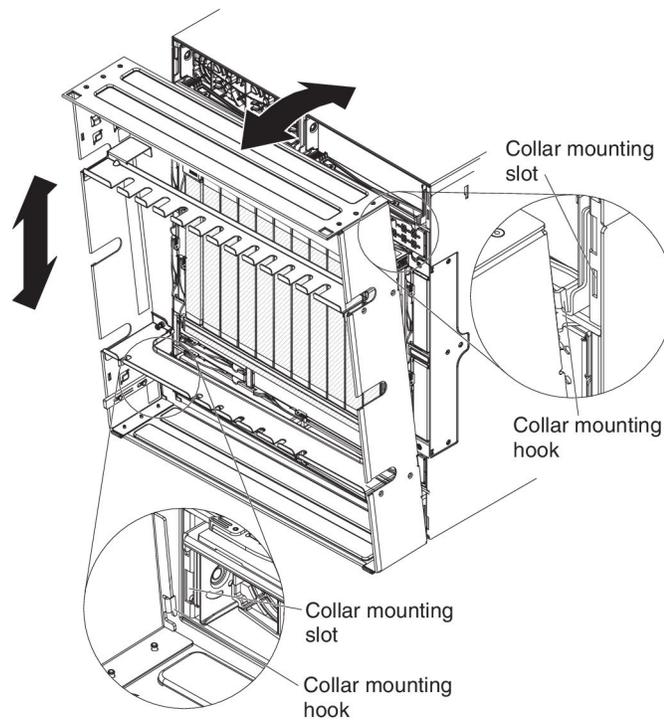
1. Read the safety information that begins on page vii and “Installation guidelines” on page 31.
2. Remove the bezel. See “Removing a bezel” on page 34 for more information.
3. Remove the light path extension assembly. Two light path extension assemblies are shipped with the BladeCenter HT Bezel to extend the light path LEDs so that they are visible through the bezel. Remove one light path extension assembly for each of the media trays installed in your BladeCenter HT unit.



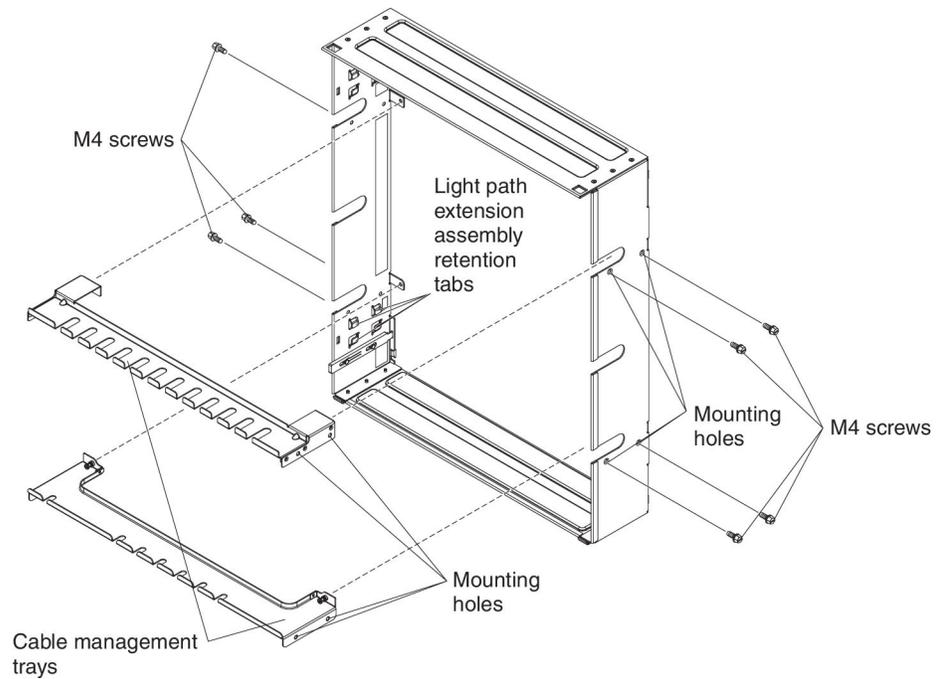
- a. Push the release tab towards the center of the BladeCenter HT unit.
- b. Pull the light path extension assembly away from the BladeCenter HT unit.
- c. Remove management module 1 and its interposer tray from management module bay 1. See “Removing a management module” on page 75 and “Removing a management-module interposer” on page 73 for more information.
- d. Remove any I/O modules and their interposer trays from I/O bays 7 and 8. See “Removing an I/O module” on page 64 and “Removing an I/O-module interposer” on page 62 for more information.



- e. Using a phillips-head screwdriver, loosen the captive mounting screws on the cable management trays so that they do not secure the trays and bezel collar to the BladeCenter HT unit.



- f. Remove the bezel collar by lifting up the bezel collar and then pulling the bezel collar away from the BladeCenter HT unit.



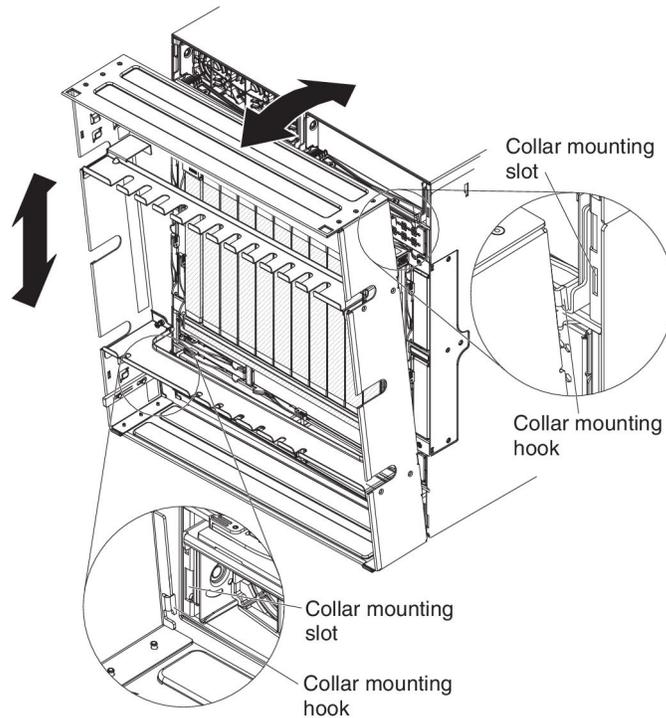
4. Remove the cable management trays by using a phillips-head screwdriver to remove the M4 screws that secure each tray to the bezel.

**Note:** Three M4 screws are used to secure the upper cable management tray and four M4 screws are used to secure the lower cable management tray.

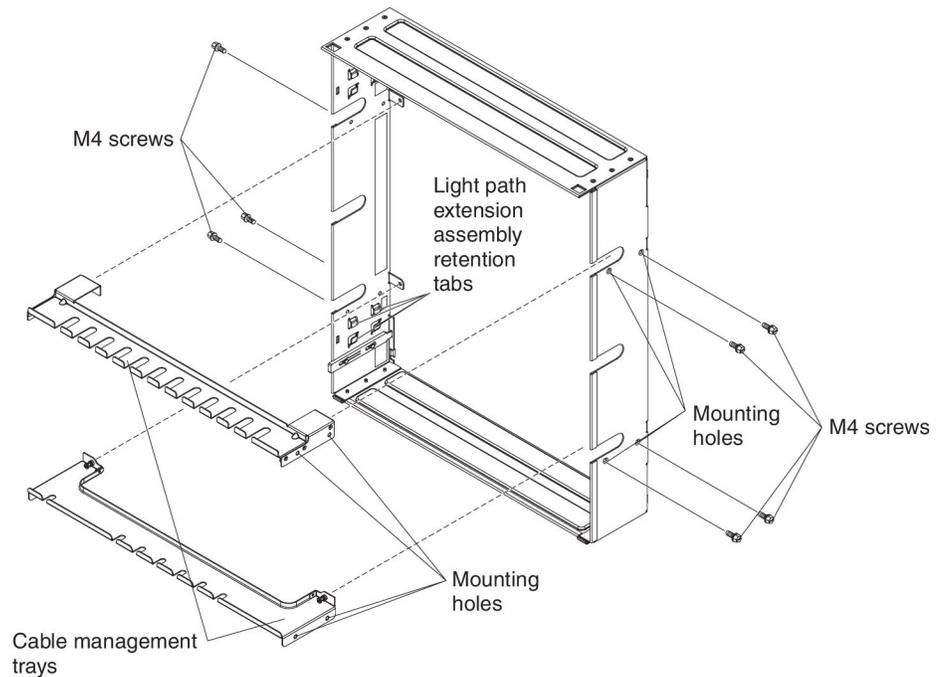
5. If you are instructed to return the bezel collar, follow all packaging instructions and use any packaging materials for shipping that are supplied to you.

## Installing a bezel collar

Complete the following steps to install the BladeCenter® HT bezel collar.



1. Read the safety information that begins on page vii and “Installation guidelines” on page 31.
2. If installed, remove the cable management trays from the BladeCenter HT unit. See “Removing a cable management tray” on page 49 for more information.

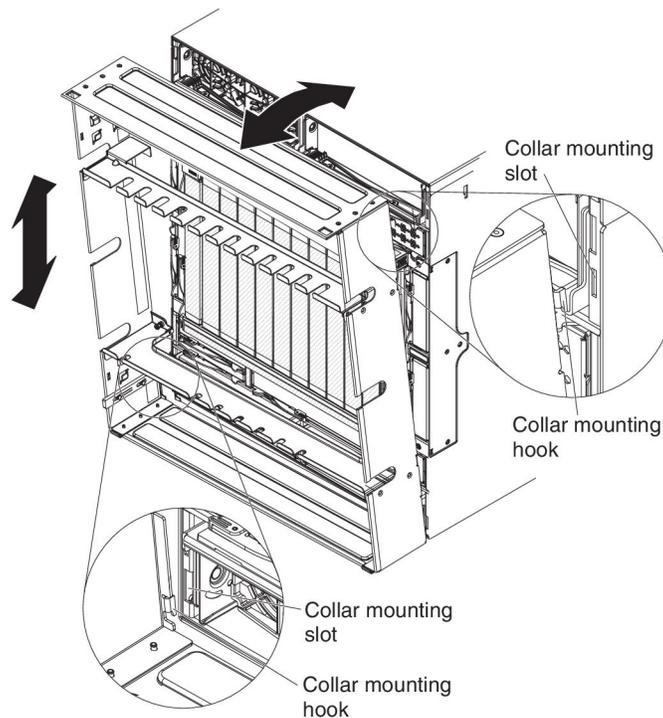


3. Attach the cable management trays to the bezel collar:
  - a. Position the bezel collar so that the light path extension assembly retention tabs are on your left.

- b. Select one of the cable management trays and align the mounting holes of the cable management tray with the mounting holes in the bezel collar.
- c. Secure the cable management tray to the collar using the supplied M4 screws.

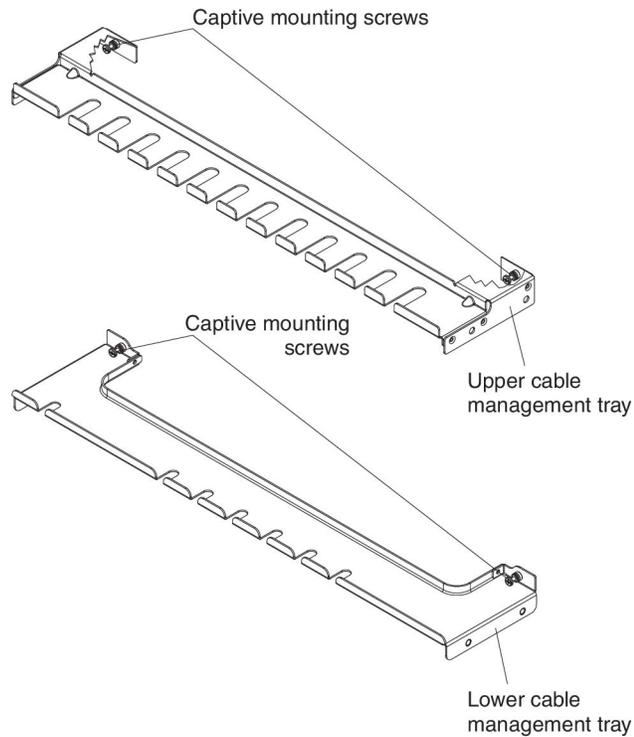
**Note:** Three M4 screws are used to secure the upper cable management tray. Be sure to insert one screw in the hole closest to the front edge of the bezel collar on the left side; then, use two screws on the right side.

- d. Repeat steps 3b and 3c for the remaining cable management tray.
4. Remove management module 1 and its interposer tray from management module bay 1. See “Removing a management module” on page 75 and “Removing a management-module interposer” on page 73 for more information.
5. Remove any I/O modules and their interposer trays from I/O bays 7 and 8. See “Removing an I/O module” on page 64 and “Removing an I/O-module interposer” on page 62 for more information.
6. Attach the bezel collar to the BladeCenter unit:



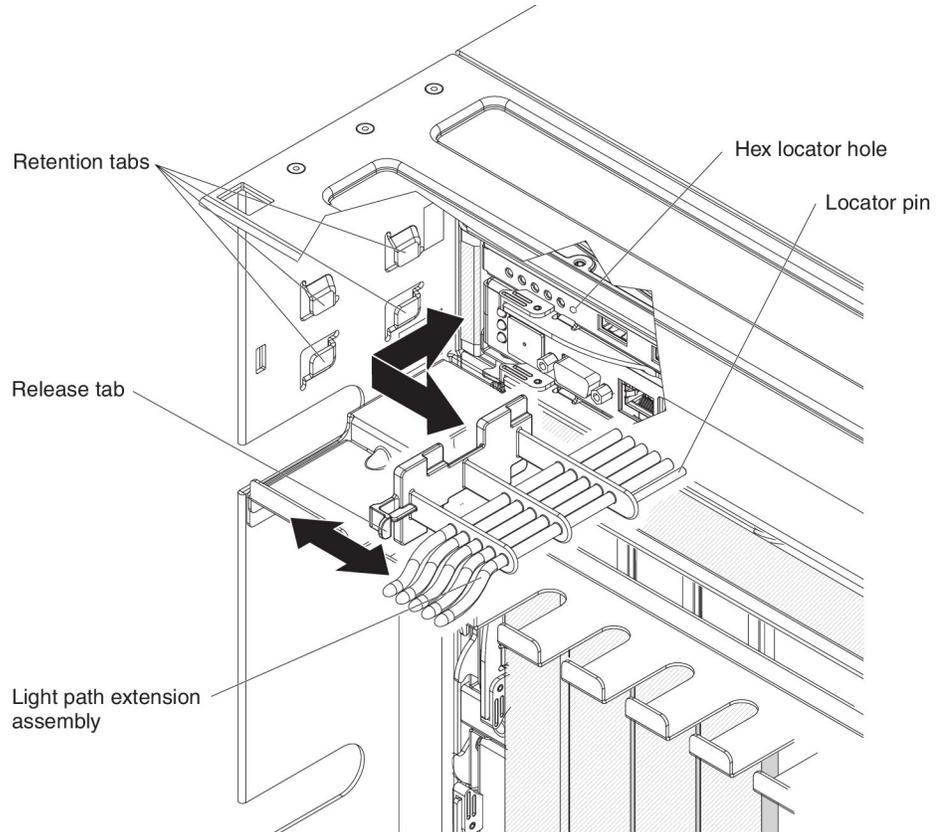
- a. Insert the lower bezel collar hooks into the bezel mounting slots on the bottom of the BladeCenter HT unit; then, rotate the top of the frame up until the upper collar hooks are inserted into the mounting slots.
- b. Push down on the bezel collar to completely engage the collar hooks in the mounting slots.

**Note:** The top of the collar should be flush with the top of the chassis.



- c. Secure the bezel collar to the BladeCenter HT unit by using a phillips-head screwdriver to tighten the captive mounting screws on the cable management trays.
7. Reinstall the management module 1 and its interposer tray into management module bay 1. See “Installing a management-module interposer” on page 74 and “Installing a management module” on page 76 for more information.
8. Reinstall any high speed switches and their interposer trays into I/O bays 7 and 8. See “Installing a high-speed I/O-module interposer tray” on page 67 and “Installing a high-speed I/O module” on page 72 for more information.

9. Install the light path extension assembly. Two light path extension assemblies are shipped with the BladeCenter HT bezel to extend the light path LEDs so that they are visible through the bezel. Install one light path extension assembly for each of the management modules installed in your BladeCenter HT unit.

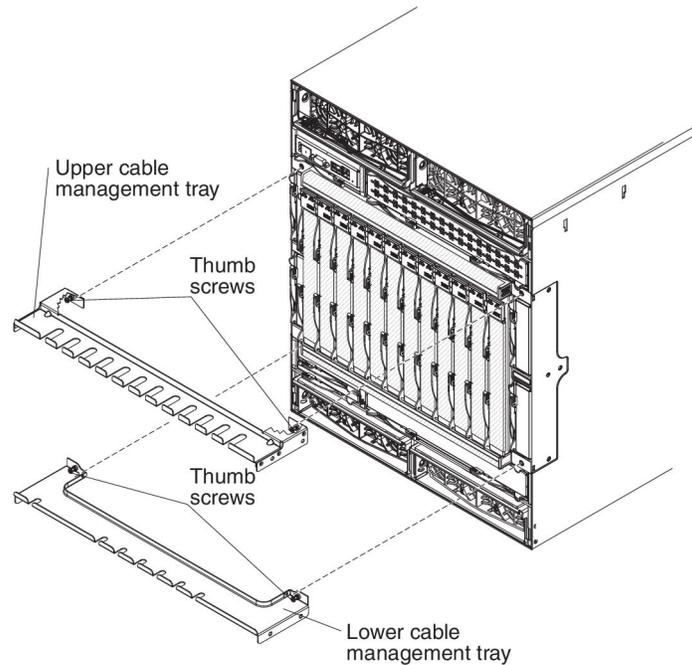


- a. Place the light path extension assembly onto the bezel collar in front of the retention tabs. The release tab should extend slightly beyond the edge of the collar.
  - b. Push the assembly toward the back of the collar until the release tab clicks into place. While pushing the assembly toward the BladeCenter HT unit, ensure that the locator pin is inserted into the hex locator hole to the right of the light path LEDs on the media tray.
10. Install the filter frame. See “Installing a bezel” on page 35 for more information.

## Removing a cable management tray

The cable management trays can be installed with or without the BladeCenter HT bezel. To remove the cable management trays and the BladeCenter HT bezel. See “Removing a bezel collar” on page 41 for more information.

To remove a cable management tray that is installed without the BladeCenter HT bezel, complete the following steps.

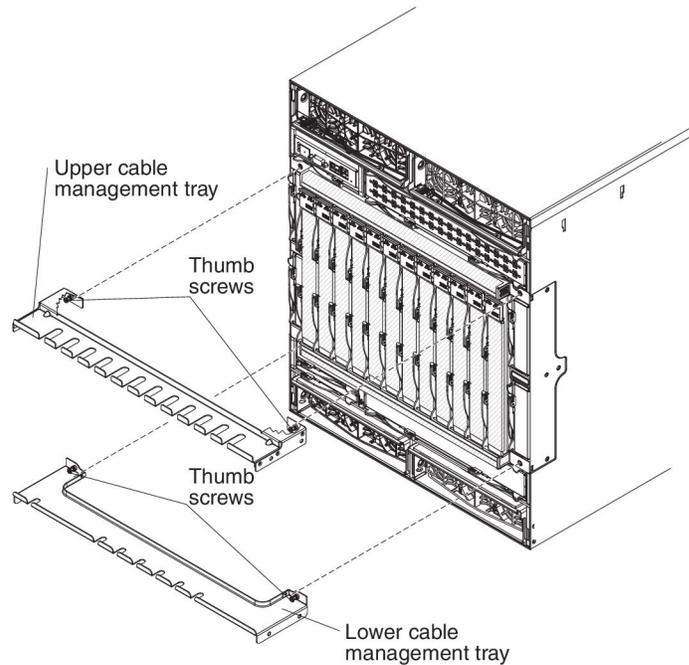


1. Read the safety information that begins on page vii and “Installation guidelines” on page 31.
2. Hold the cable management tray with one hand and use a phillips-head screwdriver to loosen the captured thumbscrews that attach the cable management tray to the BladeCenter HT unit.
3. Pull the cable management tray away from the BladeCenter HT unit.
4. Repeat these steps for the other cable management tray.
5. If you are instructed to return the cable management trays, follow all packaging instructions and use any packaging materials for shipping that are supplied to you.

## Installing a cable management tray

The cable management trays can be installed with or without the BladeCenter HT bezel. To install the cable management trays with the BladeCenter HT bezel, see “Installing a bezel collar” on page 45 for more information.

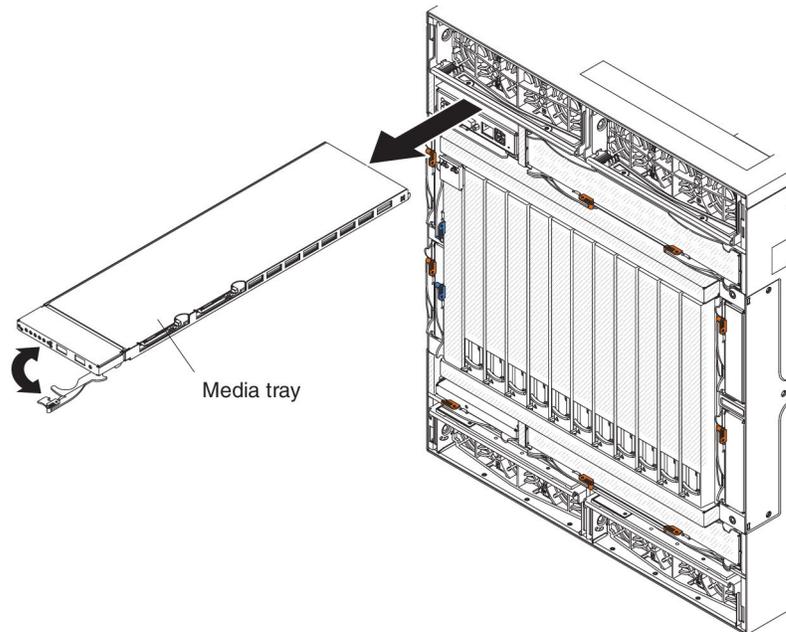
To install a cable management tray without the BladeCenter HT bezel, complete the following steps.



1. Read the safety information that begins on page vii and “Installation guidelines” on page 31.
2. To install the upper cable management tray on the BladeCenter HT, complete the following steps:
  - a. Orient the upper cable management tray so that the captive thumbscrews are positioned towards the blade-server bays.
  - b. Align the captive thumbscrews with the screw holes above I/O-module bays 1 and 3.
  - c. Use a phillips-head screwdriver to screw the captured thumbscrews into the BladeCenter HT unit.
3. To install the lower cable management tray on the BladeCenter HT, complete the following steps:
  - a. Orient the lower cable management tray so that the captive thumbscrews are positioned towards the blade-server bays.
  - b. Align the captive thumbscrews with the screw holes below I/O-module bays 2 and 4.
  - c. Use a phillips-head screwdriver to screw the captured thumbscrews into the BladeCenter HT unit.

## Removing a media tray

To remove a media tray, complete the following steps.

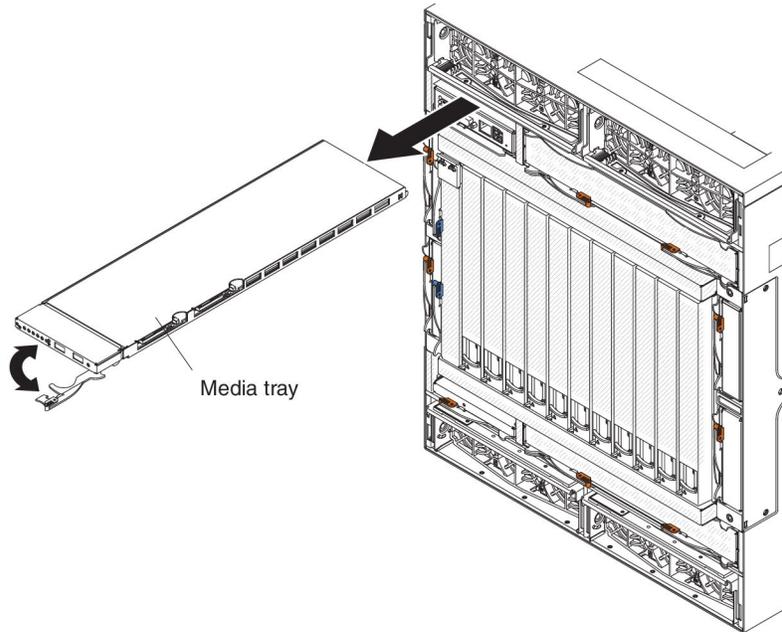


1. Read the safety information that begins on page vii and “Installation guidelines” on page 31.
2. Remove the bezel, if it is installed, to access the media tray to be removed (see “Removing a bezel collar” on page 41).
3. Pull the media tray release handle to the open position. The media tray moves out of the bay approximately 0.6 cm (0.25 inch).
4. Slide the media tray out of the bay.
5. If you are instructed to return the media tray, follow all packaging instructions and use any packaging materials for shipping that are supplied to you.

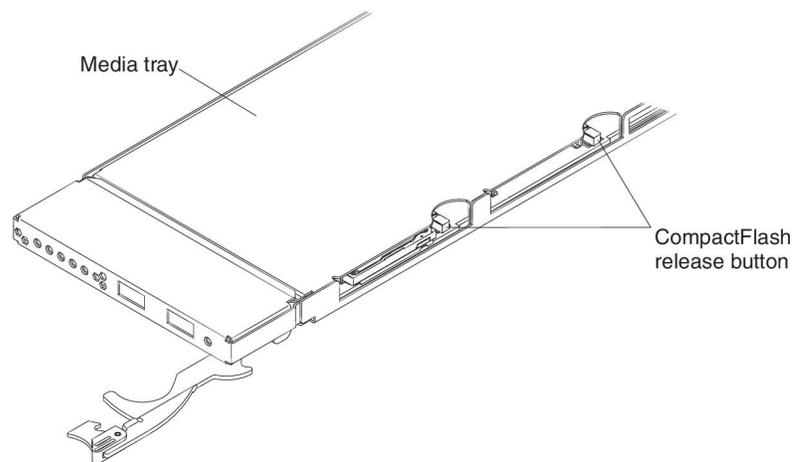
**Note:** If a CompactFlash module is installed in the media tray, remove it from the old media tray and install it in the new media tray.

## Installing a media tray

To install a media tray, complete the following steps.



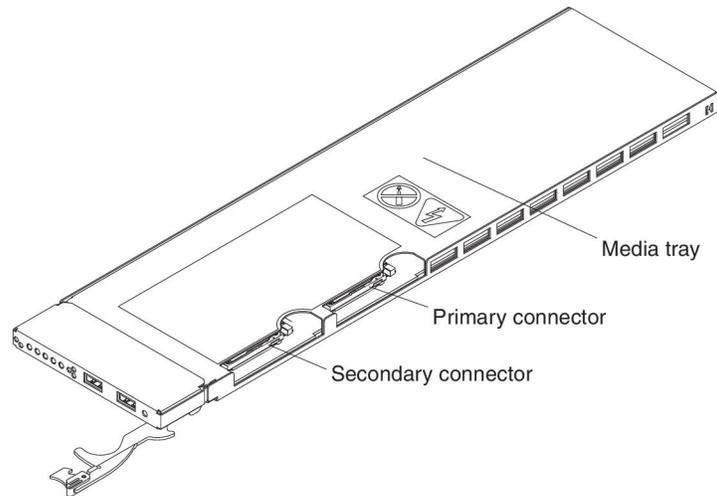
1. Read the safety information that begins on page vii and "Installation guidelines" on page 31.
2. Make sure that the CompactFlash release button is pressed into the in position.
3. Make sure that the media tray release lever is in the open position and the CompactFlash release buttons are pushed in.



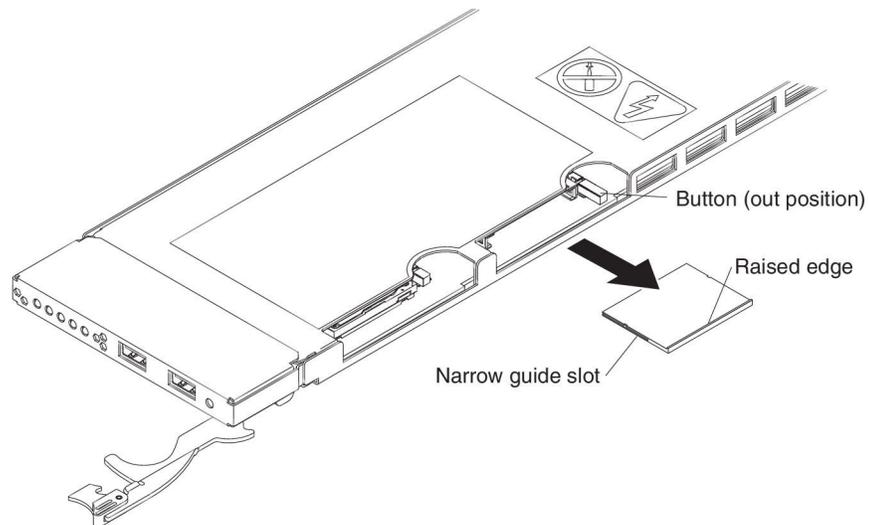
4. Slide the media tray into position until it stops and locks into place.
5. Rotate the media tray release lever to the closed position.

## Removing a CompactFlash module

To remove a CompactFlash module, complete the following steps.



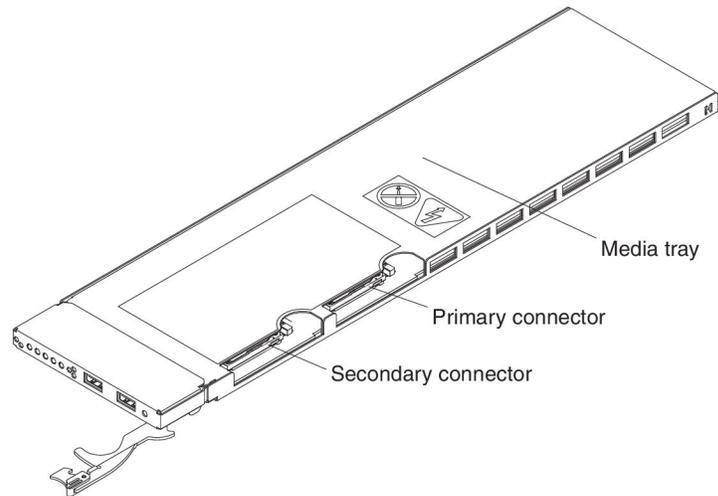
1. Read the safety information that begins on page vii and “Installation guidelines” on page 31.
2. Pull out the media tray from the BladeCenter HT unit so that the CompactFlash connectors are accessible (see “Removing a media tray” on page 51).



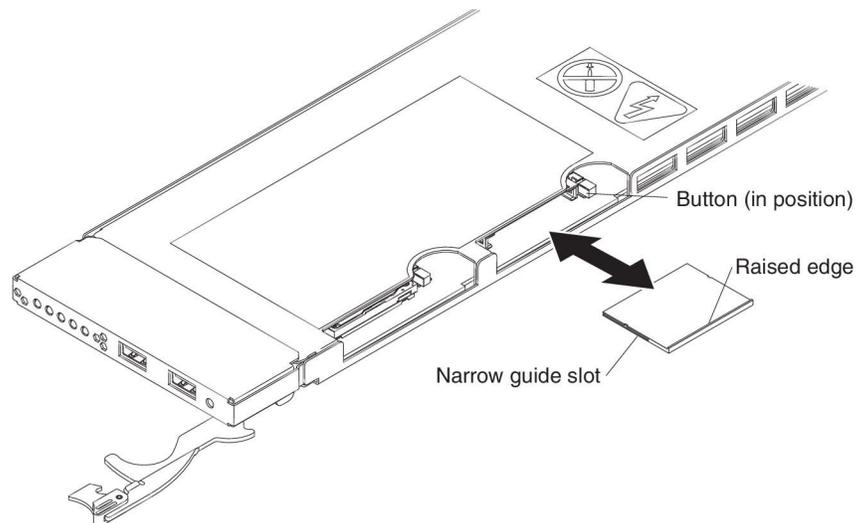
3. Press the release button next to the CompactFlash module you are removing. The release button extends from the media tray.
4. Press the release button again to eject the CompactFlash module from the media tray.
5. Press the release button again to return the release button into the in position.
6. If you are instructed to return the CompactFlash module, follow all packaging instructions and use any packaging materials for shipping that are supplied to you.

## Installing a CompactFlash module

To install a CompactFlash card, complete the following steps.



1. Read the safety information that begins on page vii and “Installation guidelines” on page 31.
2. Pull out the media tray from the BladeCenter HT unit so that the CompactFlash connectors are accessible (see “Removing a media tray” on page 51).
3. If you are replacing an existing CompactFlash module that is already installed, remove it (see “Removing a CompactFlash module” on page 53).



4. Make sure the CompactFlash release buttons are pushed in.
5. Insert the CompactFlash module into the socket on the media tray.

**Note:** The sides of the CompactFlash card have a guide slot. Insert the CompactFlash module with the narrow guide slot positioned towards the front of the media tray.

6. Install the media tray into the BladeCenter HT unit (see “Installing a media tray” on page 52).
7. See the documentation that comes with the CompactFlash card for configuration information.

## Removing a power module

### Attention:

- To help ensure proper cooling and system reliability, make sure that you replace a removed power module or filler with a power module or filler within 1 minute.
- If you are removing a functioning power module, make sure that power LEDs on the remaining power modules are lit; otherwise, shut down the operating systems and turn off all of the blade servers, before you proceed. See the documentation that comes with the blade server for instructions for shutting down the blade-server operating system and turning off the blade server.

### Statement 8:



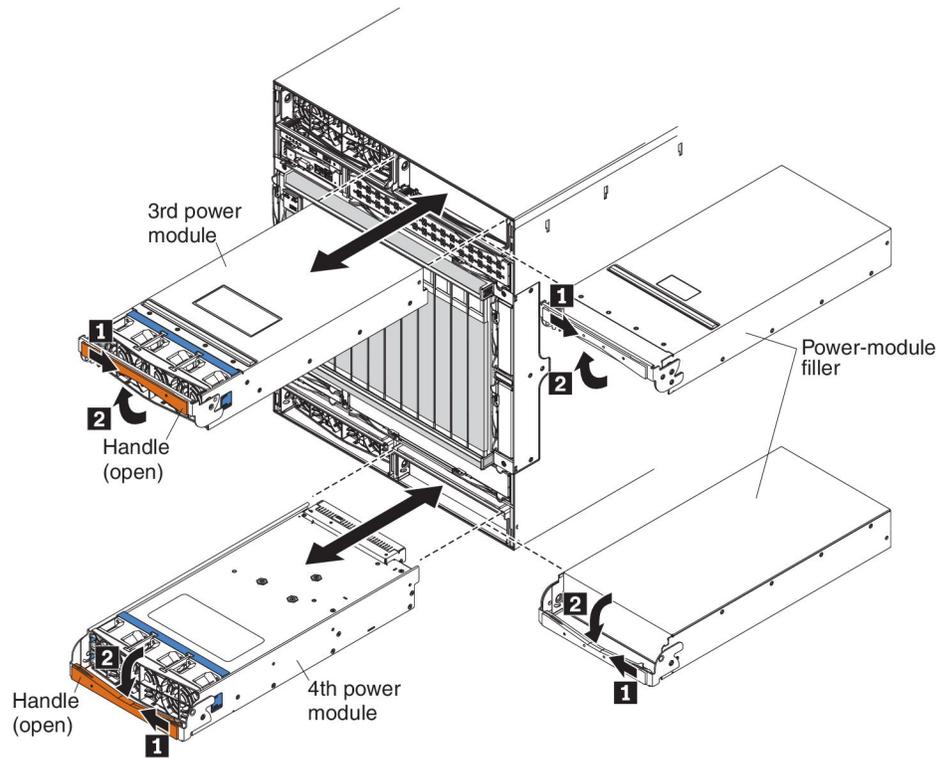
### CAUTION:

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.

To remove a power module or power-module filler, complete the following steps.



**Note:** These instructions assume that the BladeCenter HT unit is connected to power.

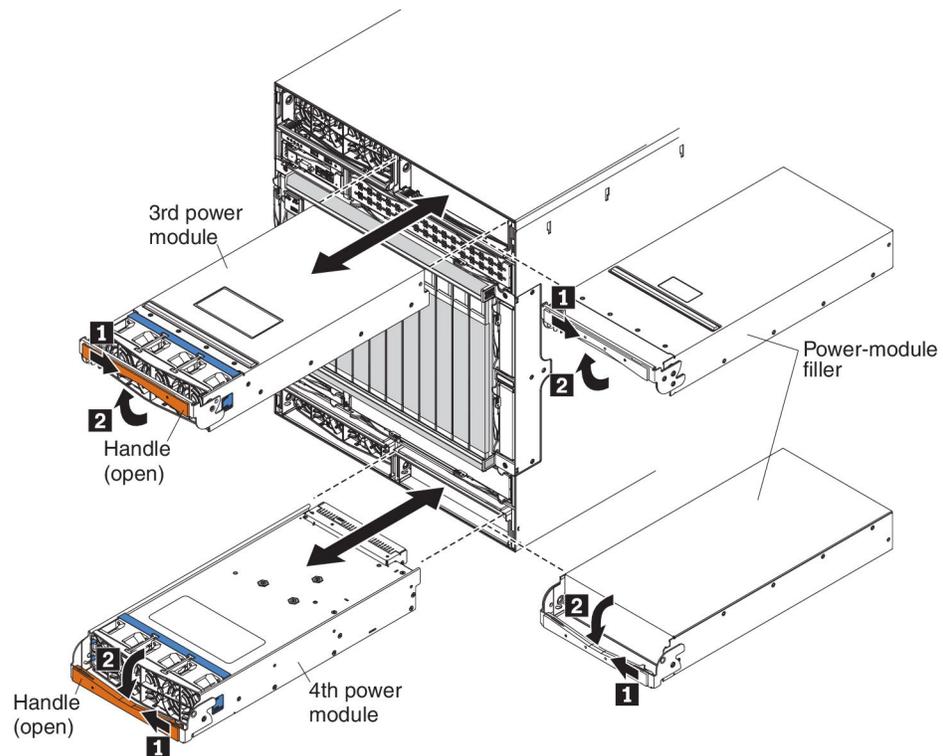
1. Read the safety information that begins on page vii and “Installation guidelines” on page 31.
2. Remove the bezel, if installed, to access the power module to be removed (see “Removing a bezel collar” on page 41).
3. Open the power-module handle using one of the following procedures:
  - For a power module in one of the upper power-module bays, push the inner handle release to the right; then, pull the handle up to the open position.
  - For a power module in one of the lower power-module bays, push the inner handle release to the left; then, pull the handle down to the open position.

The power module moves out of the bay approximately 0.6 cm (0.25 inch).

4. Use the handle to pull the module out of the bay. Within 1 minute, install either another power module or a filler into the module bay.
5. If you are replacing the power module with a new one, remove the fan pack for installation on the new power module (see “Removing a fan pack” on page 58).
6. If you are instructed to return the power module, follow all packaging instructions and use any packaging materials for shipping that are supplied to you.

## Installing a power module

To install a power module or power-module filler, complete the following steps.

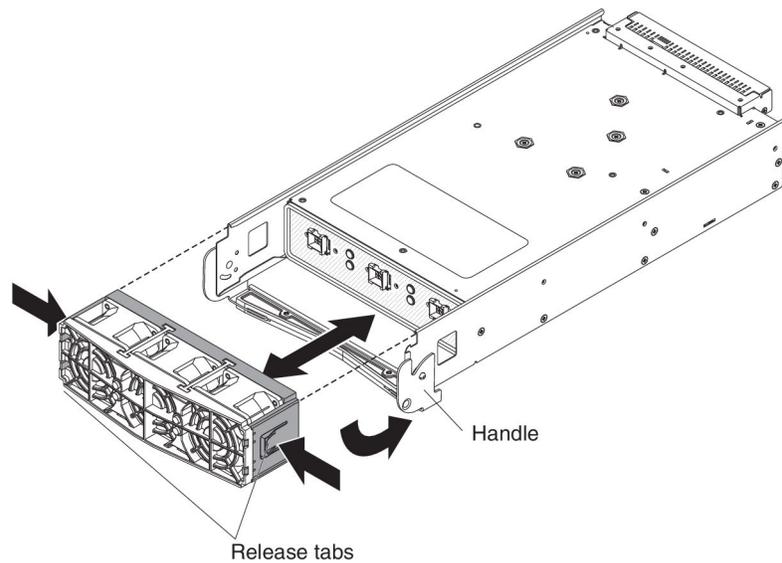


**Note:** These instructions assume that the BladeCenter HT unit is connected to power.

1. Read the safety information that begins on page vii and “Installation guidelines” on page 31.
2. Install a fan pack on the power module, if one is not installed (see “Installing a fan pack” on page 59).
3. Make sure that the handle on the power module is in the open position.
4. Orient the new power module to the selected power-module bay:
  - For the upper power-module bays, the rear connector on the power module must be facing down.
  - For the lower power-module bays, the rear connector on the power module must be facing up.
5. Slide the module into the bay until it stops; then, push the handle to the closed position.
6. Install the bezel that was removed during the removal procedure (see “Installing a bezel collar” on page 45).

## Removing a fan pack

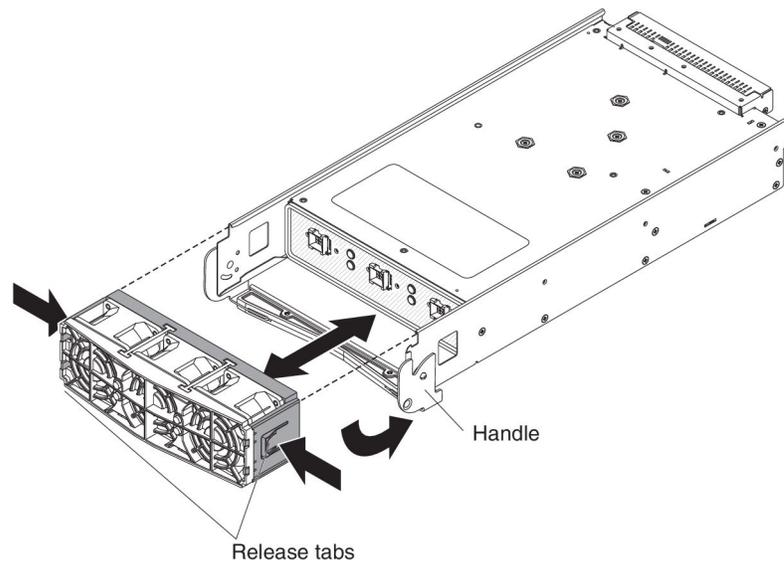
To remove a fan pack from a power module, complete the following steps.



1. Read the safety information that begins on page vii and “Installation guidelines” on page 31.
2. Remove the selected power module (see “Removing a power module” on page 55).
3. With the power module rear connector facing up, rotate the handle down so that it is parallel with the bottom of the module.
4. Press the blue release tabs on each side of the fan pack.
5. Pull the fan pack away from the power module.
6. If you are instructed to return the fan pack, follow all packaging instructions and use any packaging materials for shipping that are supplied to you.

## Installing a fan pack

To install a fan pack on a power module, complete the following steps.



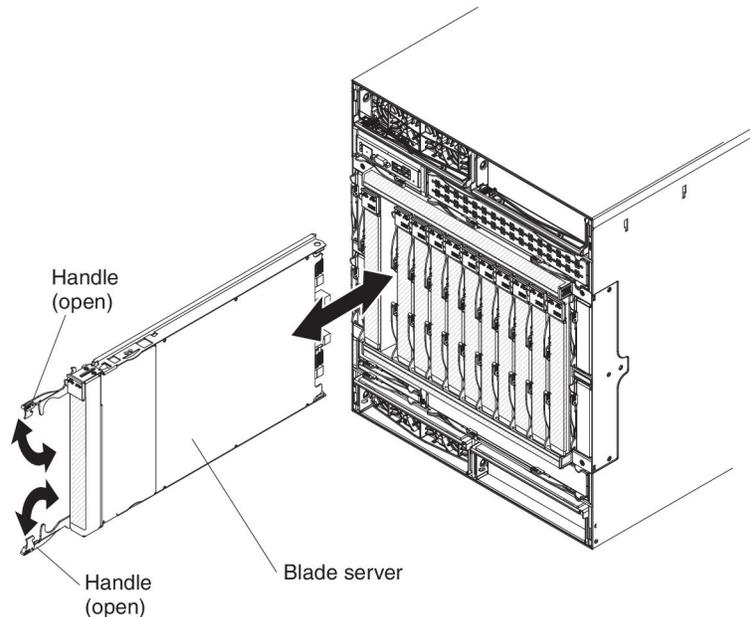
1. Read the safety information that begins on page vii and “Installation guidelines” on page 31.
2. Make sure that the handle is rotated down so that it is parallel with the bottom of the module, with the power module rear connector facing up.
3. Slide the fan pack into position on the power module until it stops and locks into place.
4. Rotate the power module handle to the open position.
5. Install the power module (see “Installing a power module” on page 57).

## Removing a blade server

### Attention:

- To maintain proper system cooling, do not operate the BladeCenter HT unit without a blade server, expansion unit, or blade server filler installed in each blade bay.
- Note the bay number. Reinstalling a blade server into a different bay from the one from which it was removed could have unintended consequences. Some configuration information and update options are established according to bay number.

To remove a blade server, complete the following steps.



**Note:** These instructions assume that the BladeCenter HT unit is connected to power.

1. Read the safety information that begins on page vii and “Installation guidelines” on page 31.
2. Remove the bezel as needed to access the blade server to be removed (see “Removing a bezel collar” on page 41).
3. Shut down the blade-server operating system; then, shut down the blade server. See the documentation that comes with your blade servers for the procedure to shut down the operating system. Wait at least 30 seconds until the drives stop spinning, before you proceed to the next step.
4. Pull the two release handles to the open position. The blade server moves out of the bay approximately 0.6 cm (0.25 inch).
5. Pull the blade server out of the bay. Within 1 minute, install either another blade server or a filler into the module bay.
6. If you are instructed to return the blade server, follow all packaging instructions and use any packaging materials for shipping that are supplied to you.

## Installing a blade server

### Statement 21:



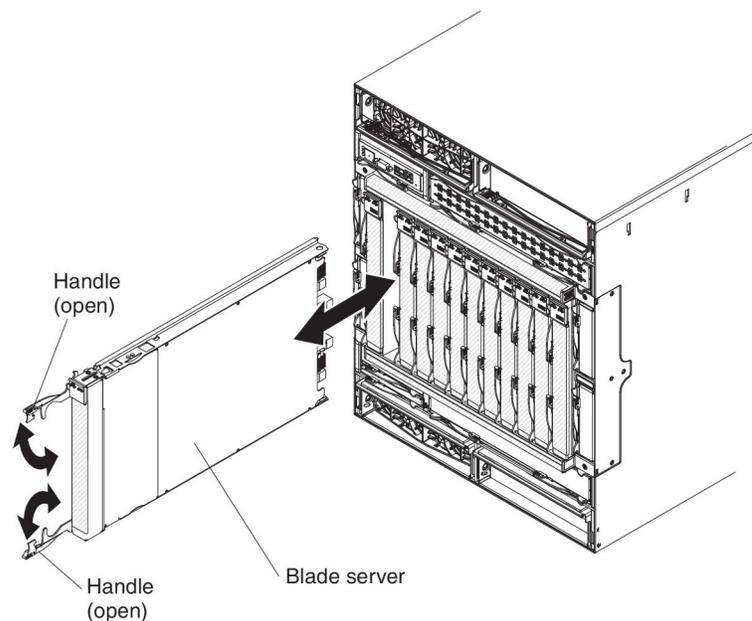
### CAUTION:

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

### Attention:

- Reinstalling a blade server into a different bay from the one from which it was removed could have unintended consequences. Some configuration information and update options are established according to bay number. You might have to reconfigure the blade server.
- If this is the initial installation of a blade server in the BladeCenter HT unit, you must configure the blade server with the blade-server Configuration/Setup Utility program and install the blade-server operating system. See the documentation that comes with the blade server for instructions.

To install a blade server, complete the following steps.



**Note:** These instructions assume that the BladeCenter HT unit is connected to power.

1. Read the safety information that begins on page vii and “Installation guidelines” on page 31.
2. Select the bay for the blade server.

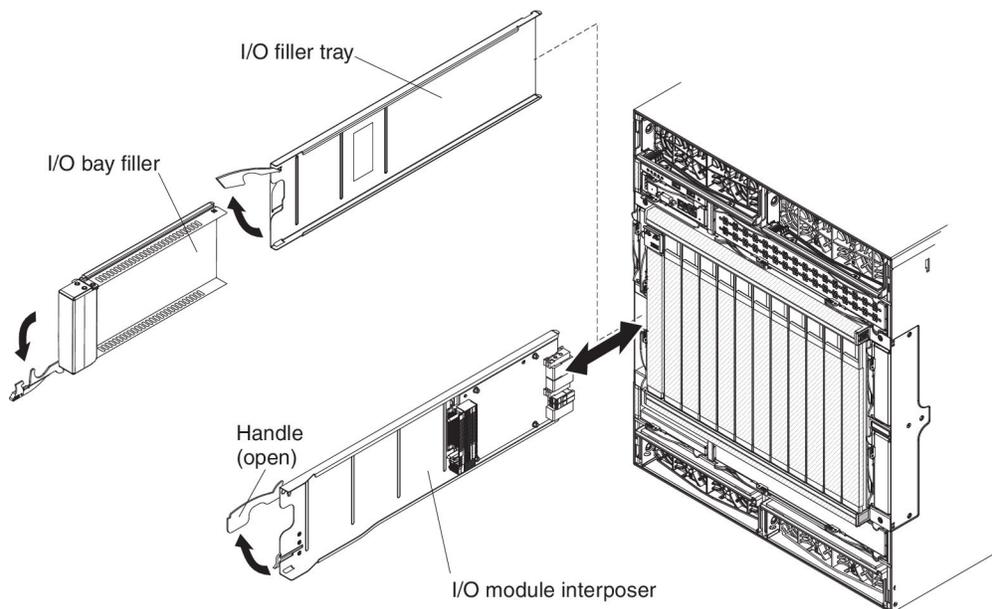
### Notes:

- a. Depending on the blade-server type and the optional devices that are installed in it, two or more adjacent bays might be required.

- b. When any blade server or device is in blade bays 7 through 12, power modules must be present in all four power bays.
3. Remove the filler from the bay, if one is installed.  
**Attention:** To help ensure proper cooling, performance, and system reliability, do not operate the BladeCenter HT unit for more than 1 minute without either a blade server or a blade filler installed in each blade bay.
4. Make sure that the two release handles are in the open position.
5. Slide the blade server into the bay until it stops.
6. Push the two release handles to the closed position.
7. Make sure that the blade server is receiving power. See the documentation that comes with the blade server for more instructions.
8. (Optional) Write identifying information on one of the labels that come with the blade server; then, place the label on the BladeCenter HT unit top bezel, just above the blade server.  
**Important:** Do not place the label on the blade server or in any way block the ventilation holes on the BladeCenter HT unit bezel.
9. Install the bezel that was removed during the removal procedure (see “Installing a bezel collar” on page 45).

## Removing an I/O-module interposer

To remove an I/O-module interposer or interposer tray, complete the following steps.

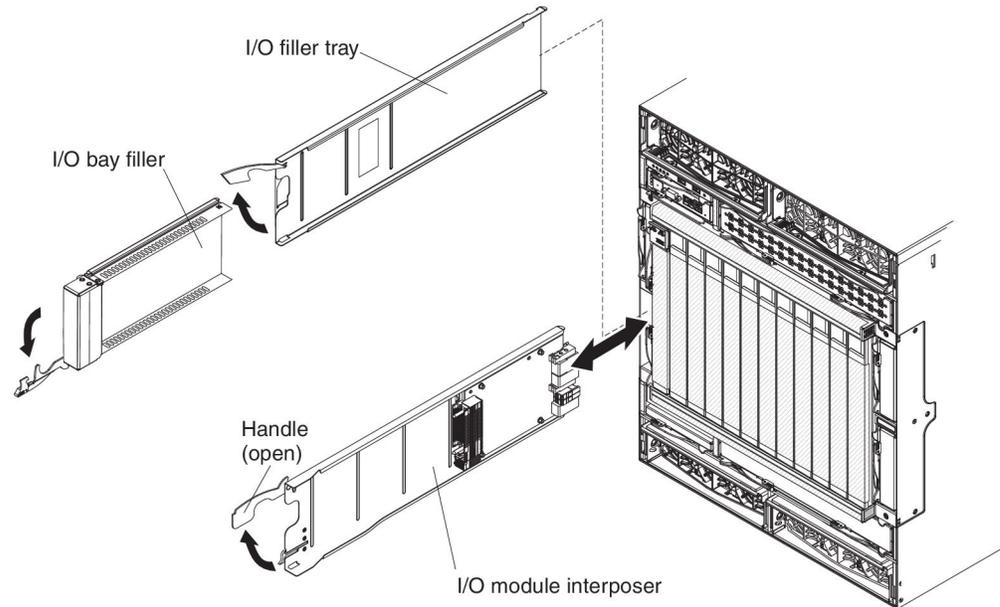


1. Read the safety information that begins on page vii and “Installation guidelines” on page 31.
2. Remove the bezel as needed to access the I/O-module interposer to be removed (see “Removing a bezel collar” on page 41).
3. If an I/O module or filler is installed in the I/O bay, remove it (see “Removing an I/O module” on page 64).
4. Make sure that the I/O-module interposer release handle is in the open position.

5. Pull the release handle or handles to the open position. The interposer moves out of the bay approximately 0.6 cm (0.25 inch).
6. If you are instructed to return the interposer, follow all packaging instructions and use any packaging materials for shipping that are supplied to you.

## Installing an I/O-module interposer

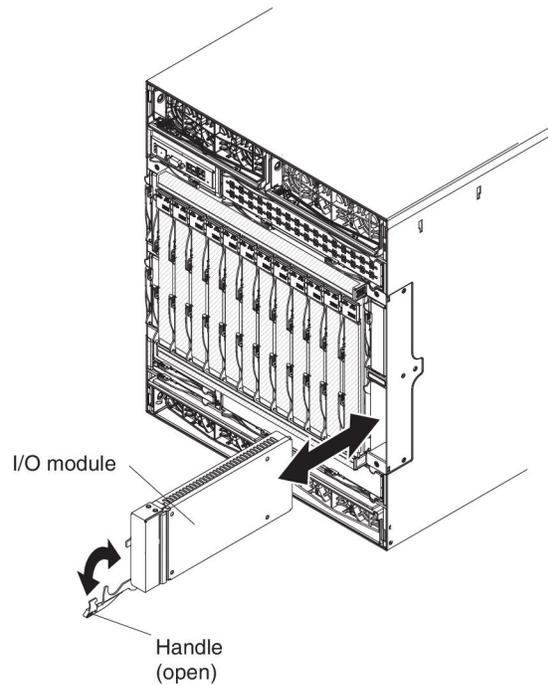
To install an I/O-module interposer or interposer tray, complete the following steps.



1. Read the safety information that begins on page vii and “Installation guidelines” on page 31.
2. Make sure that the I/O-module interposer release handle or handles are in the open position.
3. Slide the interposer into the module bay until it stops.
4. Push the release handle or handles to the closed position.
5. Install an I/O module or filler (see “Installing an I/O module” on page 65).

## Removing an I/O module

To remove an I/O module or module filler, complete the following steps.



**Note:** These instructions assume that the BladeCenter HT unit is connected to power.

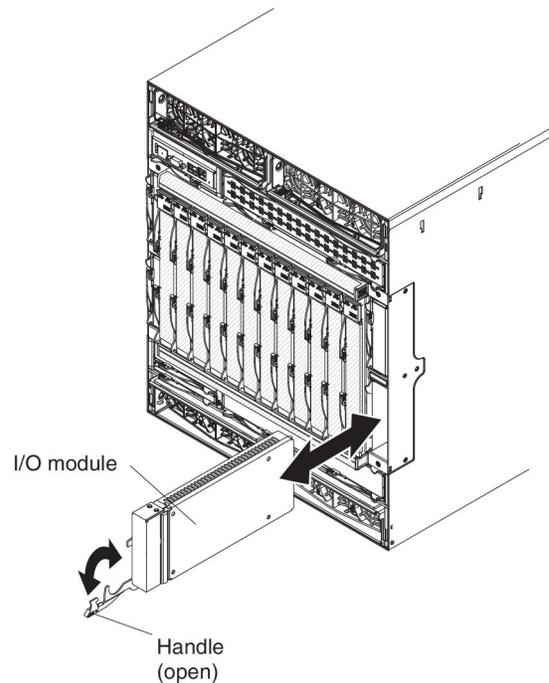
1. Read the safety information that begins on page vii and “Installation guidelines” on page 31.
2. Remove the bezel as needed to access the I/O module to be removed (see “Removing a bezel collar” on page 41).
3. Disconnect all cables from the module.
4. Pull the release handle or handles to the open position. The module moves out of the bay approximately 0.6 cm (0.25 inch).
5. Slide the module out of the bay. Within 1 minute, install either another module or a filler into the module bay.
6. If you are instructed to return the I/O module, follow all packaging instructions and use any packaging materials for shipping that are supplied to you.

## Installing an I/O module

The BladeCenter HT unit has eight hot-swap I/O module bays that are compatible with three types of I/O modules (see “Rear view” on page 16 for the location of the I/O module bays). See the *Installation and User’s Guide* for a description of the types of modules that can be used in each bay.

**Note:** Before you install a new I/O module, read the documentation that comes with the module for detailed instructions.

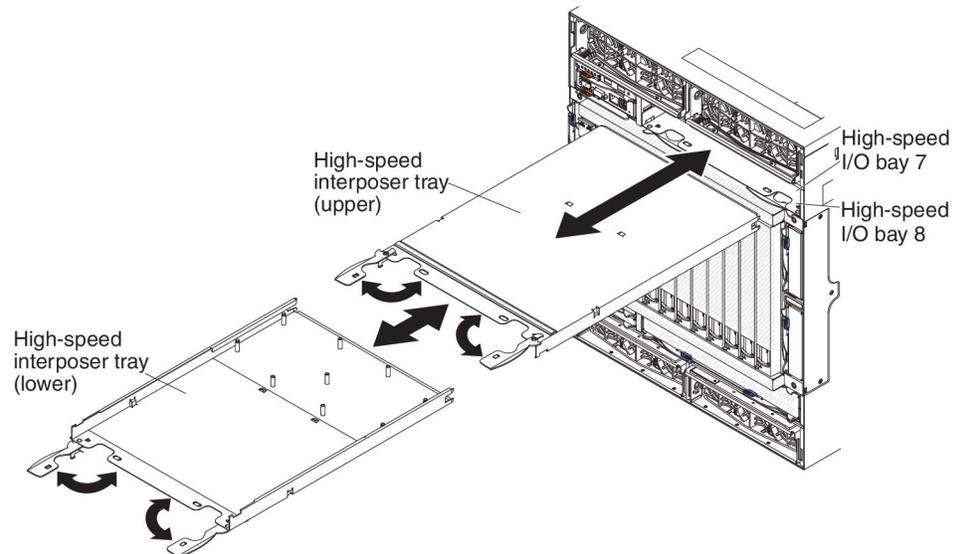
To install an I/O module or filler, complete the following steps.



1. Read the safety information that begins on page vii and “Installation guidelines” on page 31.
2. Install the I/O-module interposer “Installing an I/O-module interposer” on page 63.
3. Make sure that the I/O module release handle or handles are in the open position.
4. Slide the module into the module bay until it stops.
5. Push the release handle or handles to the closed position.
6. Reconnect all cables to the module.
7. Install the bezel that was removed during the removal procedure (see “Installing a bezel collar” on page 45).

## Removing a high-speed I/O-module interposer tray

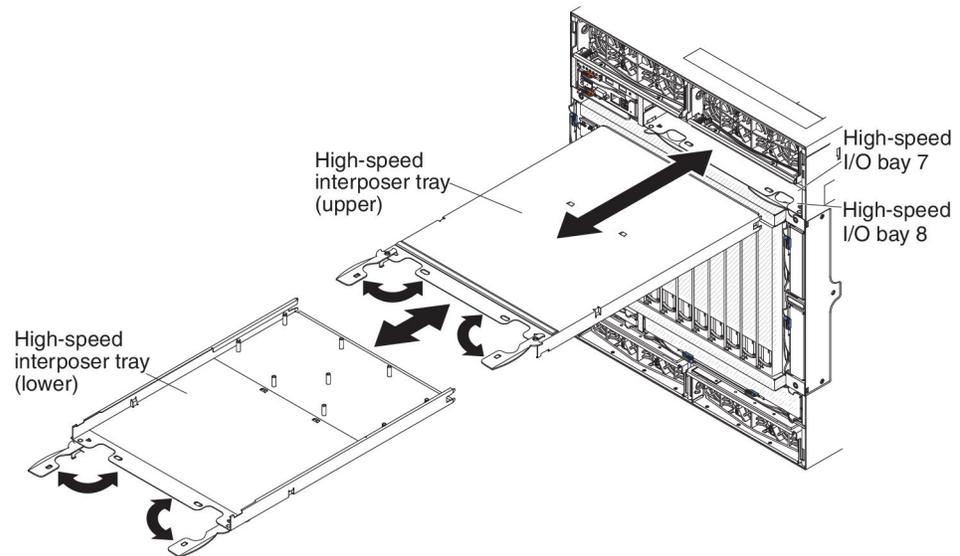
To remove a high-speed I/O-module interposer or interposer tray, complete the following steps.



1. Read the safety information that begins on page vii and “Installation guidelines” on page 31.
2. Remove the bezel as needed to access the high-speed I/O-module interposer to be removed (see “Removing a bezel collar” on page 41).
3. If an I/O module or filler is installed in the I/O bay, remove it (see “Removing a high-speed I/O module” on page 71).
4. Make sure that the I/O-module interposer release handle is in the open position.
5. Pull the release handle to the open position. The module moves out of the bay approximately 0.6 cm (0.25 inch).
6. Slide the module out of the bay.
7. If you are instructed to return the interposer, follow all packaging instructions and use any packaging materials for shipping that are supplied to you.

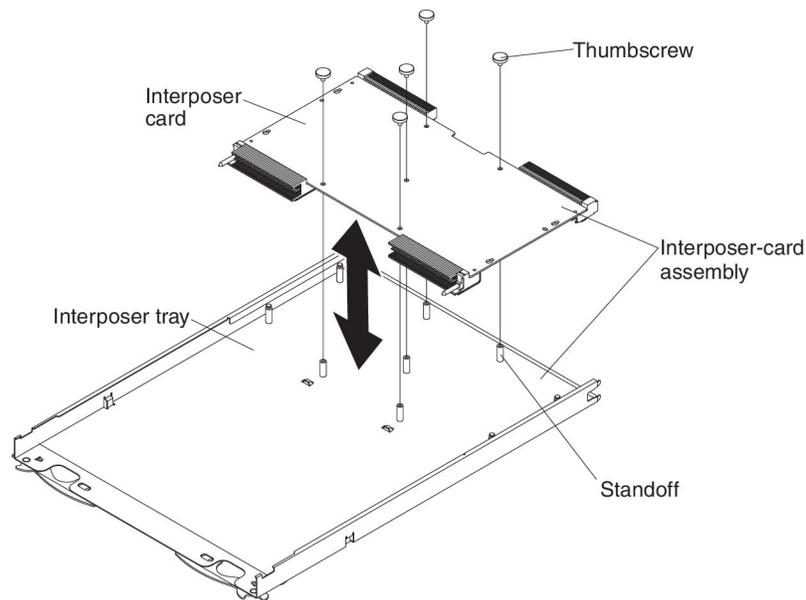
## Installing a high-speed I/O-module interposer tray

To install a high-speed I/O-module interposer or interposer tray, complete the following steps.



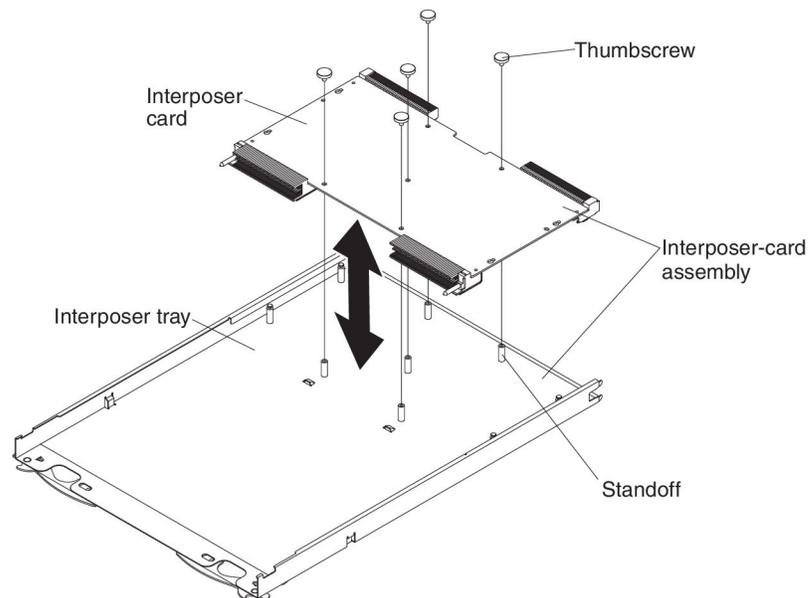
1. Read the safety information that begins on page vii and “Installation guidelines” on page 31.
2. Make sure that the high-speed I/O-module interposer release handles are in the open position.
3. Slide the interposer into the module bay until it stops.
4. Push the release handles to the closed position.
5. Install a high-speed I/O module or filler (see “Installing a high-speed I/O module” on page 72).

## Removing a high-speed I/O-module interposer card

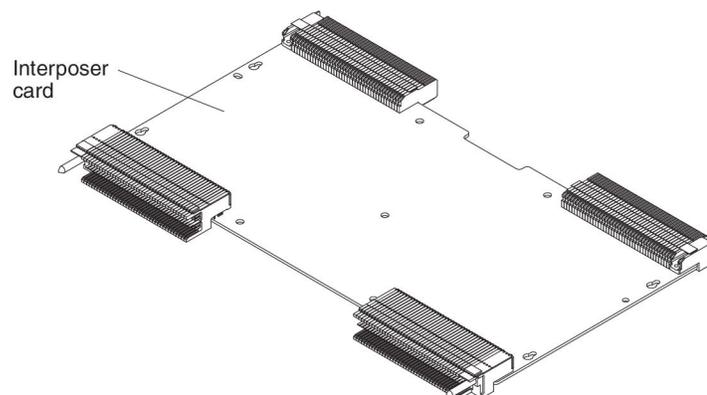


1. Read the safety information that begins on page vii and “Installation guidelines” on page 31.
2. Remove the high-speed I/O-module interposer from which you want to remove the interposer card (see “Removing a high-speed I/O-module interposer tray” on page 66).
3. The high-speed I/O-module interposer consists of an interposer tray and an interposer card. Orient the I/O-module interposer so the interposer card is visible.
4. Remove the five thumbscrews that secure the interposer card to the interposer tray.
5. Use your hand to grab the edges of the interposer card and lift it off the interposer tray.
6. If you are instructed to return the interposer, follow all packaging instructions and use any packaging materials for shipping that are supplied to you.

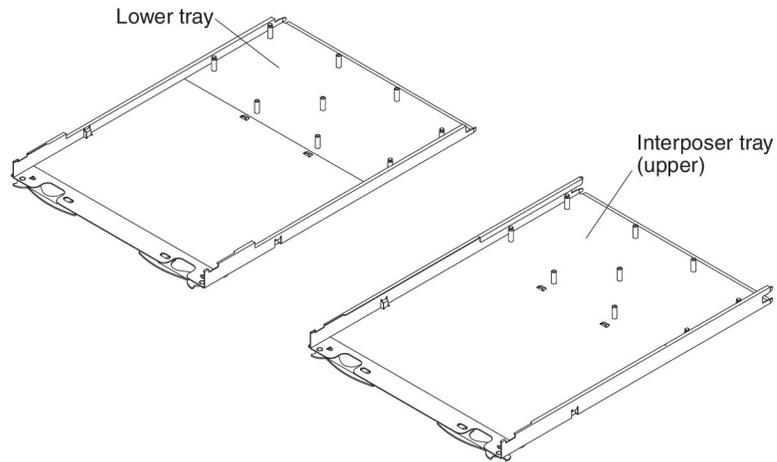
## Installing a high-speed I/O-module interposer card



1. Read the safety information that begins on page vii and “Installation guidelines” on page 31.
2. Orient the interposer tray so that the standoffs are facing up and place it on a flat surface.



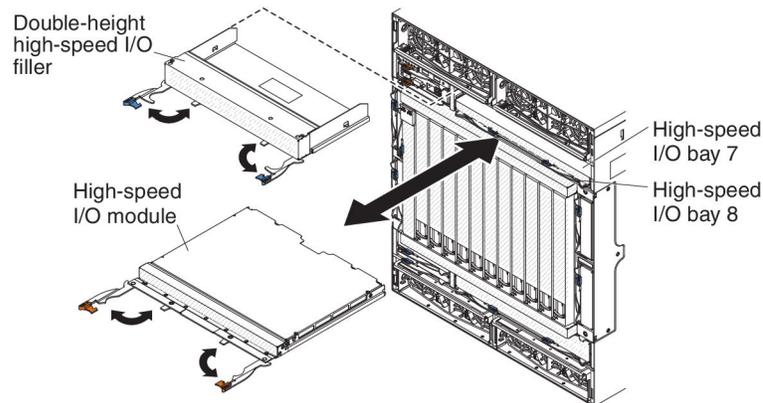
3. Orient the interposer card so that the cut out on the edge of the interposer card is at the rear of the tray.
4. Mount the high-speed interposer card on the tray:



- a. Install the interposer card on the upper interposer tray:
    - 1) Be sure that the connectors on the interposer card are oriented as shown in the illustration above.
    - 2) Align the holes in the interposer card with the standoffs on the tray; then, secure the card to the tray using the supplied thumbscrews.
  - b. Install the interposer card on the lower interposer tray:
    - 1) Be sure that the connectors on the interposer card are facing up, the opposite of what it is in the illustration above.
    - 2) Align the holes in the interposer card with the standoffs on the tray; then, secure the card to the tray using the supplied thumbscrews.
5. Install the high-speed I/O-module interposer into the BladeCenter HT unit (see “Installing a high-speed I/O-module interposer tray” on page 67).

## Removing a high-speed I/O module

To remove a high-speed I/O module or module filler, complete the following steps.



1. Read the safety information that begins on page vii and “Installation guidelines” on page 31.
2. Remove the bezel as needed to access the high-speed I/O module to be removed (see “Removing a bezel collar” on page 41).
3. Disconnect all cables from the module.
4. Pull the release handles to the open position. The module moves out of the bay approximately 0.6 cm (0.25 inch).
5. Slide the module out of the bay. Within 1 minute, install either another module or a filler into the module bay.
6. If you are instructed to return the high-speed I/O module, follow all packaging instructions and use any packaging materials for shipping that are supplied to you.

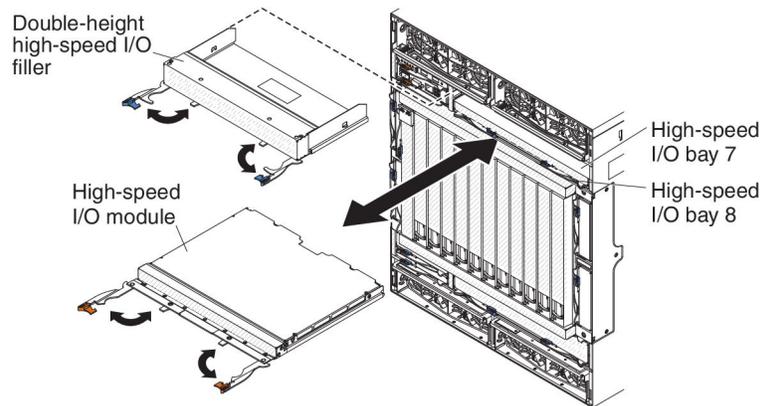
## Installing a high-speed I/O module

The BladeCenter HT unit has four hot-swap high-speed I/O module bays that are compatible with three types of I/O modules (see “Rear view” on page 16 for the location of the I/O module bays). See the *Installation and User's Guide* for a description of the types of modules that can be used in each bay.

### Notes:

1. Before you install a new I/O module, read the documentation that comes with the module for detailed instructions.
2. Power modules must be present in all four power bays.

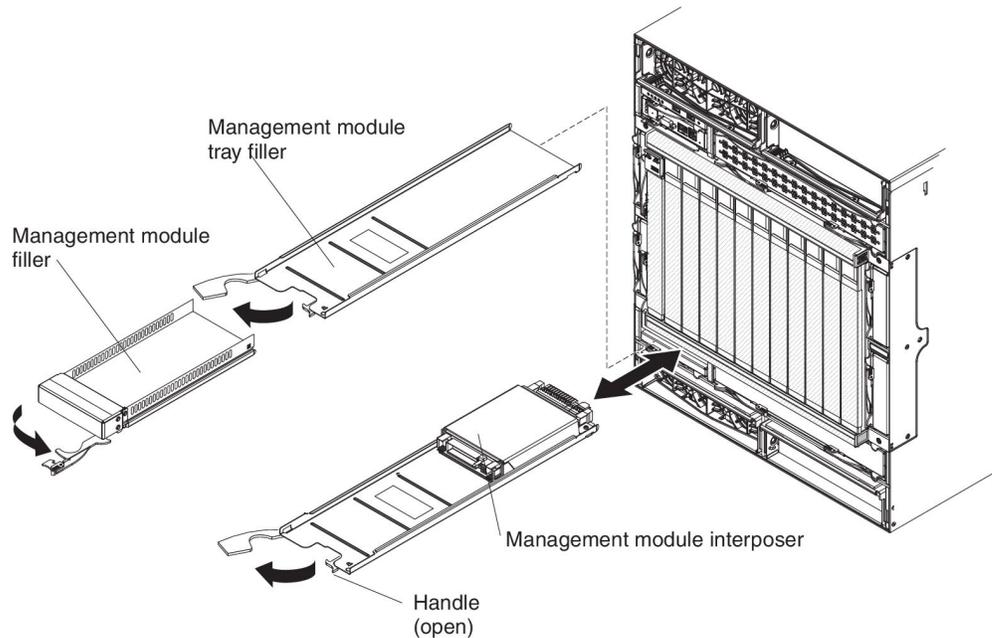
To install a high-speed I/O module or filler, complete the following steps.



1. Read the safety information that begins on page vii and “Installation guidelines” on page 31.
2. Install the high-speed I/O-module interposer. See “Installing a high-speed I/O-module interposer tray” on page 67 for more information.
3. Make sure that the high-speed I/O module release handles are in the open position.
4. Slide the module into the module bay until it stops.
5. Push the release handle or handles to the closed position.
6. Reconnect all cables to the module.
7. Install the bezel that was removed during the removal procedure. See “Installing a bezel collar” on page 45 for more information.

## Removing a management-module interposer

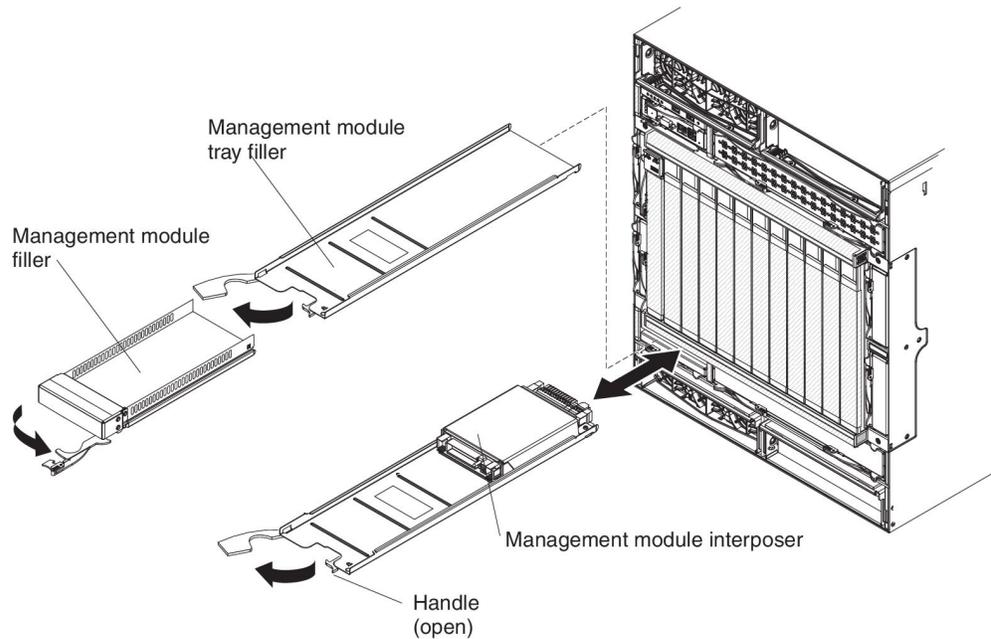
To remove a management-module interposer or tray filler, complete the following steps.



1. Read the safety information that begins on page vii and “Installation guidelines” on page 31.
2. Remove the bezel, if installed, to access the management-module interposer to be removed (see “Removing a bezel collar” on page 41).
3. If a management module or filler is installed in the management-module bay, remove it (see “Removing a management module” on page 75).
4. Pull the management-module interposer release handle to the open position. The interposer moves out of the bay approximately 0.6 cm (0.25 inch).
5. Pull the interposer out of the bay. Within 1 minute, install either another module or a filler into the module bay.
6. If you are instructed to return the interposer, follow all packaging instructions and use any packaging materials for shipping that are supplied to you.

## Installing a management-module interposer

To install a management-module interposer or tray, complete the following steps.



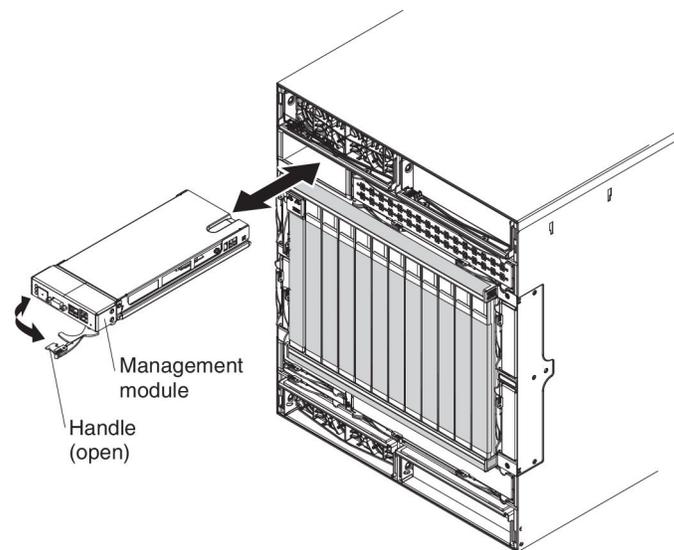
1. Read the safety information that begins on page vii and “Installation guidelines” on page 31.
2. Remove the management module filler and management module tray filler (see “Removing a management module” on page 75 and “Removing a management-module interposer” on page 73).
3. Make sure that the management-module interposer release handle is in the open position.
4. Slide the interposer into the management-module bay.
5. Push the release handle on the interposer to the closed position.
6. Install a management module or filler into the management-module bay (see “Installing a management module” on page 76).

## Removing a management module

To remove a management module or filler, complete the following steps.

### Notes:

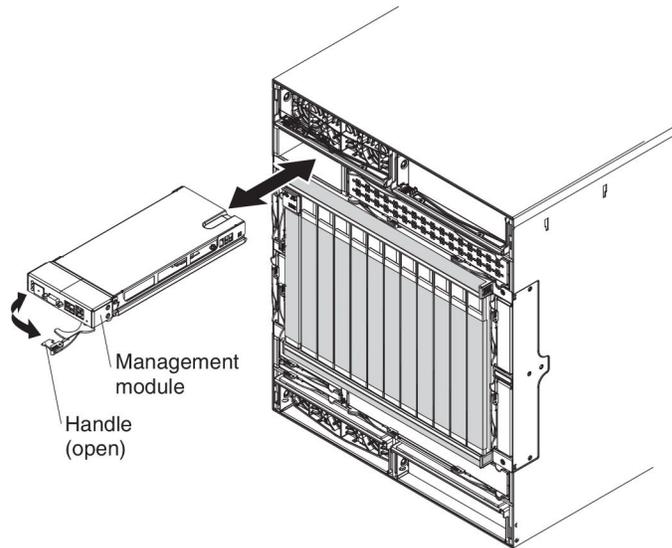
1. If you are replacing the only management module in the BladeCenter HT unit and the management module is functioning, save the configuration file before you proceed. See the *BladeCenter Management Module User's Guide* and the *BladeCenter Management Module Command-Line Interface Reference Guide* for instructions for saving and restoring a configuration file.
2. If you have just installed a second management module in the BladeCenter HT unit, do not remove the first (primary) management module for up to 45 minutes; the second (redundant) management module needs the time to receive initial status information and firmware levels from the primary management module.



1. Read the safety information that begins on page vii and “Installation guidelines” on page 31.
2. Remove the bezel, if installed, to access the management module to be removed (see “Removing a bezel collar” on page 41).
3. Disconnect all cables from the module.
4. Pull the release handle to the open position. The module moves out of the bay approximately 0.6 cm (0.25 inch).
5. Slide the module out of the bay. Within 1 minute, install either another management module or a filler into the bay.
6. If you are instructed to return the management module, follow all packaging instructions and use any packaging materials for shipping that are supplied to you.

## Installing a management module

To install a management module or filler, complete the following steps.

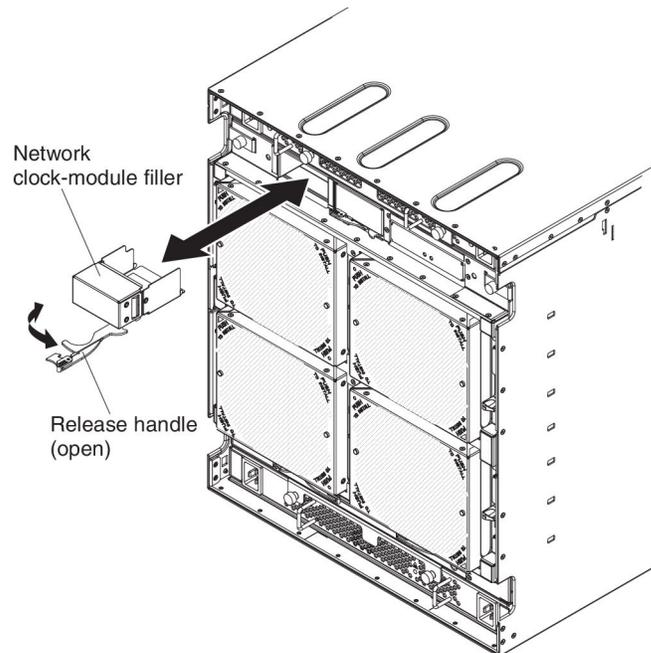


**Note:** These instructions assume that the BladeCenter HT unit is connected to power.

1. Read the safety information that begins on page vii and “Installation guidelines” on page 31.
2. Install a management-module interposer (see “Installing a management-module interposer” on page 74).
3. Make sure that the release handle on the module is in the open position.
4. Slide the module into the module bay until it stops.
5. Push the release handle to the closed position.
6. Reconnect all cables to the module.
7. If this is the only management module in the BladeCenter HT unit, restore the configuration from the configuration file that you saved when you removed the old management module. See the *BladeCenter Management Module User’s Guide* and the *BladeCenter Management Module Command-Line Interface Reference Guide* for detailed information about restoring a saved configuration file.
8. Make sure that the OK LED on the module is lit.
9. Install the bezel that was removed during the removal procedure (see “Installing a bezel collar” on page 45).

## Removing a network clock-module filler

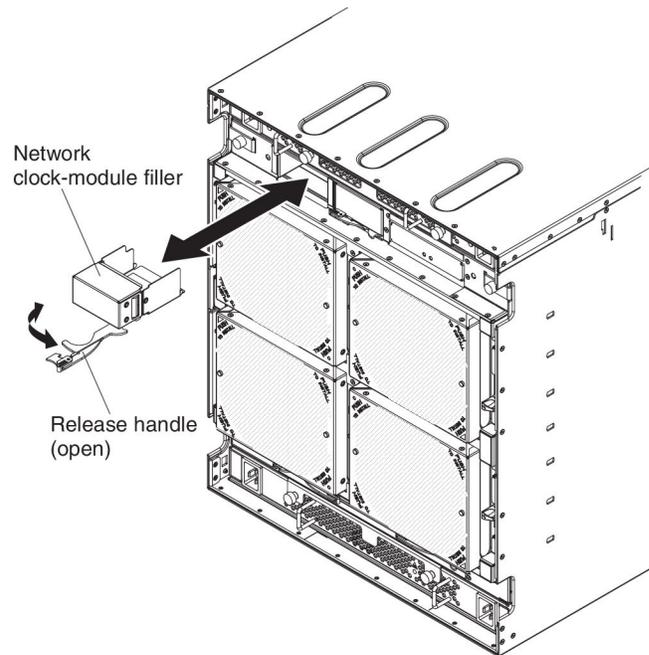
To remove a network clock-module filler, complete the following steps.



1. Read the safety information that begins on page vii and “Installation guidelines” on page 31.
2. Pull the release handle to the open position. The module moves out of the bay approximately 0.6 cm (0.25 inch).
3. Slide the filler out of the bay. Within 1 minute, install either another module or a filler into the module bay.
4. If you are instructed to return the network clock-module filler, follow all packaging instructions and use any packaging materials for shipping that are supplied to you.

## Installing a network clock-module filler

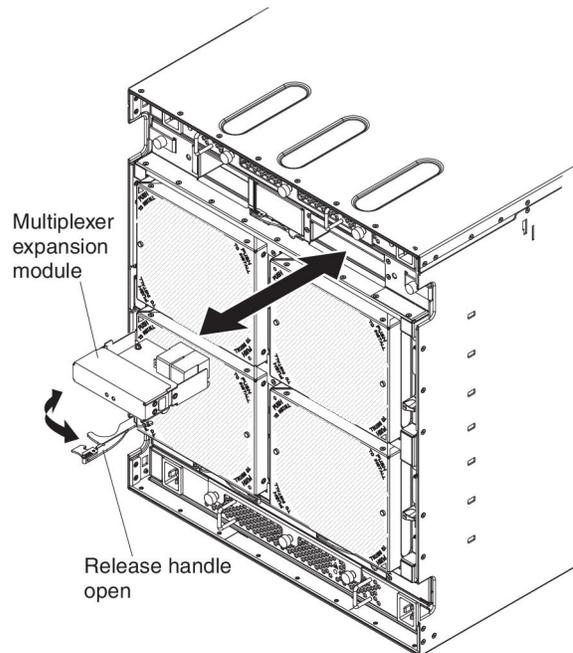
To install a network clock-module filler, complete the following steps.



1. Read the safety information that begins on page vii and “Installation guidelines” on page 31.
2. Make sure that the release handle on the filler is in the open position.
3. Slide the module into the module bay until it stops.
4. Push the release handle to the closed position.

## Removing a multiplexer expansion module

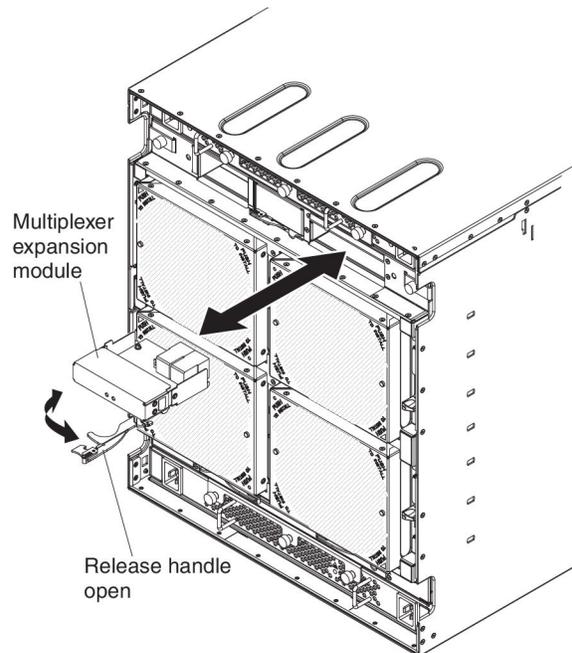
To remove a multiplexer expansion module or filler, complete the following steps.



1. Read the safety information that begins on page vii and “Installation guidelines” on page 31.
2. Make sure the FRR LED on the multiplexer expansion module is lit. This LED must be lit before removing the module. For more information see “BladeCenter HT components, controls, and LEDs” on page 14.
3. Pull the release handle or handles to the open position. The module moves out of the bay approximately 0.6 cm (0.25 inch).
4. Slide the module out of the bay. Within 1 minute, install either another module or a filler into the module bay.
5. If you are instructed to return the multiplexer expansion module, follow all packaging instructions and use any packaging materials for shipping that are supplied to you.

## Installing a multiplexer expansion module

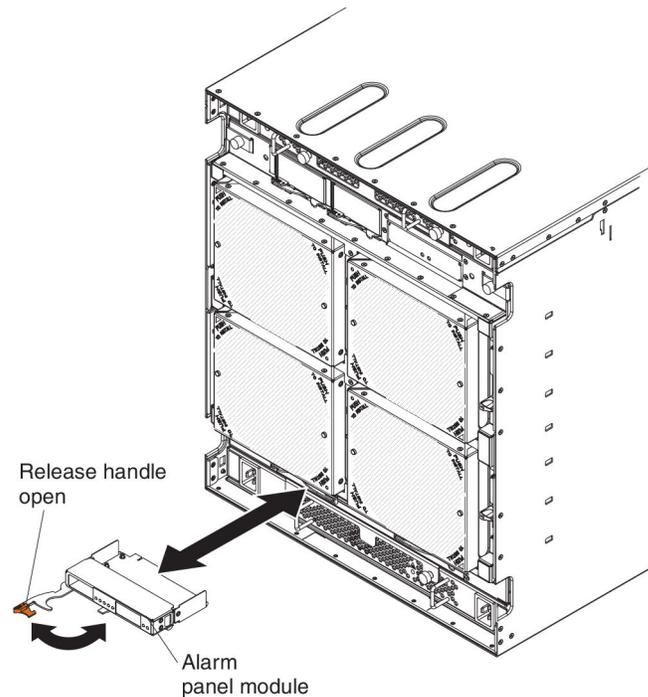
To install a multiplexer expansion module, complete the following steps.



1. Read the safety information that begins on page vii and “Installation guidelines” on page 31.
2. Make sure that the release handle on the module is in the open position.
3. Slide the module into the module bay until it stops.
4. Push the release handle to the closed position.

## Removing an alarm panel module

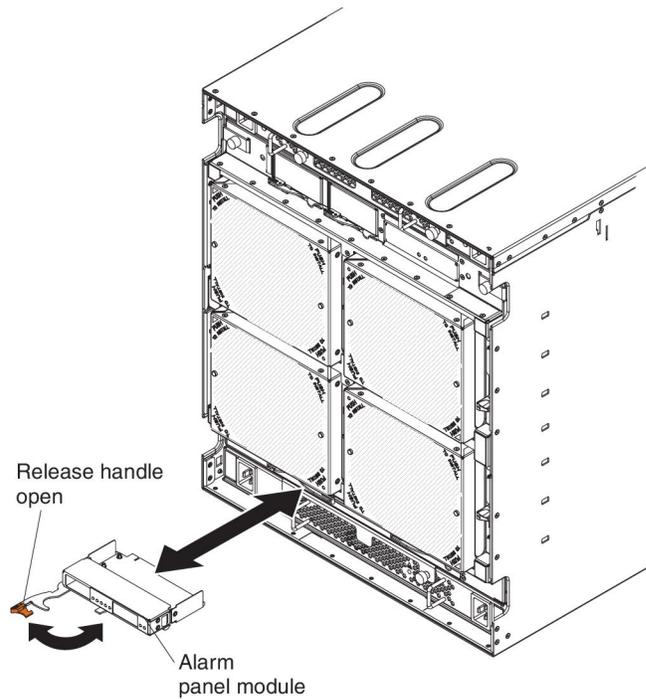
To remove an alarm panel module, complete the following steps.



1. Read the safety information that begins on page vii and “Installation guidelines” on page 31.
2. Disconnect all cables from the module.
3. Pull the release handle or handles to the open position. The module moves out of the bay approximately 0.6 cm (0.25 inch).
4. Slide the module out of the bay. Within 1 minute, install either another module or a filler into the module bay.
5. If you are instructed to return the alarm panel module, follow all packaging instructions and use any packaging materials for shipping that are supplied to you.

## Installing an alarm panel module

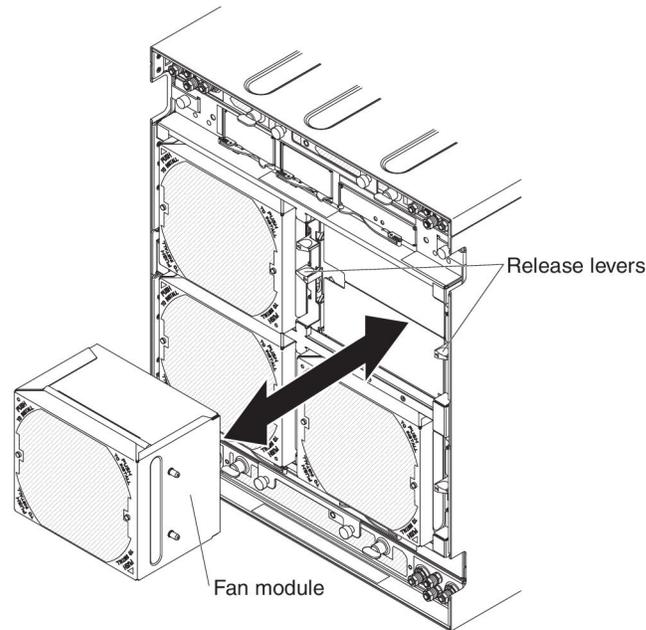
To install an alarm panel module, complete the following steps.



1. Read the safety information that begins on page vii and “Installation guidelines” on page 31.
2. Make sure that the release handle on the module is in the open position.
3. Slide the module into the module bay until it stops.
4. Push the release handle to the closed position.
5. Reconnect all cables to the module.

## Removing a fan module

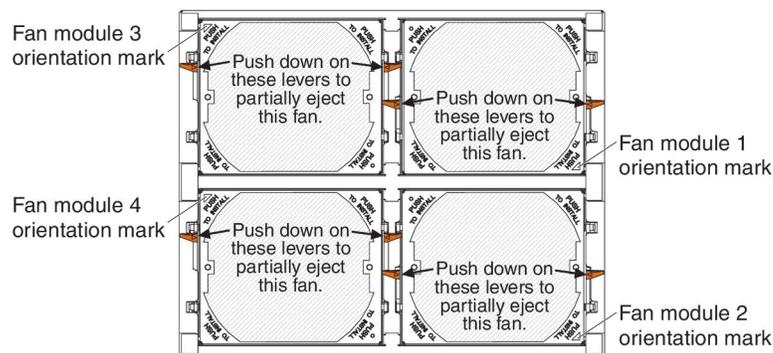
To remove a fan module, complete the following steps.



**Note:** These instructions assume that the BladeCenter HT unit is connected to power.

**Attention:** While the BladeCenter HT is operating, only one fan module should be removed at a time. Removing two fan modules might cause the BladeCenter HT unit to overheat.

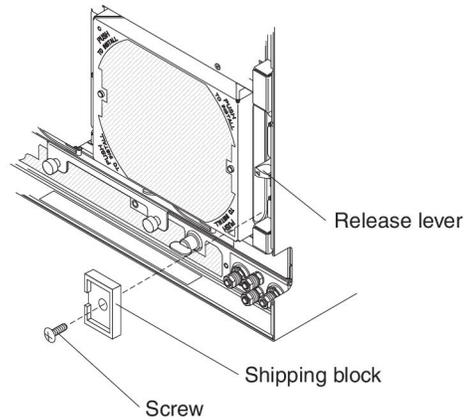
1. Read the safety information that begins on page vii and “Installation guidelines” on page 31.



**Attention:** While the BladeCenter HT is operating, only one fan module should be removed at a time. Removing two fan modules might cause the BladeCenter HT unit to overheat.

2. If a shipping block is installed below the release levers, complete the following steps:

**Note:** When the BladeCenter HT unit is shipped, a shipping block must be installed for each fan module. The shipping block is installed below the release lever that is on the same side as the fan module orientation mark.



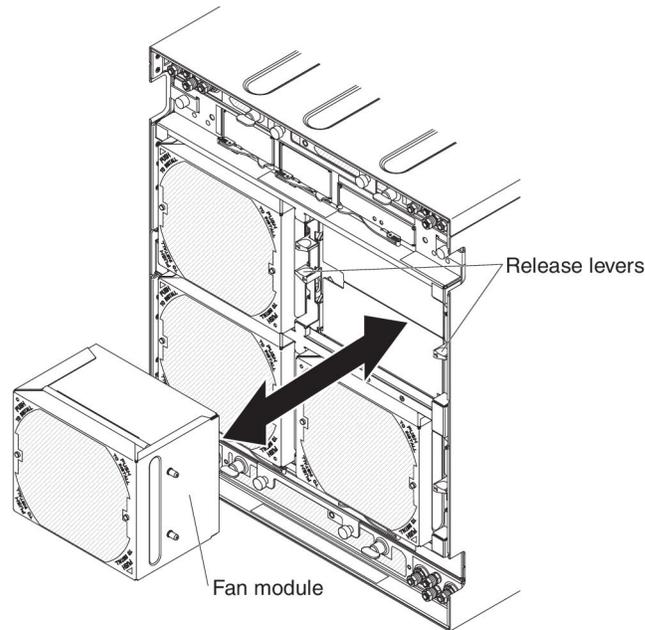
- a. Remove the phillips-head screw that attaches the shipping block to the BladeCenter HT unit.
- b. Pull the shipping block away from the BladeCenter HT unit. Place the shipping block and screw in a safe place.

**Note:** The shipping block is used to secure the fan module during shipping. Shipping blocks do not need to be installed during normal operation of the BladeCenter HT unit.

3. Press down on the release levers on either side of the fan module you are removing.
4. Slide the fan module out of the bay. Within 1 minute, install either another module or a filler into the module bay.
5. If you are instructed to return the fan module, follow all packaging instructions and use any packaging materials for shipping that are supplied to you.

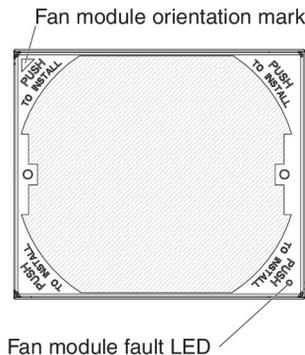
## Installing a fan module

To install a fan module, complete the following steps.



**Note:** These instructions assume that the BladeCenter HT unit is connected to power.

1. Read the safety information that begins on page vii and “Installation guidelines” on page 31.
2. Orient the fan module to the selected fan-module bay.



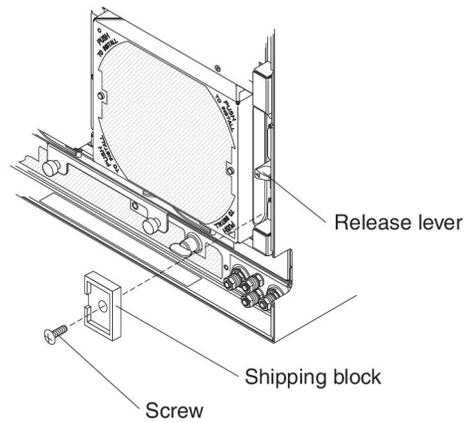
- a. If you are installing a fan module in fan-module bay 1 or 2, orient the fan so the orientation mark is at the bottom-right corner.
  - b. If you are installing a fan module in fan-module bay 3 or 4, orient the fan so the orientation mark is at the top-left corner.
3. Slide the module into the bay until it stops.

**Note:** Make sure the release levers for the fan module return to a locked position.

4. If you are shipping the BladeCenter unit to another location, install the shipping block that came with the BladeCenter HT unit.

**Note:** When the BladeCenter HT unit is shipped, a shipping block must be installed for each fan module. The shipping block is installed below the release

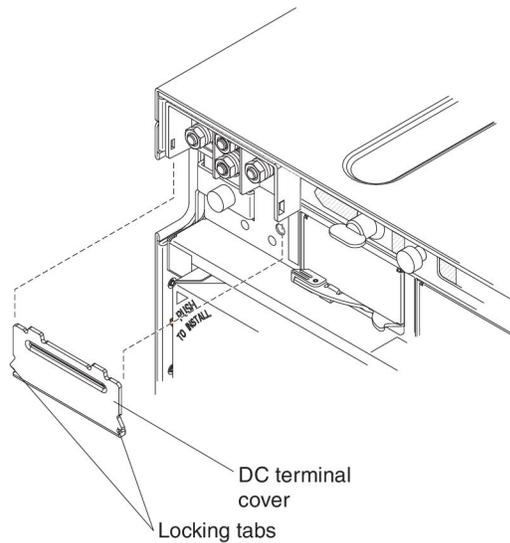
lever that is on the same side as the fan module orientation mark.

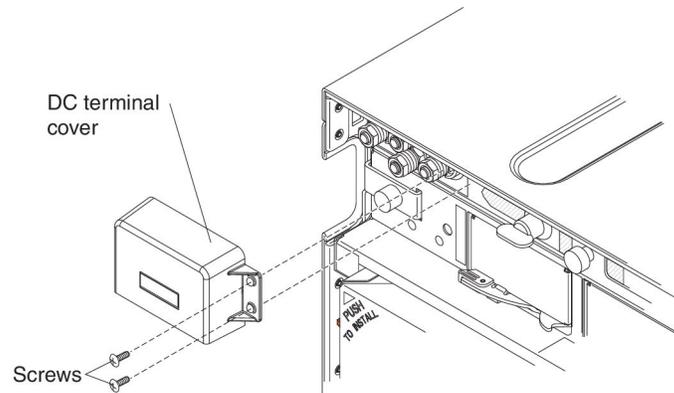


- a. Orient the shipping block below the release lever on the same side as the orientation mark on the fan module.
- b. Push the shipping block into the slot below the release lever.
- c. Install the phillips-head screw that attaches the shipping block to the BladeCenter HT unit.

## Removing a dc terminal cover

There are two types of terminal covers, depending on the date of manufacture. The following illustrations show both types of terminal covers.





To remove a dc terminal cover from an IBM BladeCenter HT type 8740, complete the following steps.

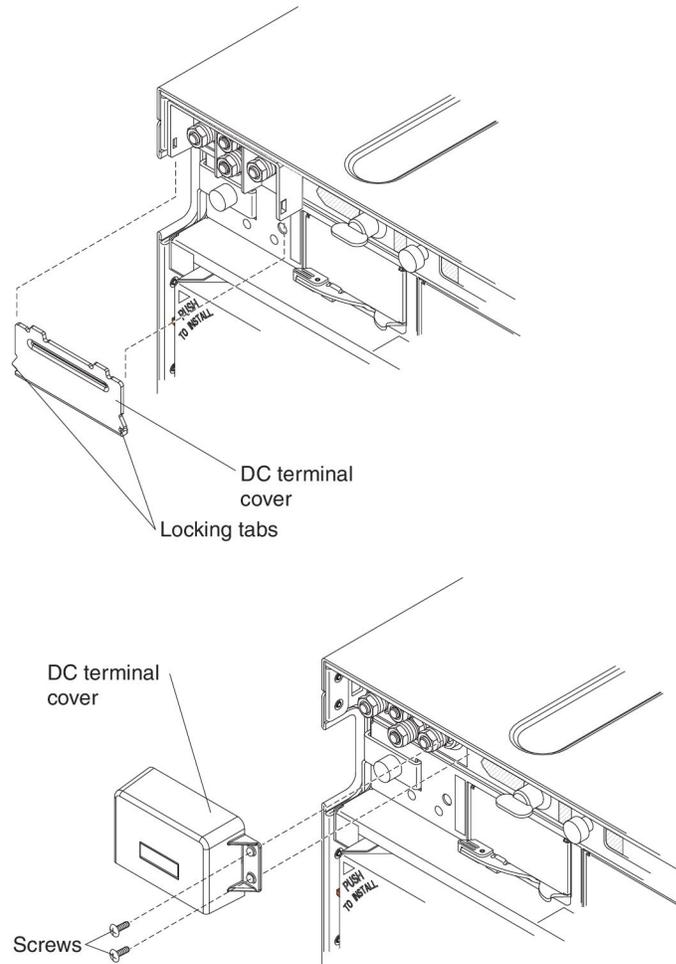
1. Read the safety information that begins on page vii and “Handling static-sensitive devices” on page 32.
2. Shut down each blade server. See the documentation that comes with your blade servers for the procedure for shutting down the operating system.
3. Turn off the power source.

**Note:** After you disconnect the BladeCenter HT unit from power, wait at least 5 seconds before you connect the BladeCenter HT unit to power again.

4. If your terminal cover is attached to the dc power box with two phillips-head screws, remove the screws.
5. Pull the terminal cover away from the BladeCenter HT unit.

## Installing a dc terminal cover

There are two types of terminal covers, depending on the date of manufacture. The following illustrations show both types of terminal covers.



To install a dc terminal cover on an IBM BladeCenter HT type 8740, complete the following steps.

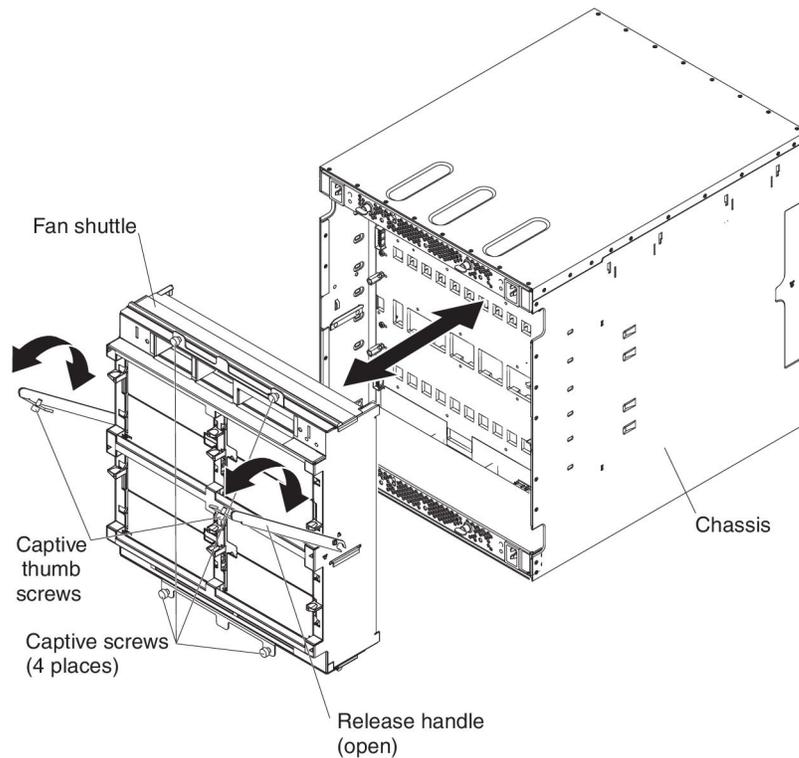
1. Read the safety information that begins on page vii and “Handling static-sensitive devices” on page 32.
2. Make sure power has been disconnected from the BladeCenter HT unit. See “Disconnecting power from the BladeCenter HT unit” on page 11 for more information.
3. Turn off the power source.

**Note:** After you disconnect the BladeCenter HT unit from power, wait at least 5 seconds before you connect the BladeCenter HT unit to power again.

4. If your terminal cover has screw holes, orient the terminal cover so that it fits over the dc power terminals and the screw holes on the terminal cover are aligned with the screw holes on the dc power box. Install the two phillips-head screws that attach the terminal cover to the power box.
5. If your terminal cover does not have screw holes, snap the cover into place so that the locking tabs go into the slots on the side of the power terminals.

## Removing the fan shuttle

To remove the fan shuttle, complete the following steps.

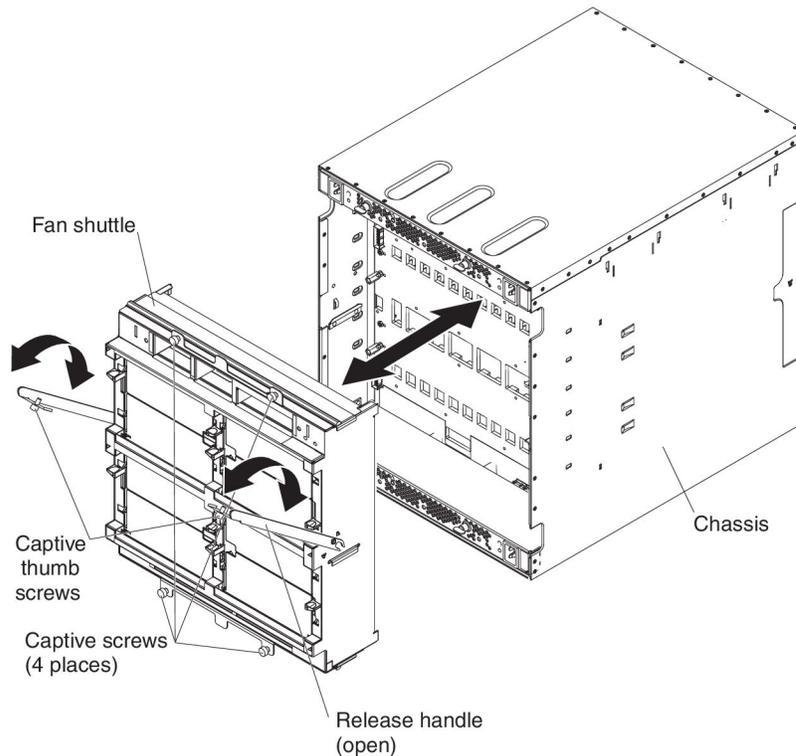


1. Read the safety information that begins on page vii and “Installation guidelines” on page 31.
2. Shut down the operating systems and turn off any blade servers in the BladeCenter HT unit. See the documentation that comes with the blade server for detailed instructions.
3. Disconnect the power from the BladeCenter HT unit (see “Disconnecting power from the BladeCenter HT unit” on page 11).
4. Disconnect the cables from the modules in the rear of the BladeCenter HT unit.
5. Remove any of the following modules that are installed in the rear of the BladeCenter HT unit:
  - Fan modules (see “Removing a fan module” on page 83).
  - Network clock-module fillers (see “Removing a network clock-module filler” on page 77).
  - Multiplexer expansion module (see “Removing a multiplexer expansion module” on page 79).
  - Alarm panel module (see “Removing an alarm panel module” on page 81).
6. Loosen the four captive thumbscrews on the fan shuttle.
7. Loosen the captive thumbscrews on the release handles, and pull the handles to the open position. The fan shuttle moves out of the BladeCenter chassis about 1.3 cm (0.5 inches).
8. Using the handles, pull the fan shuttle out until it stops (about half-way out).  
**Attention:** Use your hands to hold the frame of the fan shuttle where the fan-module bays are located. Do not use the release handles to hold the fan shuttle.

9. While you support the fan shuttle with your hands, pull the shuttle out of the BladeCenter HT chassis.
10. If you are instructed to return the shuttle, follow all packaging instructions and use any packaging materials for shipping that are supplied to you.

## Installing the fan shuttle

To install the shuttle, complete the following steps.



1. Read the safety information that begins on page vii and “Installation guidelines” on page 31.
2. Make sure that no modules are installed in the fan shuttle and the release handles on the shuttle are in the open position.
 

**Attention:** Use your hands to hold the frame of the fan shuttle where the fan-module bays are located. Do not use the release handles to hold the fan shuttle.
3. Orient the fan shuttle so that fan-module bays 1 and 3 are above fan-module bays 2 and 4 (see “Rear view” on page 16).
4. Align the shuttle with the BladeCenter chassis and push the shuttle into the chassis until it stops.
5. Push the release handles to the closed position. The shuttle will move back fully into the BladeCenter chassis.
6. Tighten the captive thumbscrews on the fan shuttle.
7. Tighten the captive thumbscrew on each release handle.
 

**Important:** The release handles have a safety switch that disables power output from the power boxes. If the release handles are not secured to the chassis with the thumbscrews, the BladeCenter HT unit will not power on.
8. Install any of the following modules that were removed from the rear of the BladeCenter HT unit:
  - Fan modules (see “Installing a fan module” on page 85).

- Network clock-module fillers (see “Installing a network clock-module filler” on page 78).
  - Multiplexer expansion modules (see “Installing a multiplexer expansion module” on page 80).
  - Alarm panel module (see “Installing an alarm panel module” on page 82).
9. Reconnect any cables that were disconnected from the modules in the rear of the BladeCenter HT unit.
  10. Reconnect the power to the BladeCenter HT unit (see “Supplying power to the BladeCenter HT unit” on page 6).
  11. Restart any blade servers that were shut down in the BladeCenter HT unit. See the documentation that comes with each blade server for detailed instructions.

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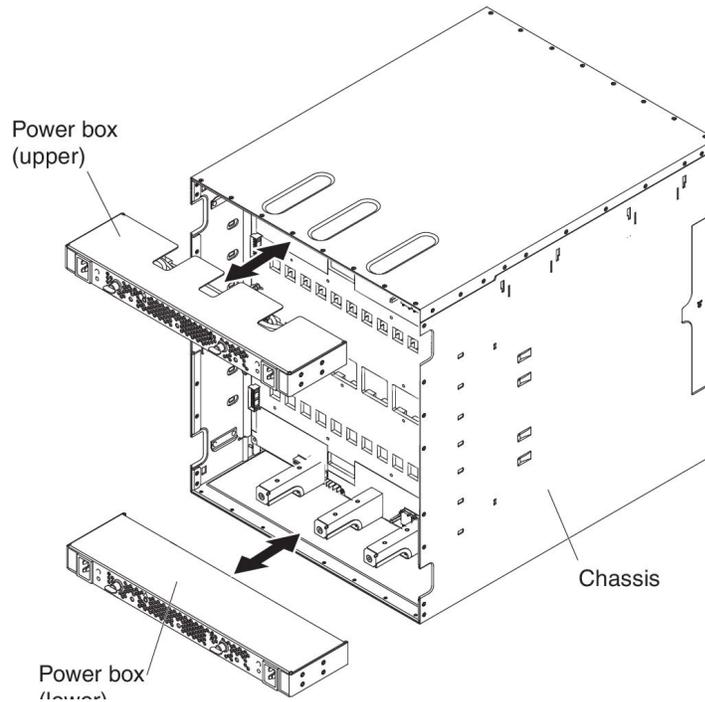
## Removing and replacing FRUs

FRUs must be installed only by trained service technicians.

The illustrations in this document might differ from your hardware.

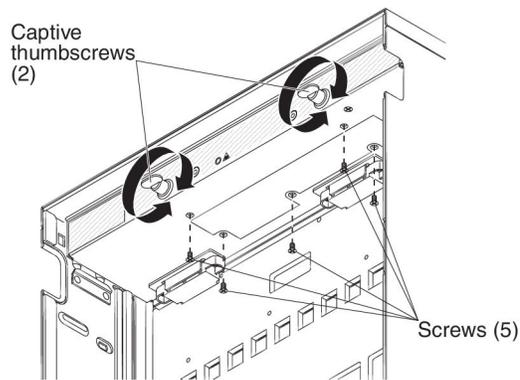
### Removing a power box

To remove a power box, complete the following steps.

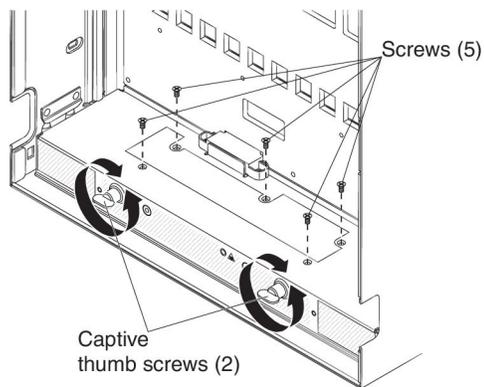


1. Read the safety information that begins on page vii and “Installation guidelines” on page 31.
2. Shut down the operating systems and turn off any blade servers in the BladeCenter HT unit. See the documentation that comes with the blade server for detailed instructions.
3. Disconnect the power from the BladeCenter HT unit (see “Disconnecting power from the BladeCenter HT unit” on page 11).
4. Remove the fan shuttle from the BladeCenter HT unit (see “Removing the fan shuttle” on page 89).

### Upper power box:



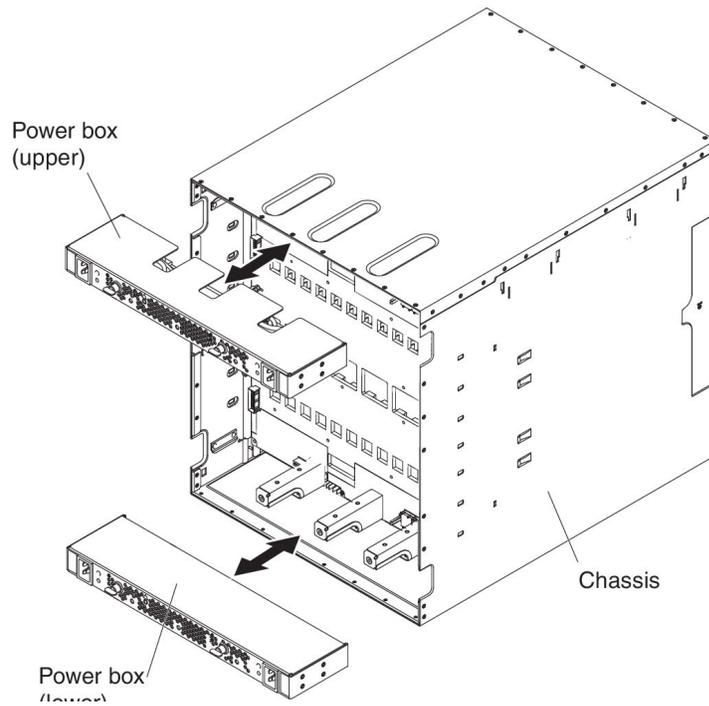
### Lower power box:



5. Remove the 5 phillips-head screws that attach the power box to the chassis.
6. Loosen the two captive thumbscrews on the power box by turning them counter-clockwise approximately 8 turns.
7. Slide the power box away from the BladeCenter HT unit.
8. If you are instructed to return the power box, follow all packaging instructions and use any packaging materials for shipping that are supplied to you.

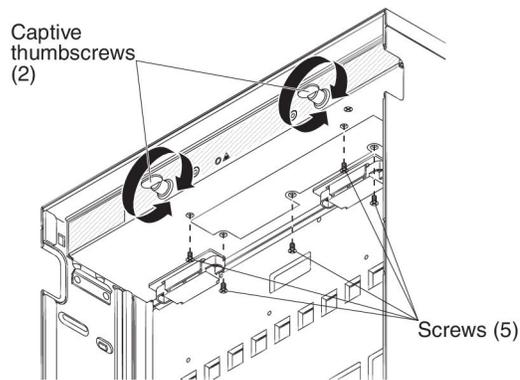
## Installing a power box

To install a power box, complete the following steps.

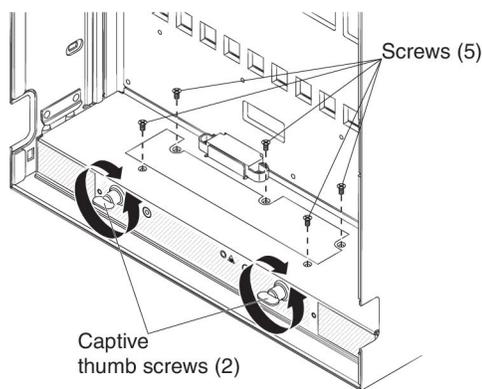


1. Read the safety information that begins on page vii and “Installation guidelines” on page 31.
2. Orient the connectors on the back of the power box with the connectors in the BladeCenter HT chassis.
3. Slide the power box into the BladeCenter HT chassis.

#### Upper power box:



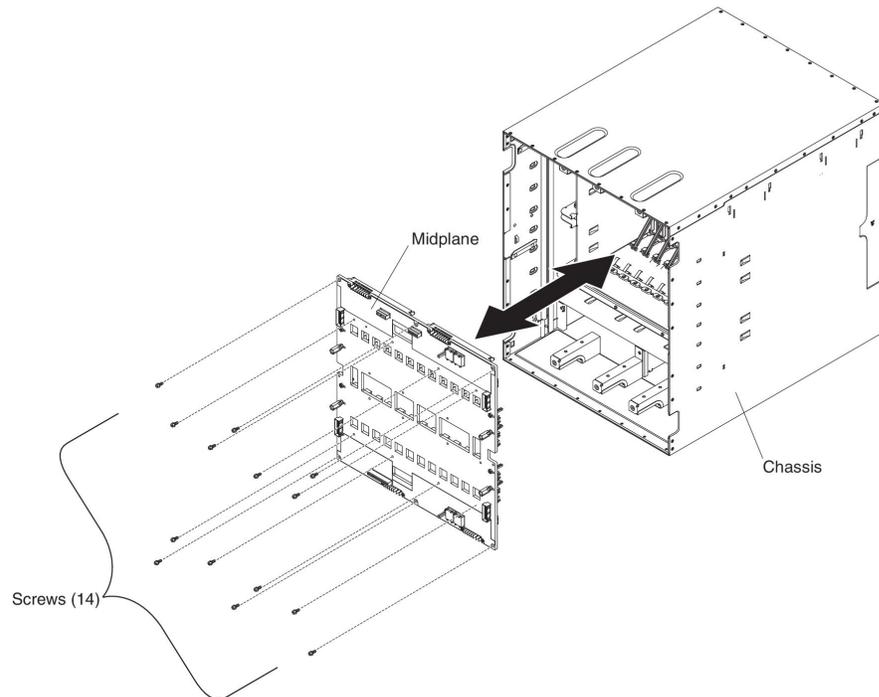
#### Lower power box:



4. Tighten the two captive thumbscrews on the power box by turning the thumbscrews clockwise approximately eight turns.
5. Install the five phillips-head screws that attach the power box to the chassis.
6. Install the fan shuttle into the BladeCenter HT unit (see “Installing the fan shuttle” on page 90).
7. Reconnect any cables that were disconnected from the modules in the rear of the BladeCenter HT unit.
8. Reconnect the power to the BladeCenter HT unit (see “Supplying power to the BladeCenter HT unit” on page 6).
9. Restart any blade servers that were shut down in the BladeCenter HT unit. See the documentation that comes with each blade server for detailed instructions.

## Removing the midplane

To remove the midplane, complete the following steps.



1. Read the safety information that begins on page vii and “Installation guidelines” on page 31.
2. Shut down the operating systems and turn off any blade servers in the BladeCenter HT unit. See the documentation that comes with the blade server for detailed instructions.
3. Disconnect the power from the BladeCenter HT unit (see “Disconnecting power from the BladeCenter HT unit” on page 11).
4. Remove the following components from the front of the BladeCenter HT unit.
  - I/O modules: Pull the handle on each I/O module or filler to the open position and remove the module or filler (see “Removing an I/O module” on page 64).
  - High-speed I/O modules: Pull the two release handles on each high-speed I/O module or filler to the open position and remove the module or filler (see “Removing a high-speed I/O module” on page 71).
  - Management modules: Pull the handle on each management module or filler to the open position and remove the module or filler (see “Removing a high-speed I/O module” on page 71).
5. Disengage the following components from the BladeCenter HT midplane using the procedure indicated:

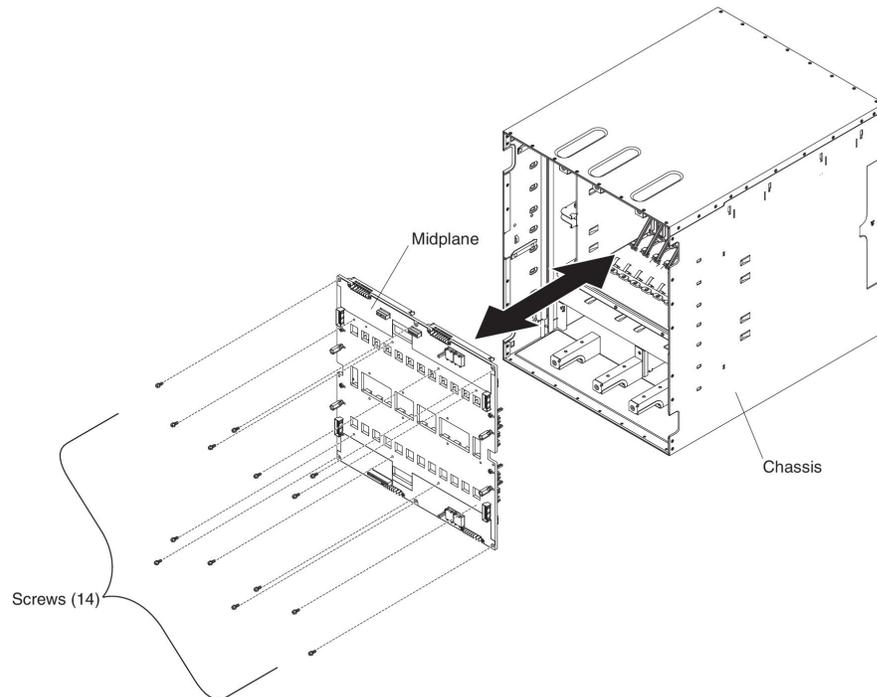
**Note:** Make sure each component is pulled out of the BladeCenter HT unit at least 2.54 cm (1 inch).

- Blade servers: Pull the two release handles on each blade server to the open position (see “Removing a blade server” on page 60).
- Power modules: Pull the handle on each power module or filler to the open position (see “Removing a power module” on page 55).
- Media tray: Pull the handle on each media tray or filler to the open position (see “Removing a media tray” on page 51).

- I/O module interposers: Pull the handle on each I/O module interposer to the open position (see “Removing an I/O-module interposer” on page 62).
  - High-speed I/O module interposers: Pull the two release handles on each high-speed I/O module interposer to the open position (see “Removing a high-speed I/O-module interposer tray” on page 66).
  - Management module interposers: Pull the handle on each management module interposer to the open position (see “Removing a management-module interposer” on page 73).
6. Remove the fan shuttle from the BladeCenter HT unit (see “Removing the fan shuttle” on page 89).
  7. Remove the upper and lower power boxes from the rear of the BladeCenter HT chassis (see “Removing a power box” on page 92).
  8. Remove the 14 phillips-head screws that secure the midplane to the shuttle.
  9. Pull the midplane away from the BladeCenter HT unit.
  10. If you are instructed to return the midplane, follow all packaging instructions and use any packaging materials for shipping that are supplied to you.

## Installing the midplane

To install the midplane, complete the following steps.



1. Read the safety information that begins on page vii and “Installation guidelines” on page 31.
2. Orient the midplane so that the "TOP" label is above the "BOTTOM" label and the labels face away from the chassis.
3. Align the screw holes on the midplane with the screw holes in the rear of the BladeCenter HT chassis and put the midplane into the rear of the chassis.
4. Push the midplane into the chassis until the midplane is seated in the chassis.
5. Install the 14 phillips-head screws that attach the midplane to the BladeCenter HT chassis.
6. Install the upper and lower power boxes into the BladeCenter HT chassis (see “Installing a power box” on page 94).
7. Install the fan shuttle into the BladeCenter HT chassis (see “Installing the fan shuttle” on page 90).
8. Push the following components fully into the front of the BladeCenter HT unit to re-engage the midplane:
  - Blade servers: Slide each blade server or filler into the bay; then, push the two release handles to the closed position (see “Installing a blade server” on page 61).
  - Media trays: Slide each media tray or filler into the BladeCenter HT; then, push the release handle to the closed position (see “Installing a media tray” on page 52).
  - I/O module interposers: Slide each I/O-module interposer or tray into the BladeCenter HT; then, push the release handle to the closed position (see “Installing an I/O-module interposer” on page 63).

- High-speed I/O module interposers: Slide each high-speed I/O-module interposer or tray into the BladeCenter HT; then, push the release handles to the closed position (see “Installing a high-speed I/O-module interposer tray” on page 67).
  - Management module interposers: Slide each management-module interposer or tray into the BladeCenter HT; then, push the release handle to the closed position (see “Installing a management-module interposer” on page 74).
9. Install the following components into the front of the BladeCenter HT unit:
    - I/O modules: Slide each I/O-module or filler into the BladeCenter HT; then, push the release handle to the closed position (see “Installing an I/O module” on page 65).
    - High-speed I/O modules: Slide each high-speed I/O module or filler into the BladeCenter HT; then, push the release handles to the closed position (see “Installing a high-speed I/O module” on page 72).
    - Management modules: Slide each management module or filler into the BladeCenter HT; then, push the release handle to the closed position (see “Installing a management module” on page 76).
  10. Reconnect the power to the BladeCenter HT unit (see “Supplying power to the BladeCenter HT unit” on page 6).
  11. Slide each power module or filler into the bay; then, push the release handle to the closed position (see “Installing a power module” on page 57).
  12. Restart any blade servers that were shut down in the BladeCenter HT unit. See the documentation that comes with the blade server for detailed instructions.
  13. Update the vital product data (VPD) for the BladeCenter:
    - a. Log into the advanced management module Web interface.
    - b. In the navigation pane, click **Monitor** → **Hardware VPD**.
    - c. Click **Chassis**.
    - d. Click **Edit BladeCenter System Vital Product Data**.
    - e. Obtain the model number and serial number on the ID label on the BladeCenter; then, enter the information in the **Type/Model** and **Serial Number** fields.
    - f. If the advanced management module is using firmware version BPET54R or older, restart the advanced management module.



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## Chapter 5. Diagnostics

This chapter describes the diagnostic tools that are available to help you solve problems that might occur in the BladeCenter HT unit.

If you cannot locate and correct the problem using the information in this chapter, see Appendix A, “Getting help and technical assistance,” on page 121 for more information.

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### Diagnostic tools

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

- **Troubleshooting tables**

These tables list problem symptoms and steps to correct the problems. See “Troubleshooting tables” on page 102 for more information.

- **Diagnostic programs and error messages**

The built-in self-test (BIST) program checks the BladeCenter HT unit during startup and generates error messages if problems are found.

- **Light path diagnostic LEDs**

Use the light path diagnostic LEDs on the BladeCenter HT unit and the BladeCenter components to identify system errors quickly. See “Light path diagnostic LEDs” on page 113.

- **System event logs**

The management module stores system events and can be accessed through the management module user interface. See the *User's Guide* that comes with the management module for more information.

- **Service data**

The management module stores important hardware information that can be accessed through the management module user interface. See the *User's Guide* that comes with the management module for more information.

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## Troubleshooting tables

Use the troubleshooting tables to find solutions to problems that have identifiable symptoms. If one or more LEDs on the BladeCenter HT unit or the components is lit, see “Light path diagnostic LEDs” on page 113.

If you cannot find the problem in these tables, see “Solving undetermined problems” on page 118.

If you have just added a new optional device and the BladeCenter HT unit is not working, complete the following steps before using the troubleshooting tables:

1. Remove the device that you just added.
2. Restart the BladeCenter HT unit to determine whether the BladeCenter HT unit is working correctly.
3. Update the firmware for the optional device.
4. Reinstall the new device.

## Blade server problems

- Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.
- See Chapter 3, “Parts listing,” on page 23 to determine which components are CRUs and which components are FRUs.
- If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician.

Symptom	Action
A blade server power-on LED flashes rapidly for an extended amount of time.	<ul style="list-style-type: none"><li>• Make sure that at least one management module is installed and it is active and working.</li><li>• Make sure that the version of the management-module firmware is correct for the blade server type and model.</li><li>• Use the management-module Web interface to check the event log.</li><li>• If the management-module event log indicates an SP comm or kernel mode error, call for service.</li><li>• Use the management-module Web interface to make sure that local power control is enabled for the blade server. See the <i>Management Module User's Guide</i> for more information.</li><li>• Reseat the blade server.</li><li>• Make sure that the fault LEDs on the multiplexer expansion modules are not lit. If a fault LED on a multiplexer expansion module is lit, reseat the module.</li><li>• Move the management module to the other management-module bay, or failover to the second management module.</li><li>• Move the blade server to a known working bay in the BladeCenter HT unit or in another BladeCenter HT unit.</li><li>• Replace the blade server.</li></ul>

<ul style="list-style-type: none"> <li>• Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.</li> <li>• See Chapter 3, “Parts listing,” on page 23 to determine which components are CRUs and which components are FRUs.</li> <li>• If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician.</li> </ul>	
Symptom	Action
A blade server does not power-on.	<ul style="list-style-type: none"> <li>• Press the power-control button on the blade server to turn it on. See your blade server documentation for more information.</li> <li>• Reseat the blade server.</li> <li>• Make sure that power modules are installed and working. <b>Note:</b> Power modules 1 and 2 provide power to blade bays 1 through 6, and power modules 3 and 4 supply power to blade bays 7 through 10.</li> <li>• Make sure that at least one management module is installed and it is active and working.</li> <li>• Check the event log, using the management-module Web interface.</li> <li>• Use the management-module Web interface to make sure that local power control is enabled for the blade server.</li> <li>• Make sure that the fault LEDs on the multiplexer expansion modules are not lit. If a fault LED on a multiplexer expansion module is lit, reseal the module.</li> <li>• Move the blade server to a known working bay in the BladeCenter HT unit or in another BladeCenter HT unit.</li> <li>• Replace the blade server.</li> </ul>

## Fan-module problems

<ul style="list-style-type: none"> <li>• Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.</li> <li>• See Chapter 3, “Parts listing,” on page 23 to determine which components are CRUs and which components are FRUs.</li> <li>• If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician.</li> </ul>	
Symptom	Action
A fan module is running at full speed.	<ol style="list-style-type: none"> <li>1. Make sure that: <ul style="list-style-type: none"> <li>• All other fan modules are installed and working.</li> <li>• At least one management module is installed and it is active and working.</li> </ul> </li> <li>2. Reseat the following components: <ol style="list-style-type: none"> <li>a. Multiplexer expansion modules (see “Removing a multiplexer expansion module” on page 79)</li> <li>b. Fan modules (see “Removing a fan module” on page 83)</li> </ol> </li> <li>3. Reverse the locations of the fan modules. (If more than two fan modules are removed or more than two fan modules experience a double fan failure, the blade servers will shut down within 1 to 3 seconds.) <ol style="list-style-type: none"> <li>a. If the same fan module runs at full speed, replace it.</li> <li>b. If a different fan module in the same bay runs at full speed, call for service.</li> </ol> </li> </ol>

- Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.
- See Chapter 3, “Parts listing,” on page 23 to determine which components are CRUs and which components are FRUs.
- If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician.

Symptom	Action
All fan modules are running at full speed.	<ol style="list-style-type: none"> <li>1. Make sure that: <ul style="list-style-type: none"> <li>• All other fan modules are installed and working.</li> <li>• At least one management module is installed and it is active and working.</li> <li>• The BladeCenter HT unit is not overheating. Use the management-module Web interface to check the operating temperature within the BladeCenter HT unit.</li> </ul> </li> <li>2. Check the management-module event log for I2C bus errors. Resolve the errors before you proceed.</li> <li>3. Reseat the following components: <ol style="list-style-type: none"> <li>a. Fan modules (see “Removing a fan module” on page 83)</li> <li>b. Multiplexer expansion modules (see “Removing a multiplexer expansion module” on page 79)</li> <li>c. Management modules (see “Removing a management module” on page 75)</li> <li>d. Shuttle (see “Removing the fan shuttle” on page 89)</li> </ol> </li> <li>4. Use a known working fan module to find a fan module that is not working correctly. If one fan module is not working, the other fan modules will run at full speed.</li> <li>5. If another BladeCenter HT unit is available, install the fan modules into the working BladeCenter HT unit to make sure the fan modules are not defective.</li> </ol>
A fan module is not working.	<ol style="list-style-type: none"> <li>1. Make sure that all power cords are connected to proper power sources and that the power sources are working.</li> <li>2. Reseat the fan module (see “Removing a fan module” on page 83)</li> <li>3. Install a known working fan module into the bay of the nonworking fan module to isolate the problem to the fan module or to the fan bay.</li> <li>4. If the problem is isolated to the bay, reverse the locations of the power cords. If that changes the failing bay, replace the power cord that powers that bay.</li> <li>5. If another fan module works in the fan bay, replace the fan module.</li> </ol>

## Fan pack problems

<ul style="list-style-type: none"> <li>Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.</li> <li>See Chapter 3, “Parts listing,” on page 23 to determine which components are CRUs and which components are FRUs.</li> <li>If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician.</li> </ul>	
Symptom	Action
<p>A fan pack is running at full speed.</p> <p><b>Note:</b> A fan pack is installed on the front of each power module.</p>	<ol style="list-style-type: none"> <li>Make sure that at least one management module is installed and it is active and working.</li> <li>Reseat the following components:             <ol style="list-style-type: none"> <li>Power module (see “Removing a power module” on page 55)</li> <li>Fan pack (see “Removing a fan pack” on page 58)</li> </ol> </li> <li>Install the fan pack on another power module to isolate the problem to the fan pack or to the power module.</li> </ol>

## I/O module problems

<ul style="list-style-type: none"> <li>Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.</li> <li>See Chapter 3, “Parts listing,” on page 23 to determine which components are CRUs and which components are FRUs.</li> <li>If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician.</li> </ul>	
Symptom	Action
<p>An I/O module will not turn on.</p>	<ol style="list-style-type: none"> <li>Make sure that:             <ul style="list-style-type: none"> <li>An I/O-module interposer is installed.</li> <li>Power modules 3 and 4 are installed and working, if the I/O module is in any of I/O-module bays 7 through 10.</li> <li>Power modules 1 and 2 are installed and working, if the I/O module is in any of I/O-module bays 1 through 4.</li> <li>At least one management module is installed and it is working.</li> </ul> </li> <li>Check the management-module event log for messages.</li> <li>Check the management module for I/O POST error codes.</li> <li>Make sure that the installed version of the management-module firmware supports the I/O module.</li> <li>Reseat the I/O-module interposer and the I/O module (see “Removing an I/O module” on page 64).</li> <li>Move the I/O module to a known working I/O bay in the BladeCenter HT unit or in another BladeCenter HT unit.             <ol style="list-style-type: none"> <li>If the I/O module does not work in that bay, replace it.</li> <li>If the I/O module works in the known working bay, call for service.</li> </ol> </li> </ol>

- Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.
- See Chapter 3, “Parts listing,” on page 23 to determine which components are CRUs and which components are FRUs.
- If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician.

Symptom	Action
Cannot communicate with the external ports on an I/O module.	<ol style="list-style-type: none"> <li>1. Make sure that the external ports option is enabled in the management-module Web interface.</li> <li>2. Check the management-module logs to verify that the active management module has completed POST.</li> <li>3. Make sure that the blade server that is being used to initiate the communication has a known good configuration.</li> <li>4. Check the management interface of the I/O module and the upstream switch and verify that a good link exists.</li> <li>5. Verify that the configuration on the I/O module is good by copying a known good configuration to the I/O module or by resetting the I/O module to the default configuration.</li> <li>6. Reseat the I/O module (see “Removing an I/O module” on page 64).</li> <li>7. Replace the I/O module with a known working I/O module of the same type in the bay or move the I/O module to a known working bay.</li> <li>8. Replace the I/O module.</li> </ol>

## Keyboard, mouse, or pointing-device problems

**Note:** These symptoms apply only to the devices that are connected to the management module; they do not apply to the remote console or the media tray..

<ul style="list-style-type: none"> <li>• Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.</li> <li>• See Chapter 3, “Parts listing,” on page 23 to determine which components are CRUs and which components are FRUs.</li> <li>• If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician.</li> </ul>	
Symptom	Action
The keyboard, mouse, or pointing device is not working.	<ol style="list-style-type: none"> <li>1. Make sure that: <ul style="list-style-type: none"> <li>• The device is connected to the active management module.</li> <li>• The KVM is owned by a blade server that supports KVM.</li> <li>• The blade server that owns the KVM is turned on.</li> </ul> </li> <li>2. Reseat the device cable.</li> <li>3. Replace the device.</li> </ol>
The keyboard, mouse or pointing device does not work after ownership of the KVM is switched to a different blade server.	<p>Make sure that:</p> <ul style="list-style-type: none"> <li>• The device cables are connected to the active management module, not the USB connectors on the media tray.</li> <li>• The KVM is owned by a blade server that supports KVM.</li> </ul>

## Management-module problems

<ul style="list-style-type: none"> <li>• Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.</li> <li>• See Chapter 3, “Parts listing,” on page 23 to determine which components are CRUs and which components are FRUs.</li> <li>• If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician.</li> </ul>	
Symptom	Action
Cannot connect to the BladeCenter HT unit by using the Web interface or Telnet.	<ol style="list-style-type: none"> <li>1. Make sure that: <ul style="list-style-type: none"> <li>• The management-module interposer is installed.</li> <li>• The network cable is connected to the Ethernet port on the active management module.</li> <li>• The network cable is not connected to the serial port on the management module.</li> <li>• The IP address or host name is correct.</li> </ul> </li> <li>2. Reseat the management-module interposer and the management module (see “Removing a management-module interposer” on page 73).</li> <li>3. Move the management module to the other bay.</li> <li>4. Reset and reconfigure the management module (see the <i>BladeCenter Advanced Management Module Installation Guide</i> for more information).</li> <li>5. Replace the management module.</li> </ol>

<ul style="list-style-type: none"> <li>• Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.</li> <li>• See Chapter 3, “Parts listing,” on page 23 to determine which components are CRUs and which components are FRUs.</li> <li>• If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician.</li> </ul>	
Symptom	Action
Cannot connect to the BladeCenter HT unit after a switchover to the redundant management module	<ol style="list-style-type: none"> <li>1. Make sure that: <ul style="list-style-type: none"> <li>• The network cable is connected to the Ethernet port on the active (redundant) management module.</li> <li>• The network cable is not connected to the serial port on the active (redundant) management module.</li> <li>• The IP address or host name is correct.</li> </ul> </li> <li>2. Reseat the management module (see “Removing a management module” on page 75).</li> <li>3. Reset and reconfigure the management module (see the <i>BladeCenter Advanced Management Module Installation Guide</i> for more information).</li> <li>4. Replace the management module.</li> </ol>

## Media tray problems

<ul style="list-style-type: none"> <li>• Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.</li> <li>• See Chapter 3, “Parts listing,” on page 23 to determine which components are CRUs and which components are FRUs.</li> <li>• If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician.</li> </ul>	
Symptom	Action
An external USB device is not recognized by any blade server. <b>Note:</b> The BladeCenter HT unit supports one external USB hub.	<ol style="list-style-type: none"> <li>1. Make sure that the active blade server and the installed operating system support USB devices.</li> <li>2. Make sure that the blade server is enabled to use a USB device. See your blade server documentation for more information.</li> <li>3. Make sure that the USB device is powered-on.</li> <li>4. Make sure that the blade server is turned on and owns KVM control. See the blade server documentation for more information.</li> <li>5. Check the LEDs on the multiplexer expansion module.</li> <li>6. Reseat the following components: <ol style="list-style-type: none"> <li>a. USB device</li> <li>b. Media tray (see “Removing a media tray” on page 51)</li> <li>c. Multiplexer expansion module (see “Removing a multiplexer expansion module” on page 79)</li> </ol> </li> <li>7. Replace the following components: <ol style="list-style-type: none"> <li>a. USB device</li> <li>b. Media tray</li> <li>c. Multiplexer expansion module</li> </ol> </li> </ol>

- Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.
- See Chapter 3, “Parts listing,” on page 23 to determine which components are CRUs and which components are FRUs.
- If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician.

Symptom	Action
A CompactFlash module is not recognized by the management module.	<ol style="list-style-type: none"> <li>1. Reseat the following components:               <ol style="list-style-type: none"> <li>a. Media tray (see “Removing a media tray” on page 51)</li> <li>b. CompactFlash module (see “Removing a CompactFlash module” on page 53)</li> <li>c. Multiplexer expansion module (see “Removing a multiplexer expansion module” on page 79)</li> </ol> </li> <li>2. Replace the following components:               <ol style="list-style-type: none"> <li>a. Media tray</li> <li>b. CompactFlash module</li> <li>c. Multiplexer expansion module</li> </ol> </li> </ol>

## Monitor or video problems

**Note:** These symptoms apply only to the monitor that is connected to the management module; they do not apply to the remote console.

Some IBM monitors have their own self-tests. If you suspect a problem with your monitor, see the documentation that comes with the monitor for instructions for testing and adjusting the monitor.

<ul style="list-style-type: none"><li>• Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.</li><li>• See Chapter 3, “Parts listing,” on page 23 to determine which components are CRUs and which components are FRUs.</li><li>• If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician.</li></ul>	
Symptom	Action
The monitor is not working	<ol style="list-style-type: none"><li>1. Make sure that:<ul style="list-style-type: none"><li>• The monitor is turned on and the brightness and contrast controls are adjusted correctly.</li><li>• The monitor is connected to the active management module.</li><li>• The blade server that owns the KVM is turned on.</li><li>• The KVM is owned by a blade server that supports KVM.</li></ul></li><li>2. Reseat the monitor cable.</li><li>3. Reseat the multiplexer expansion module (see “Removing a multiplexer expansion module” on page 79)</li><li>4. Replace the monitor.</li><li>5. Replace the multiplexer expansion module.</li></ol>

## Power problems

<ul style="list-style-type: none"> <li>• Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.</li> <li>• See Chapter 3, “Parts listing,” on page 23 to determine which components are CRUs and which components are FRUs.</li> <li>• If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician.</li> </ul>	
Symptom	Action
The BladeCenter HT unit does not power-on.	<ol style="list-style-type: none"> <li>1. Make sure that:             <ol style="list-style-type: none"> <li>a. If the BladeCenter HT unit is a type 8740, dc power modules are installed.</li> <li>b. If the BladeCenter HT unit is a type 8750, ac power modules are installed.</li> <li>c. The power modules do not have damaged connectors.</li> <li>d. All power cords are connected to compatible power sources and the power sources are working.</li> <li>e. The input and output LEDs on the power modules are lit.</li> <li>f. The shuttle release handles are in the closed position and the captive thumbscrews are tightened.</li> </ol> </li> <li>2. If you just installed an optional device, remove it and restart the BladeCenter HT unit. If the BladeCenter HT unit now powers-on, you might have installed more devices than the power modules support. You might have to install power modules in power-module bays 3 and 4.</li> <li>3. See “Solving undetermined problems” on page 118.</li> </ol>
A new device does not power-on.	<ol style="list-style-type: none"> <li>1. Make sure that:             <ol style="list-style-type: none"> <li>a. Power modules are installed in the power-module bays as necessary. Power modules are required in power-module bays 3 and 4 if blade servers are installed in blade bays 7 through 12 or if I/O modules are installed in any of I/O-module bays 7 through 10.</li> <li>b. If an I/O module is installed in any I/O module bay 1 through 4, power modules 1 and 2 are installed and working.</li> <li>c. The device is allowed local power control through the management module Web interface.</li> </ol> </li> <li>2. Reseat the device.</li> <li>3. Remove the device and insert it into a known working bay of the same type.             <ol style="list-style-type: none"> <li>a. If the device still will not power-on, replace it.</li> <li>b. If the device powers-on in the other bay, call for service.</li> </ol> </li> <li>4. See “Solving undetermined problems” on page 118.</li> </ol>
The green power-module input LED is not lit.	<ol style="list-style-type: none"> <li>1. Make sure that:             <ol style="list-style-type: none"> <li>a. All power cords are connected to compatible power sources and the power sources are working.</li> <li>b. The shuttle release handles are in the closed position and the captive thumbscrews are tightened.</li> </ol> </li> <li>2. Replace the power module with a power module that is known to work.</li> <li>3. See “Solving undetermined problems” on page 118.</li> </ol>

- Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.
- See Chapter 3, “Parts listing,” on page 23 to determine which components are CRUs and which components are FRUs.
- If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician.

Symptom	Action
The green power-module output LED is not lit.	<ol style="list-style-type: none"> <li>1. Make sure that:               <ol style="list-style-type: none"> <li>a. All power cords are connected to compatible power sources and the power sources are working.</li> <li>b. The shuttle release handles are in the closed position and the captive thumbscrews are tightened.</li> </ol> </li> <li>2. Replace the power module with a power module that is known to work.</li> <li>3. See “Solving undetermined problems” on page 118.</li> </ol>
The amber power-module error LED is lit.	<ol style="list-style-type: none"> <li>1. Make sure that:               <ol style="list-style-type: none"> <li>a. All power cords are connected to compatible power sources and the power sources are working.</li> <li>b. The shuttle release handles are in the closed position and the captive thumbscrews are tightened.</li> </ol> </li> <li>2. Replace the power module with a power module that is known to work.</li> <li>3. See “Solving undetermined problems” on page 118.</li> </ol>

## Light path diagnostic LEDs

Light path diagnostic LEDs are a system of LEDs on the BladeCenter HT unit and the BladeCenter components that can be used to identify system errors. If the front or rear system-error LED of the BladeCenter HT unit is lit, one or more error LEDs on the BladeCenter components also might be lit. These LEDs help identify the cause of the problem.

## BladeCenter system LEDs

Use the following table to find solutions to problems that are identified by the media tray and alarm panel module LED panels.

Lit LED	Cause	Action
<b>Media tray and alarm panel module LED panel</b>		
Power-on (Green)	When this green LED is lit, power is present in the BladeCenter HT unit. When this LED is off, the power subsystem, the power, or the LED has failed, or the management module is not present or not functioning.  <b>Attention:</b> If the power-on LED is not lit, there still might be electrical current present in the BladeCenter HT unit. The LED might be burned out. To remove all electrical current from the BladeCenter HT unit, remove all of the power modules or disconnect all power cords from the power connectors in the rear of the chassis.	<ol style="list-style-type: none"> <li>1. Make sure the BladeCenter HT is connected to a compatible power supply (see “Supplying power to the BladeCenter HT unit” on page 6).</li> <li>2. Reseat the following components: <ol style="list-style-type: none"> <li>a. Media tray (see “Removing a media tray” on page 51.)</li> <li>b. Power modules (see “Removing a power module” on page 55.)</li> <li>c. Management module (see “Removing a management module” on page 75.)</li> </ol> </li> </ol>
Location (Blue)	When this blue LED is lit, a condition has occurred in the BladeCenter HT unit that has caused the remote system management to identify the BladeCenter HT unit as needing attention.	Look for any information or error LEDs on the system LED panels, the modules, and the blade servers in this BladeCenter HT unit.
Critical system fault (Amber/Red)	When this LED is lit, the BladeCenter HT unit has a critical system fault. A critical system fault is an error or event that is detected by the system with a significant impact to the system. In this case, the system cannot continue to operate or is operating in a non-redundant power configuration or a non-redundant cooling configuration. The critical alarm LED will be enabled and the critical alarm relay will be activated.	<ol style="list-style-type: none"> <li>1. Check the error log for messages.</li> <li>2. Look for a lit error LED on the modules and blade servers to locate a failing component: <ul style="list-style-type: none"> <li>• If the error LED is on a module, see the documentation that comes with the module.</li> <li>• If the error LED is on a blade server, see the documentation that comes with the blade server.</li> </ul> </li> </ol>
Major system fault (Amber/Red)	When this LED is lit, the BladeCenter HT unit has a major system fault. The system can continue to operate but may lose some functionality and performance. The rear panel major alarm LED will be enabled and the major alarm relay will be activated.	<ol style="list-style-type: none"> <li>1. Check the error log for messages.</li> <li>2. Look for a lit error LED on the modules and blade servers to locate a failing component: <ul style="list-style-type: none"> <li>• If the error LED is on a module, see the documentation that comes with the module.</li> <li>• If the error LED is on a blade server, see the documentation that comes with the blade server.</li> </ul> </li> </ol>

Lit LED	Cause	Action
Minor system fault (Amber)	When this LED is lit, the BladeCenter HT unit has a minor system fault. The system can continue to operate, usually without noticeable loss of functionality or performance. The rear panel minor alarm LED will be enabled and the minor alarm relay will be activated.	Check the error log for the messages. Check the LEDs on the BladeCenter HT unit and the blade servers to isolate the component.
Media tray fault (Amber) <b>Note:</b> The media tray fault LED is located on the media tray on the front of the BladeCenter HT unit.	There is an error with the media tray.	<ol style="list-style-type: none"> <li>1. Reseat the media tray (see “Removing a media tray” on page 51.)</li> <li>2. Replace the media tray.</li> </ol>
Alarm panel module fault (Amber) <b>Note:</b> The alarm panel module fault LED is located on the alarm panel module on the rear of the BladeCenter HT unit.	There is an error with the alarm panel module.	<ol style="list-style-type: none"> <li>1. Reseat the alarm panel module (see “Removing an alarm panel module” on page 81.)</li> <li>2. Replace the alarm panel module.</li> </ol>

## Module LEDs

Use the following table to find solutions to problems that are identified by LEDs on the modules installed in BladeCenter HT unit.

**Note:** To find descriptions and actions for LEDs on I/O modules or blade servers, see the documentation that comes with the device.

LED status	Description	Action
<p>Management module: Error LED lit  (Amber)</p>	<p>A critical error has occurred in the management module.</p>	<ol style="list-style-type: none"> <li>1. Reseat the management module and management-module interposer.</li> <li>2. Reset and reconfigure the management module. See the <i>BladeCenter Advanced Management Module Installation Guide</i> for more information.</li> <li>3. Replace the management module.</li> </ol>
<p>Power module: Input power LED not lit  (Green)</p>	<p>There is no power being supplied to the power module or the power module has failed.</p>	<p>Make sure that:</p> <ol style="list-style-type: none"> <li>1. All power cords are plugged into compatible power sources and that the power sources are working.</li> <li>2. The shuttle release handles are in the closed position and the captive thumbscrews are tightened.</li> </ol> <p>Replace the power module with a power module that is known to work. If the problem remains, go to “Solving undetermined problems” on page 118.</p>
<p>Power module: Output power LED not lit  (Green)</p>	<p>There is no power being supplied to the power module or the power module has failed.</p>	<p>Make sure that:</p> <ol style="list-style-type: none"> <li>1. All power cords are plugged into compatible power sources and that the power sources are working.</li> <li>2. The shuttle release handles are in the closed position and the captive thumbscrews are tightened.</li> </ol> <p>Replace the power module with a power module that is known to work. If the problem remains, go to “Solving undetermined problems” on page 118.</p>
<p>Power module: Fan error LED lit  (Amber)</p>	<p>The fan pack has failed.</p>	<p>Replace the fan pack.</p>

- Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.
- See Chapter 3, “Parts listing,” on page 23 to determine which components are CRUs and which components are FRUs.
- If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician.

LED status	Description	Action
Power module: Error LED lit  (Amber)	The power module has failed.	Make sure that: <ol style="list-style-type: none"> <li>1. All power cords are plugged into compatible power sources and that the power sources are working.</li> <li>2. The shuttle release handles are in the closed position and the captive thumbscrews are tightened.</li> </ol> Replace the power module with a power module that is known to work. If the problem remains, go to “Solving undetermined problems” on page 118.
Fan module: Error LED lit  (Amber)	The fan module has failed.	Replace the fan module with a fan module that is known to work.
Multiplexer expansion module:  Fault LED lit  (Amber)	There is an error with the multiplexer expansion module.	<ol style="list-style-type: none"> <li>1. Reseat the multiplexer expansion module (see “Removing a multiplexer expansion module” on page 79.) <b>Note:</b> The multiplexer expansion module takes several minutes to initialize.</li> <li>2. Replace the multiplexer expansion module.</li> </ol>
Multiplexer expansion module:  One FRR (FRU ready for removal) LED lit  (Blue)	You can remove the multiplexer expansion module without interrupting any connections between the management module and the blade servers. The module is not active while the FRR LED is lit.	Remove the multiplexer expansion module.
Multiplexer expansion module:  Two FRR (FRU ready for removal) LEDs lit  (Blue)	Under normal conditions, the blue FRR LED on the multiplexer expansion module that is associated with the active management module is off, and the FRR LED on the multiplexer expansion module that is associated with the standby management module is lit. If they are both lit, an I2C bus error has occurred between the active management module and the associated multiplexer expansion module, or a problem with the active management module has occurred.	<ol style="list-style-type: none"> <li>1. Force a failover to the standby management module by removing the active management module from the BladeCenter unit. If there is only one management module, move it to the alternative management-module bay.</li> <li>2. If the blue LEDs on both multiplexer expansion modules are still lit after 60 seconds, reverse the locations of the two multiplexer expansion modules.</li> <li>3. If the blue LEDs on both multiplexer expansion modules are still lit after 60 seconds, reverse the locations of the management modules. If there is only one management module, move it to the other management-module bay.</li> <li>4. If the problem remains, possibly an I2C bus failure has occurred on the midplane. Call for service.</li> </ol>

---

## Event log messages

Messages that are generated while the management module is monitoring the BladeCenter HT unit or by the BIST program during startup are displayed in the management module event log. Each message includes a severity level (error [E], warning [W], or information [I]), a source (such as, management module [SERVPROC] or blade server number [BLADE\_xx]), a timestamp, and a text description.

When you are viewing the event log, consider the following information:

- If the source of a message is a blade server, see the documentation that comes with the blade server for more information.
- If the source of a message is not a blade server or the management module, see the documentation that comes with the device for more information.
- By default, the entries are sorted by timestamp, with the most recent entry first. You can sort the entries by severity, source, or timestamp by clicking on the appropriate column heading.
- You can filter the entries to show only the entries that match the severity, source, or date you select.
- When a message identifies a specific component, use the following general procedure to resolve the problem:
  1. Check for lit LEDs on the component (see “Light path diagnostic LEDs” on page 113 for more information).
  2. Reseat the component.
  3. If the problem remains, call for service.
- Review messages with earlier timestamps before taking action on a more recent message. For example, an error message about a failing component with a recent timestamp might be related to an error message about the prior failure of another component.
- For some messages, when a problem has been resolved, the log will display a message beginning with the word “Recovery” and followed by the same text as the original message.

---

## Service data

The management module stores important hardware information that can be accessed through the management module user interface. This information is useful for service personnel to troubleshoot problems. See the *User's Guide* that comes with the management module for using the management module user interface to get the service data information.

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## Solving undetermined problems

If the diagnostic aids did not diagnose the failure or if the BladeCenter HT unit is inoperative, use the information in this section.

**Note:** When you are diagnosing a problem in the BladeCenter HT unit, you must determine if the problem is in the BladeCenter HT unit, one of the BladeCenter modules, or in a blade server.

- If the BladeCenter HT unit contains more than one blade server and only one of the blade servers has the problem, troubleshoot the blade server that has the problem.
- If all of the blade servers have the same symptom, it is probably a BladeCenter HT unit or module problem.

Check the LEDs on all the power modules. If the LEDs indicate that the power modules are working correctly, and reseating the BladeCenter components does not correct the problem, complete the following steps to remove or disconnect the BladeCenter components one at a time until you reach a minimal configuration or you locate the problem.

**Note:** You do not have to remove power from the BladeCenter HT unit.

1. Shut down the operating system on all blade servers.
2. Make sure that each blade server is turned off; then, pull the release handles to the open position and slide it out of the bay approximately 1 inch.
3. Disengage power modules 2, 3, and 4, one at a time. To do this, pull the release handle to the open position and slide the power module out of its bay approximately 1 inch.

**Note:** Blade servers in bays 7 through 10 will not power on with power modules 3 and 4 removed.

4. Disengage the I/O modules, one at a time. To do this, pull the release handle or release handles to the open position and slide the I/O module out of the bay approximately 1 inch.

**Note:** The following minimum configuration is required for troubleshooting the BladeCenter HT unit. See "Features and specifications" on page 5 for the minimum operational configuration.

- BladeCenter HT unit (media tray may be connected)
- One power module in power module bay 1
- Four fan modules
- One management module in management-module bay 1 or 2.
- One multiplexer expansion module in multiplexer expansion-module bay 1 or 2.

**Notes:**

1. If the management module is installed in management-module bay 1, the multiplexer expansion module must be installed in multiplexer expansion-module bay 1.
2. If the management module is installed in management-module bay 2, the multiplexer expansion module must be installed in multiplexer expansion-module bay 2.

The BladeCenter HT unit can be checked with the management module Web interface at each stage as components are removed, and will work in the minimal configuration. If the minimal configuration does not work, do the following.

1. Check the management-module settings. See the *User's Guide* that comes with the management module.
2. Reseat the management module.
3. Install the management module into the second management-module bay.
4. Move the power module to power module bay 2.
5. Make sure that the power cords are installed correctly. See "Supplying power to the BladeCenter HT unit" on page 6 for more information.
6. Contact IBM support.

---

## Calling IBM for service

See Appendix A, "Getting help and technical assistance," on page 121 for information about calling IBM for service.

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

- Machine type, model, and serial number
- Service data from the management module
- Microprocessor or hard disk upgrades
- Failure symptoms
  - Does the system fail the diagnostic programs? If so, what are the error codes?
  - What occurred? When? Where? Did it occur on a single or multiple systems?
  - Is the failure repeatable?
  - Has the current system configuration ever worked?
  - What changes, if any, were made before it failed?
  - Is this the original reported failure, or has this failure been reported before?
- Diagnostic program type and version level
- Hardware configuration (print the screen with the system summary information)
- BIOS code level
- Operating-system type and version level

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

- Machine type and model
- BIOS code level
- Adapters and attachments, in the same locations
- Address jumpers, terminators, and cabling
- Software versions and release levels
- Diagnostic programs type and version level
- Configuration option settings
- Operating-system control-file setup

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## 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. 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.

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### 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.
- 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/](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.

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## 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/>. Also, some documents are available through the IBM Publications Center at <http://www.ibm.com/shop/publications/order/>.

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## Getting help and information from 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/>. The address for IBM System x<sup>®</sup> information is <http://www.ibm.com/systems/x/>. The address for IBM BladeCenter information is <http://www.ibm.com/systems/bladecenter/>. The address for IBM IntelliStation<sup>®</sup> information is <http://www.ibm.com/systems/intellistation/>.

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## How to send Dynamic System Analysis 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](http://www.ibm.com/de/support/ecurep/send_http.html)
- **Standard upload with the system serial number:** [http://www.ecurep.ibm.com/app/upload\\_hw](http://www.ecurep.ibm.com/app/upload_hw)
- **Secure upload:** [http://www.ibm.com/de/support/ecurep/send\\_http.html#secure](http://www.ibm.com/de/support/ecurep/send_http.html#secure)
- **Secure upload with the system serial number:** [https://www.ecurep.ibm.com/app/upload\\_hw](https://www.ecurep.ibm.com/app/upload_hw)

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## Creating a personalized support web page

At <http://www.ibm.com/support/mynotifications/>, you can create a personalized support web page by identifying IBM products that are of interest to you. 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.

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## 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).

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## 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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## IBM Taiwan product service

台灣 IBM 產品服務聯絡方式：  
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  
3F, No 7, Song Ren Rd.  
Taipei, Taiwan  
Telephone: 0800-016-888



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## Appendix B. Notices

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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.

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

Each solid-state memory cell has an intrinsic, finite number of write cycles that the cell can incur. Therefore, a solid-state device has a maximum number of write cycles that it can be subjected to, expressed as “total bytes written” (TBW). A device that has exceeded this limit might fail to respond to system-generated commands or might be incapable of being written to. IBM is not responsible for replacement of a device that has exceeded its maximum guaranteed number of program/erase cycles, as documented in the Official Published Specifications for the device.

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

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## 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 server 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 server 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 server, IBM may condition provision of repair or replacement of servers 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	<ul style="list-style-type: none"> <li>The room air must be continuously filtered with 40% atmospheric dust spot efficiency (MERV 9) according to ASHRAE Standard 52.2<sup>1</sup>.</li> <li>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.</li> <li>The deliquescent relative humidity of the particulate contamination must be more than 60%<sup>2</sup>.</li> <li>The room must be free of conductive contamination such as zinc whiskers.</li> </ul>
Gaseous	<ul style="list-style-type: none"> <li>Copper: Class G1 as per ANSI/ISA 71.04-1985<sup>3</sup></li> <li>Silver: Corrosion rate of less than 300 Å in 30 days</li> </ul>
<p><sup>1</sup> 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><sup>2</sup> 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><sup>3</sup> 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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## Documentation format

The publications for this product are in Adobe Portable Document Format (PDF) and should be compliant with accessibility standards. If you experience difficulties when you use the PDF files and want to request a web-based format or accessible PDF document for a publication, direct your mail to the following address:

*Information Development  
IBM Corporation  
205/A015  
3039 E. Cornwallis Road  
P.O. Box 12195  
Research Triangle Park, North Carolina 27709-2195  
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## **Telecommunication regulatory statement**

This product may not be certified in your country for connection by any means whatsoever to interfaces of public telecommunications networks. Further certification may be required by law prior to making any such connection. Contact an IBM representative or reseller for any questions.

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## **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.

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

## **Industry Canada Class A emission compliance statement**

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

## **Avis de conformité à la réglementation d'Industrie Canada**

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

## Australia and New Zealand Class A statement

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

## 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

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Technical Regulations, Department M372  
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## 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.**

## **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適合品

Japanese Electronics and Information Technology Industries Association (JEITA)  
Confirmed Harmonics Guideline (products less than or equal to 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

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。



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