

Power Systems

*Installing the 5888  
PCIe storage enclosure*





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**Note**

Before using this information and the product it supports, read the information in “Safety notices” on page v, “Notices” on page 27, the *IBM Systems Safety Notices* manual, G229-9054, and the *IBM Environmental Notices and User Guide*, Z125-5823.

This edition applies to IBM Power Systems™ servers that contain the POWER7 processor and to all associated models.

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## Safety notices

Safety notices may be printed throughout this guide:

- **DANGER** notices call attention to a situation that is potentially lethal or extremely hazardous to people.
- **CAUTION** notices call attention to a situation that is potentially hazardous to people because of some existing condition.
- **Attention** notices call attention to the possibility of damage to a program, device, system, or data.

### World Trade safety information

Several countries require the safety information contained in product publications to be presented in their national languages. If this requirement applies to your country, safety information documentation is included in the publications package (such as in printed documentation, on DVD, or as part of the product) shipped with the product. The documentation contains the safety information in your national language with references to the U.S. English source. Before using a U.S. English publication to install, operate, or service this product, you must first become familiar with the related safety information documentation. You should also refer to the safety information documentation any time you do not clearly understand any safety information in the U.S. English publications.

Replacement or additional copies of safety information documentation can be obtained by calling the IBM Hotline at 1-800-300-8751.

### German safety information

Das Produkt ist nicht für den Einsatz an Bildschirmarbeitsplätzen im Sinne § 2 der Bildschirmarbeitsverordnung geeignet.

### Laser safety information

IBM® servers can use I/O cards or features that are fiber-optic based and that utilize lasers or LEDs.

### Laser compliance

IBM servers may be installed inside or outside of an IT equipment rack.

## DANGER

When working on or around the system, observe the following precautions:

Electrical voltage and current from power, telephone, and communication cables are hazardous. To avoid a shock hazard:

- Connect power to this unit only with the IBM provided power cord. Do not use the IBM provided power cord for any other product.
- Do not open or service any power supply assembly.
- Do not connect or disconnect any cables or perform installation, maintenance, or reconfiguration of this product during an electrical storm.
- The product might be equipped with multiple power cords. To remove all hazardous voltages, disconnect all power cords.
- Connect all power cords to a properly wired and grounded electrical outlet. Ensure that the outlet supplies proper voltage and phase rotation according to the system rating plate.
- Connect any equipment that will be attached to this product to properly wired outlets.
- When possible, use one hand only to connect or disconnect signal cables.
- Never turn on any equipment when there is evidence of fire, water, or structural damage.
- Disconnect the attached power cords, telecommunications systems, networks, and modems before you open the device covers, unless instructed otherwise in the installation and configuration procedures.
- Connect and disconnect cables as described in the following procedures when installing, moving, or opening covers on this product or attached devices.

To Disconnect:

1. Turn off everything (unless instructed otherwise).
2. Remove the power cords from the outlets.
3. Remove the signal cables from the connectors.
4. Remove all cables from the devices.

To Connect:

1. Turn off everything (unless instructed otherwise).
2. Attach all cables to the devices.
3. Attach the signal cables to the connectors.
4. Attach the power cords to the outlets.
5. Turn on the devices.

(D005)

## DANGER



Observe the following precautions when working on or around your IT rack system:

- Heavy equipment—personal injury or equipment damage might result if mishandled.
- Always lower the leveling pads on the rack cabinet.
- Always install stabilizer brackets on the rack cabinet.
- To avoid hazardous conditions due to uneven mechanical loading, always install the heaviest devices in the bottom of the rack cabinet. Always install servers and optional devices starting from the bottom of the rack cabinet.
- Rack-mounted devices are not to be used as shelves or work spaces. Do not place objects on top of rack-mounted devices.



- Each rack cabinet might have more than one power cord. Be sure to disconnect all power cords in the rack cabinet when directed to disconnect power during servicing.
- Connect all devices installed in a rack cabinet to power devices installed in the same rack cabinet. Do not plug a power cord from a device installed in one rack cabinet into a power device installed in a different rack cabinet.
- An electrical outlet that is not correctly wired could place hazardous voltage on the metal parts of the system or the devices that attach to the system. It is the responsibility of the customer to ensure that the outlet is correctly wired and grounded to prevent an electrical shock.

#### CAUTION

- Do not install a unit in a rack where the internal rack ambient temperatures will exceed the manufacturer's recommended ambient temperature for all your rack-mounted devices.
- Do not install a unit in a rack where the air flow is compromised. Ensure that air flow is not blocked or reduced on any side, front, or back of a unit used for air flow through the unit.
- Consideration should be given to the connection of the equipment to the supply circuit so that overloading of the circuits does not compromise the supply wiring or overcurrent protection. To provide the correct power connection to a rack, refer to the rating labels located on the equipment in the rack to determine the total power requirement of the supply circuit.
- *(For sliding drawers.)* Do not pull out or install any drawer or feature if the rack stabilizer brackets are not attached to the rack. Do not pull out more than one drawer at a time. The rack might become unstable if you pull out more than one drawer at a time.
- *(For fixed drawers.)* This drawer is a fixed drawer and must not be moved for servicing unless specified by the manufacturer. Attempting to move the drawer partially or completely out of the rack might cause the rack to become unstable or cause the drawer to fall out of the rack.

(R001)

**CAUTION:**

Removing components from the upper positions in the rack cabinet improves rack stability during relocation. Follow these general guidelines whenever you relocate a populated rack cabinet within a room or building:

- Reduce the weight of the rack cabinet by removing equipment starting at the top of the rack cabinet. When possible, restore the rack cabinet to the configuration of the rack cabinet as you received it. If this configuration is not known, you must observe the following precautions:
  - Remove all devices in the 32U position and above.
  - Ensure that the heaviest devices are installed in the bottom of the rack cabinet.
  - Ensure that there are no empty U-levels between devices installed in the rack cabinet below the 32U level.
- If the rack cabinet you are relocating is part of a suite of rack cabinets, detach the rack cabinet from the suite.
- Inspect the route that you plan to take to eliminate potential hazards.
- Verify that the route that you choose can support the weight of the loaded rack cabinet. Refer to the documentation that comes with your rack cabinet for the weight of a loaded rack cabinet.
- Verify that all door openings are at least 760 x 230 mm (30 x 80 in.).
- Ensure that all devices, shelves, drawers, doors, and cables are secure.
- Ensure that the four leveling pads are raised to their highest position.
- Ensure that there is no stabilizer bracket installed on the rack cabinet during movement.
- Do not use a ramp inclined at more than 10 degrees.
- When the rack cabinet is in the new location, complete the following steps:
  - Lower the four leveling pads.
  - Install stabilizer brackets on the rack cabinet.
  - If you removed any devices from the rack cabinet, repopulate the rack cabinet from the lowest position to the highest position.
- If a long-distance relocation is required, restore the rack cabinet to the configuration of the rack cabinet as you received it. Pack the rack cabinet in the original packaging material, or equivalent. Also lower the leveling pads to raise the casters off of the pallet and bolt the rack cabinet to the pallet.

(R002)

(L001)



(L002)



(L003)



or



All lasers are certified in the U.S. to conform to the requirements of DHHS 21 CFR Subchapter J for class 1 laser products. Outside the U.S., they are certified to be in compliance with IEC 60825 as a class 1 laser product. Consult the label on each part for laser certification numbers and approval information.

**CAUTION:**

This product might contain one or more of the following devices: CD-ROM drive, DVD-ROM drive, DVD-RAM drive, or laser module, which are Class 1 laser products. Note the following information:

- 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 the controls or adjustments or performance of procedures other than those specified herein might result in hazardous radiation exposure.

(C026)

**CAUTION:**

Data processing environments can contain equipment transmitting on system links with laser modules that operate at greater than Class 1 power levels. For this reason, never look into the end of an optical fiber cable or open receptacle. (C027)

**CAUTION:**

This product contains a Class 1M laser. Do not view directly with optical instruments. (C028)

**CAUTION:**

Some laser products contain an embedded Class 3A or Class 3B laser diode. Note the following information: laser radiation when open. Do not stare into the beam, do not view directly with optical instruments, and avoid direct exposure to the beam. (C030)

**CAUTION:**

The battery contains lithium. To avoid possible explosion, do not burn or charge the battery.

*Do Not:*

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

Exchange only with the IBM-approved part. Recycle or discard the battery as instructed by local regulations. In the United States, IBM has a process for the collection of this battery. For information, call 1-800-426-4333. Have the IBM part number for the battery unit available when you call. (C003)

## **Power and cabling information for NEBS (Network Equipment-Building System) GR-1089-CORE**

The following comments apply to the IBM servers that have been designated as conforming to NEBS (Network Equipment-Building System) GR-1089-CORE:

The equipment is suitable for installation in the following:

- Network telecommunications facilities
- Locations where the NEC (National Electrical Code) applies

The intrabuilding ports of this equipment are suitable for connection to intrabuilding or unexposed wiring or cabling only. The intrabuilding ports of this equipment *must not* be metallically connected to the interfaces that connect to the OSP (outside plant) or its wiring. These interfaces are designed for use as intrabuilding interfaces only (Type 2 or Type 4 ports as described in GR-1089-CORE) and require isolation from the exposed OSP cabling. The addition of primary protectors is not sufficient protection to connect these interfaces metallically to OSP wiring.

**Note:** All Ethernet cables must be shielded and grounded at both ends.

The ac-powered system does not require the use of an external surge protection device (SPD).

The dc-powered system employs an isolated DC return (DC-I) design. The DC battery return terminal *shall not* be connected to the chassis or frame ground.

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## Installing the 5888 PCIe storage enclosure

Use this overview as a guide to the tasks required for installing the 5888 PCI Express (PCIe) storage enclosure (EXP30 Ultra SSD I/O Drawer) into a rack and cabling it to a server.

You can use the following table to read about and complete the high-level tasks for installing the 5888 PCIe storage enclosure.

*Table 1. Tasks to install the disk drive enclosure into a rack*

Task	Where to find associated information
<p><b>Preinstalled enclosures only</b></p> <p>Remove the front and rear shipping brackets.</p> <p>After you have removed the shipping brackets, go to the task If you have solid-state drive units that require installation to the PCIe storage enclosure, install them now.</p>	<p>To remove the front and rear shipping brackets, see step 2 on page 3.</p>
<p>Perform inventory.</p> <p>Ensure that you have the rails.</p> <p>Ensure that you have both a Philips-head and flat-head screwdriver.</p>	<p>Locate the inventory list for your disk drive enclosure, and verify that you received all of the parts that you ordered.</p> <p>Each order contains, at a minimum, the following items:</p> <ul style="list-style-type: none"><li>• Left and right rack-mounting rails</li><li>• Mounting screws</li><li>• Power supply cables</li></ul> <p>If your shipment contains parts that are not required to complete the installation procedure, store those parts until they are required to be used.</p> <p>If you have incorrect, missing, or damaged parts, consult any of the following resources:</p> <ul style="list-style-type: none"><li>• Your IBM reseller.</li><li>• IBM Rochester manufacturing automated information at 1-800-300-8751 (United States only).</li><li>• Directory of worldwide contacts at <a href="http://www.ibm.com/planetwide">http://www.ibm.com/planetwide</a>. (Select your location to view the service and support contact information.)</li></ul> <p>You can also obtain order information from your marketing representative or IBM Business Partner.</p>
<p>Verify that you have a rack.</p>	<p>You must have a rack installed. If you do not have a rack installed, see <i>Installing the rack</i> (<a href="http://publib.boulder.ibm.com/infocenter/systems/scope/hw/topic/p7hbf/installrack.htm">http://publib.boulder.ibm.com/infocenter/systems/scope/hw/topic/p7hbf/installrack.htm</a>).</p>
<p>Prepare to install the disk drive enclosure.</p>	<p>To ensure that you have taken all other preparatory steps to install this disk drive enclosure, see <i>Installing the 5888 in a rack</i> (<a href="http://publib.boulder.ibm.com/infocenter/systems/scope/hw/topic/p7ham/p7ham_5888_prepare.htm">http://publib.boulder.ibm.com/infocenter/systems/scope/hw/topic/p7ham/p7ham_5888_prepare.htm</a>).</p>

Table 1. Tasks to install the disk drive enclosure into a rack (continued)

Task	Where to find associated information
Power off the system, if required, to install the disk drive enclosure.	For requirements and procedures related to shutting down and powering off the system, see Overview for I/O expansion units ( <a href="http://publib.boulder.ibm.com/infocenter/systems/scope/hw/topic/p7ham/p7ham_pcistor_concepts.htm">http://publib.boulder.ibm.com/infocenter/systems/scope/hw/topic/p7ham/p7ham_pcistor_concepts.htm</a> ).
Determine where to install the disk drive enclosure in the rack.	For suggestions about how to organize the hardware in your rack and to assign a location for the disk drive enclosure, see step 4 on page 8.
Mark the location on the rack where the PCIe storage enclosure will be installed.	To mark the rack location where you will install the PCIe storage enclosure, see step 4d on page 9.
Install the rail assembly in the rack.	To install the mounting hardware in the rack, see step 5 on page 10.
Install the PCIe storage enclosure on the rail assembly.	To install the PCIe storage enclosure on the rail assembly, see step 6 on page 13.
If you have solid-state drive units that require installation to the PCIe storage enclosure, install them now.	To install solid-state drives (SSDs) to the PCIe storage enclosure, see Removing and installing a solid-state drive for a 5888 PCIe storage enclosure ( <a href="http://publib.boulder.ibm.com/infocenter/systems/scope/hw/topic/p7eeg/p7eegdiskunit.htm">http://publib.boulder.ibm.com/infocenter/systems/scope/hw/topic/p7eeg/p7eegdiskunit.htm</a> ) and select the topic that supports the server to which you are installing this PCIe storage enclosure.
Review the configuration options for adding the PCIe storage enclosure to the server.	To identify the configuration option that you will use from a list of example configurations, see step 8 on page 17.
Cable the PCIe storage enclosure to the server.	To add the PCIe storage enclosure to the system configuration, see step 9 on page 19.
Configure the solid state drives of the PCIe storage enclosure.	To review serial-attached SCSI (SAS) Redundant Array of Independent Disks (RAID) information and configure the enclosure to the specifications of your operating system and system configuration, see step 10 on page 20.

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## Installing the 5888 PCIe storage enclosure: Details

The detailed installation procedure includes information from online references that are specified in the overview. You can use the expanded instructions in this procedure to install your PCIe storage enclosure into a rack and to cable it to a server.

- This information is provided in printed form as a list of basic tasks for installing the 5888 PCIe storage enclosure. For the most current version, use the online information: Installing the 5888 PCIe storage enclosure (<http://publib.boulder.ibm.com/infocenter/systems/scope/hw/topic/p7eee/p7eee.pdf>).
- This procedure supports the following installation scenarios:
  - Your 5888 PCIe storage enclosure was delivered already mounted in a rack, and you need to complete the installation.
  - Your 5888 PCIe storage enclosure was delivered separately from a rack, and you need to mount the enclosure in an existing rack and complete the installation.

**Note:** If the rack is not yet installed, you must first complete the procedure for Installing the rack (<http://publib.boulder.ibm.com/infocenter/systems/scope/hw/topic/p7hbf/installrack.htm>).

- Before installing the PCIe storage enclosure into a rack, read the Rack safety notices (<http://publib.boulder.ibm.com/infocenter/systems/scope/hw/topic/p7hbf/racksafety.htm>).

To install the 5888 disk drive enclosure, complete the following tasks:

1. Choose the type of installation you are performing:
  - To complete the installation of a 5888 PCIe storage enclosure that was delivered already mounted in a rack, go to step 2.
  - To complete the installation of a 5888 PCIe storage enclosure that was delivered separately from a rack, go to step 3 on page 8.
2. Remove the shipping brackets attached at the front and rear of the PCIe storage enclosure as follows:
  - a. At the rear of the rack, find the rear panel of the 5888 PCIe storage enclosure. Observe that the enclosure contains a power supply on each side of the unit behind the shipping bracket. Each power supply handle (**A**) is attached to a tab (**B**) of the rear shipping bracket (**C**) using an orange releasable Panduit tie wrap (**D**), as shown in the following figure.

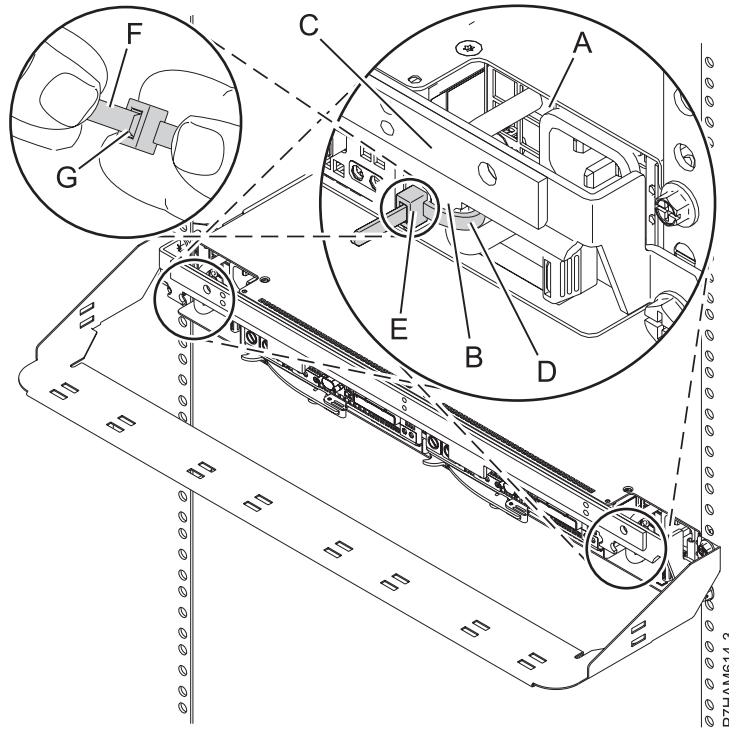
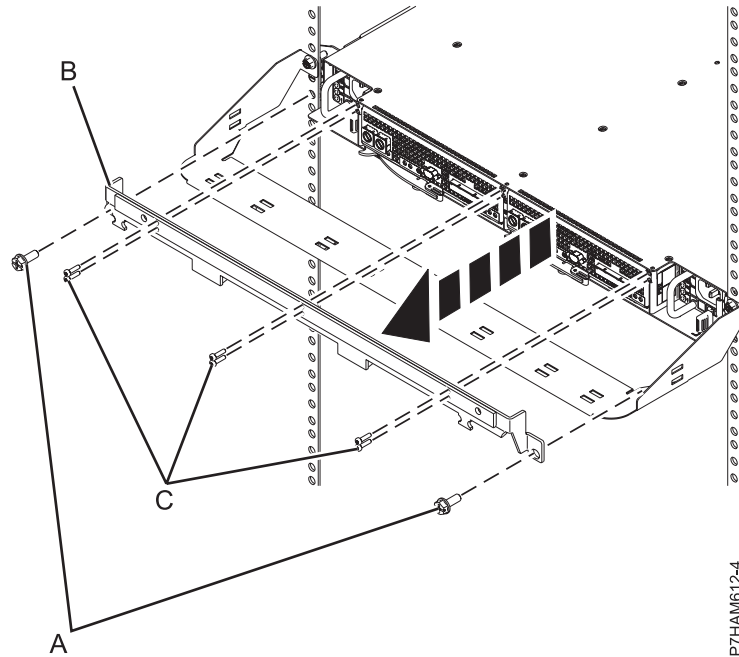


Figure 1. Power supply attachment to the rear shipping bracket

- b. To remove a Panduit tie wrap (D), use one hand to hold the tie wrap head (E) between two fingers, and use your other hand to hold the loose end (F) of the tie wrap, as shown in the preceding figure. Then, while using your thumb nail to catch and pull the release (G) in the tie wrap head, push the loose end through the head to expand the tie wrap loop. When the loose end is fed completely through, remove the tie wrap. Then remove the other Panduit tie wrap.
- c. Using a screwdriver, remove the two screws (A) that attach the rear shipping bracket (B) to the left and right flanges of the rack frame, as shown in the following figure. Use the screwdriver provided in the installation kit to remove the six screws (C) that attach the rear shipping bracket (B) to the rear of the PCIe storage enclosure. Lift the bracket away from the rack frame.

**Tip:** Save all of the brackets and screws that you have removed for any future reinstallation and for shipping of the 5888 PCIe storage enclosure that might be required.

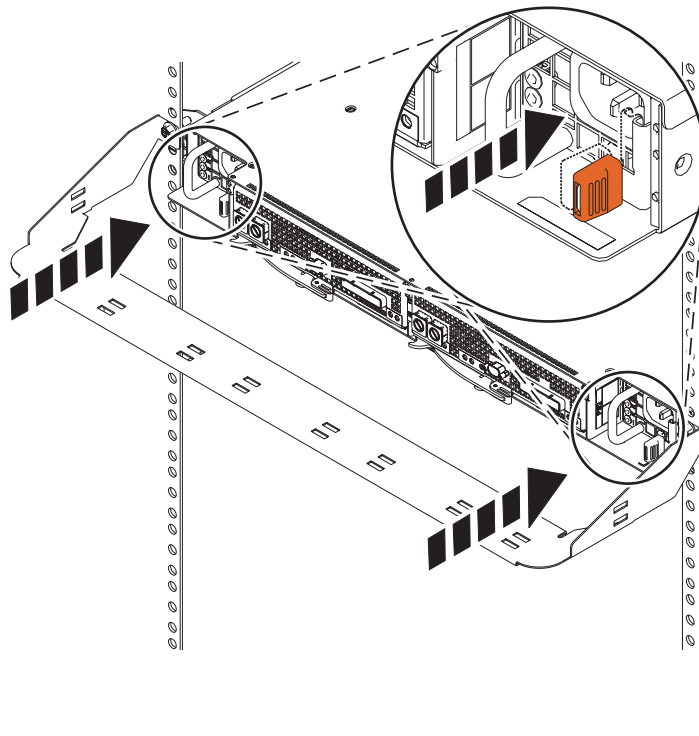




P7HAM612-4

Figure 2. Removing the rear shipping bracket

- d. Dock one of the power supplies by gently sliding it into the enclosure until the orange release tab latches, as shown in the following figure. Then dock the other power supply.



P7HAM615-1

Figure 3. Docking the power supply

- e. At the front of the rack, find the front panel of the 5888 PCIe storage enclosure. Hold the service card (A) with its handle away from the enclosure and facing upward, as shown in the following

figure. Align the other end of the service card with the bottom of the last bank of solid-state drives (SSDs) on the right of the enclosure (**B**). Gently slide the service card into the space between the bottom SSD slot and the sheet metal of the chassis (**C**).

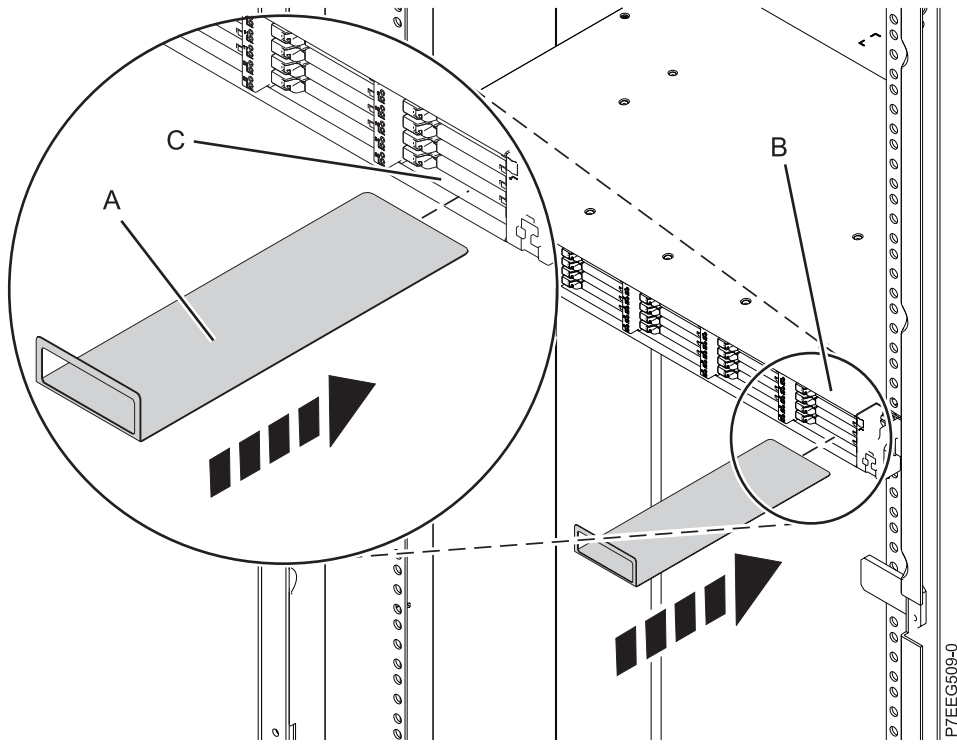


Figure 4. Inserting the service card

- f. Install the six SSD EMC bezels (**A**) to cover the slots that contain the SSDs, as shown in the following figure.

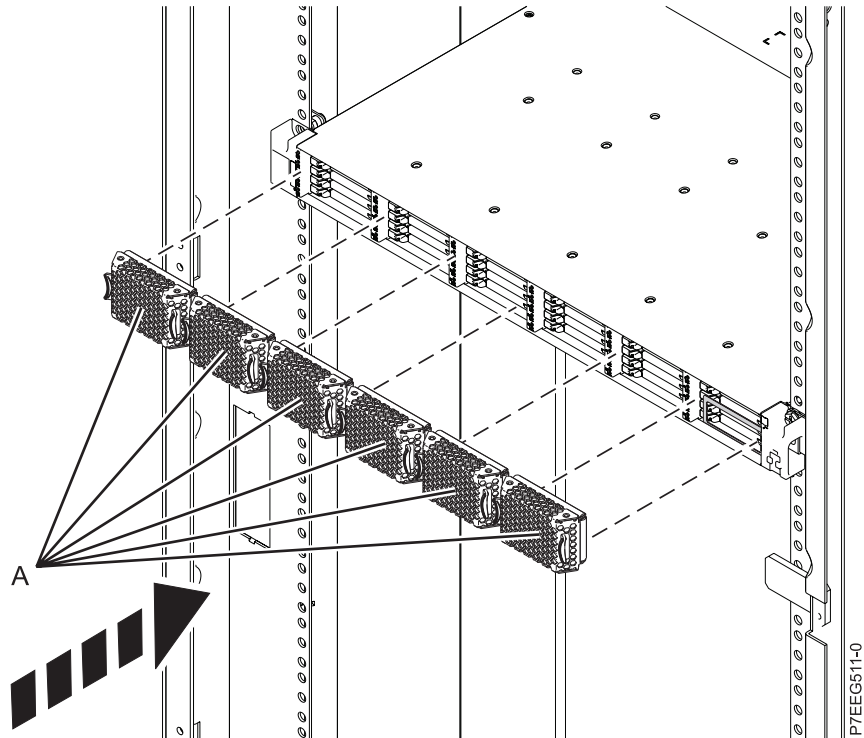


Figure 5. Installing the SSD EMC bezels

- g. At the rear of the rack, install the power cables (A), as shown in the following figure. Use Velcro ties to secure the power cords to the cable management bracket.

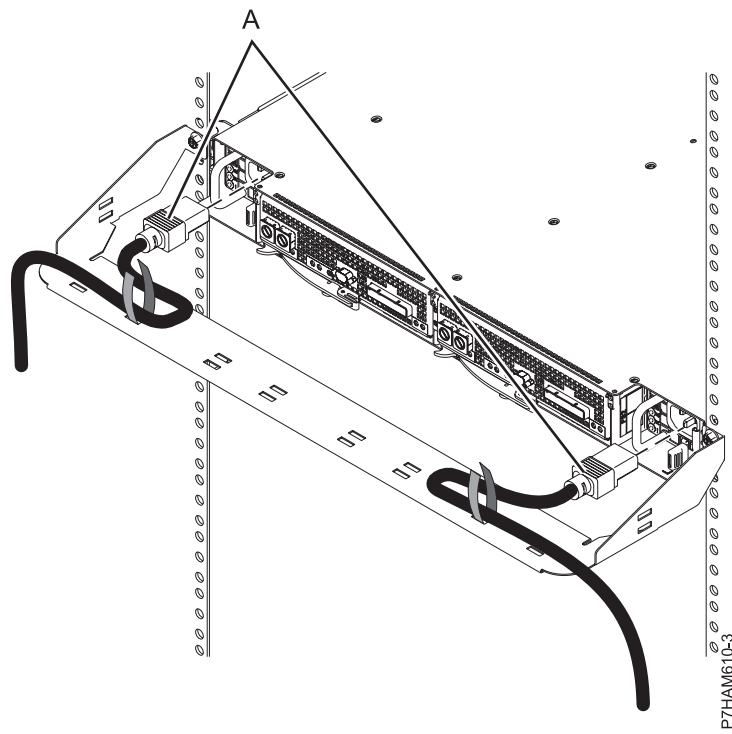


Figure 6. Installing the power cords

Go to step 8 on page 17.

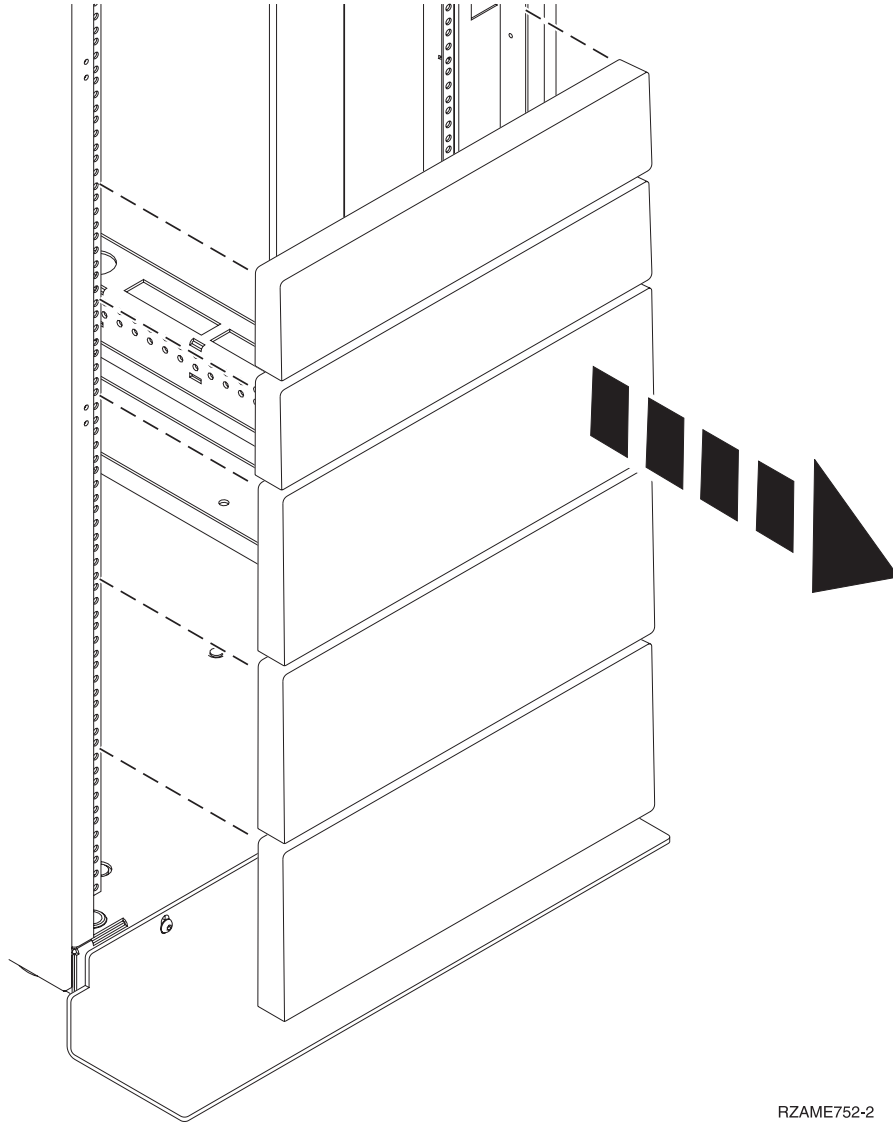
3. Unpack the PCIe storage enclosure as follows:
  - a. Refer to the kitting list provided with the rack installation kit, and complete a parts inventory.
  - b. Locate the rack-mounting hardware kit and the system rail assemblies that were included with your PCIe storage enclosure.

The rails are front-to-back and left-to-right side dependent.

4. Determine where to install the PCIe storage enclosure into the rack as follows:
  - a. Determine where in the rack to place the PCIe storage enclosure in relation to other system hardware. As you plan, keep the following steps in mind:
    - 1) Organize larger and heavier units into the lower part of the rack.
    - 2) Plan to install units into the lower part of the rack first.
    - 3) Record the EIA locations in your plan.

**Note:** The PCIe storage enclosure is one Electronic Industries Alliance (EIA) unit high. An EIA unit is 44.50 mm (1.75 in.) in height. The rack contains three mounting holes for each EIA unit of height. This enclosure, therefore, is 44.50 mm (1.75 in.) high and covers 3 mounting holes in the rack.

- b. If necessary, remove the filler panels to allow access to the inside of the rack enclosure where you plan to place the PCIe storage enclosure.



RZAME752-2

*Figure 7. Removing the filler panels*

- c. If necessary, remove the front and rear rack doors.
- d. Mark the rack location where you will install the PCIe storage enclosure by completing the following steps:
  - 1) Face the front of the rack and work from the left side. Make a note of the EIA unit to be used for the PCIe storage enclosure. Use tape, a marker, or a pencil to mark the middle mounting hole **(A)** of the EIA unit. Place another mark beside the bottom mounting hole **(B)**. Mark the rack so that these marks can also be seen from the rear of the rack.

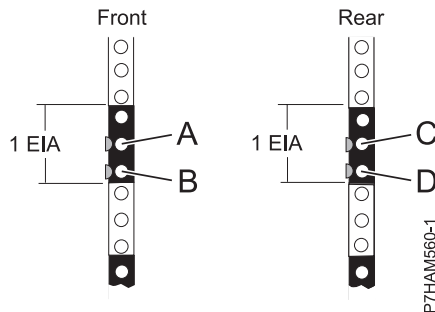


Figure 8. Marking the installation locations

- 2) Repeat the last step to place two marks on the corresponding mounting holes on the front-right side of the rack.
  - 3) Go to the rear of the rack. On the left side, find the EIA unit to be used for the PCIe storage enclosure.
  - 4) Mark the middle mounting hole (C) of this EIA unit. Place another mark beside the bottom mounting hole (D).
  - 5) Repeat the last step to place two marks on the corresponding mounting holes on the rear-right side of the rack.
5. Install the rail assembly into the rack as follows:

**Important:** To complete this procedure, use two people to attach the rail assembly to the rack. Position one person in front of the rack and one person at the rear of the rack.

**CAUTION:**

**Installing the rails in the rack is a complex procedure. To install the rails correctly, you must perform each task in the following order. Failure to do so might cause rail failure and potential danger to yourself and the system unit.**

- a. Facing the front of the rack, locate the two marks made previously on the Electronic Industries Alliances (EIA) strips.

**Notes:**

- The rail installation can be completed by one person. However, the installation is easier if one person is positioned at the front of the rack and one person is positioned at the rear of the rack.
  - In order to install the rails in the limited rack space for this enclosure model, ensure that you have open work space either directly above or directly below the EIA location that you have marked. If the rack spaces directly above and below the EIA location currently contain hardware, choose one of the following options to increase the work space:
    - If the hardware unit directly above or below the EIA location can be slid into a service position, do so now to provide more work space.
    - Remove the hardware unit either directly above or below the EIA location to provide more work space, and reinstall it following the rails installation.
- b. Select a rail. Identify the side of the rack where the rail must be mounted by holding the rail inside of the open space of the rack as follows:
    - The rail points from front to rear.
    - The tension clip (A) points toward the front of the rack and aligns with the bottom EIA hole that you marked previously, as shown in Figure 9 on page 11.
    - The rail shaft is aligned with the inside edge of the front rack flange with its open side facing inward.

- c. Bend the tension clip (A) up and insert it into the bottom EIA hole that you marked previously, as shown in Figure 9. Ensure that the lip of the clip is brought fully through the hole and clasped against the bottom of the hole. Seat the alignment screw (B) in the middle EIA hole that you marked previously.

**Note:** There are two sizes of alignment screws (B). If your rack has round mounting holes, use the smaller alignment screw for each rail. If your rack has square mounting holes, use the larger alignment screw for each rail. Alignment screws are provided with the rack installation kit.

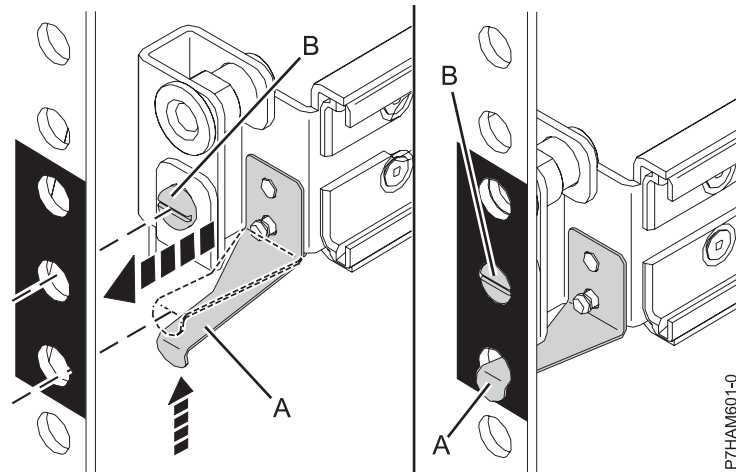


Figure 9. Mounting the rail to the front of the rack

- d. At the rear of the rack, locate the two marks that you made previously on the EIA strips. Compress the rail (C) as shown in Figure 10, and then expand the rail carefully toward the marks until the rail end meets the rear rack flange.

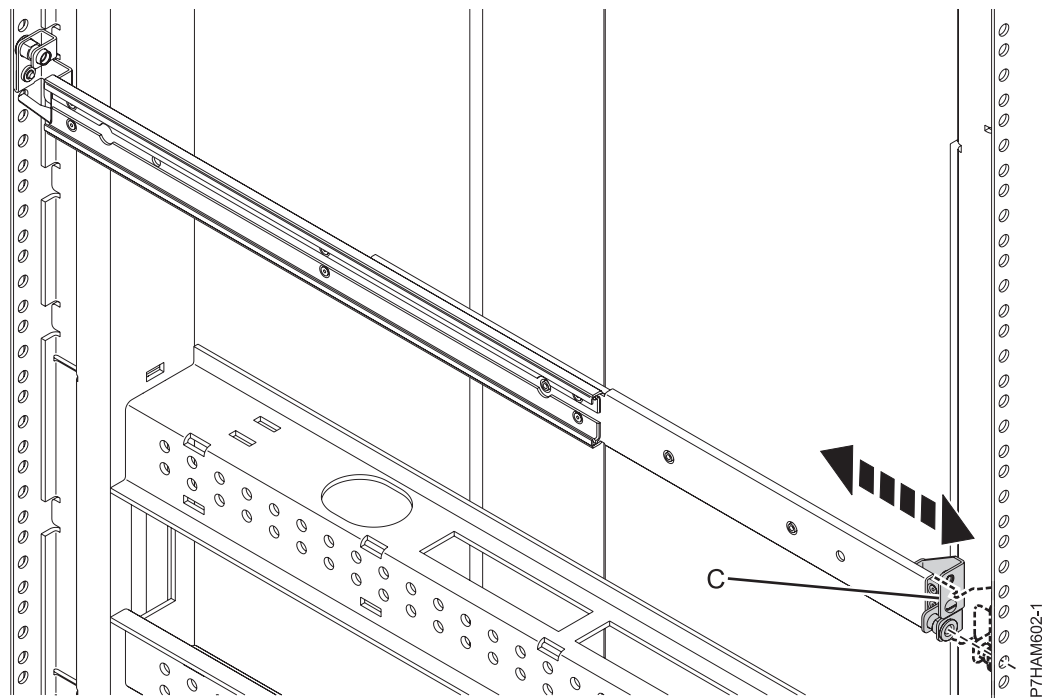


Figure 10. Expanding the rail to the rear of the rack

- e. Seat the alignment screw (D) of the rail into the middle EIA hole that you marked previously, as shown in Figure 11.

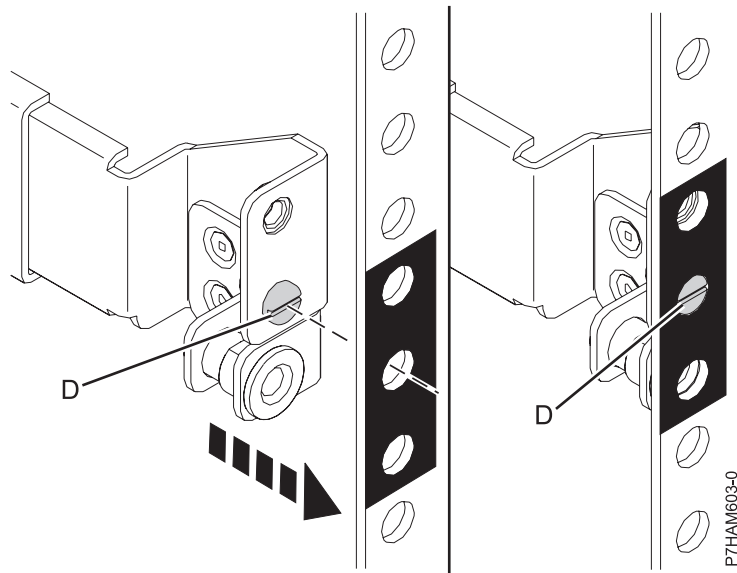


Figure 11. Mounting the rail to the rear of the rack

- f. Repeat step 5c on page 11 through step 5e for the other rail.
- g. At the rear of the rack, hold the cable management bracket up to the rear rack flanges, aligning the bracket mounting holes to the top holes of the EIA that contains the enclosure, as shown in Figure 12 on page 13. Apply the M5 screws (E) through the mounting holes of the bracket and into the top EIA holes on the rack flanges.

**CAUTION:**

To provide for the secure attachment of the rails, the M5 screws (E) must be applied at the specified EIA locations even if you do not mount the cable management bracket.



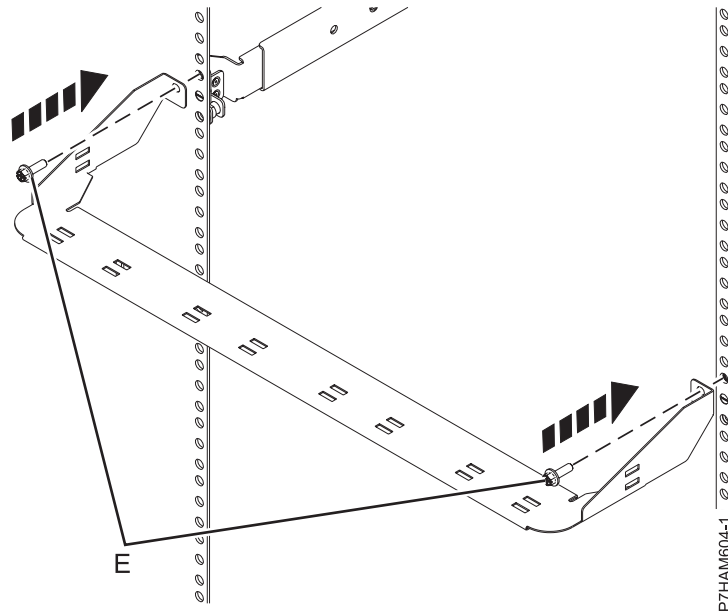


Figure 12. Mounting the cable management bracket

6. Install the PCIe storage enclosure onto the rails as follows:
  - a. Before attempting to mount the PCIe storage enclosure to the rails, review Figure 13 to observe how the chassis bracket guide (A) on the side of the enclosure fits and slides into the rail sheath (B) that matches its shape.

**Note:** In Figure 13, the right rail (B) is portrayed at an angle to show the location of the rail sheath. The actual rail is mounted in an upright position in the rack.

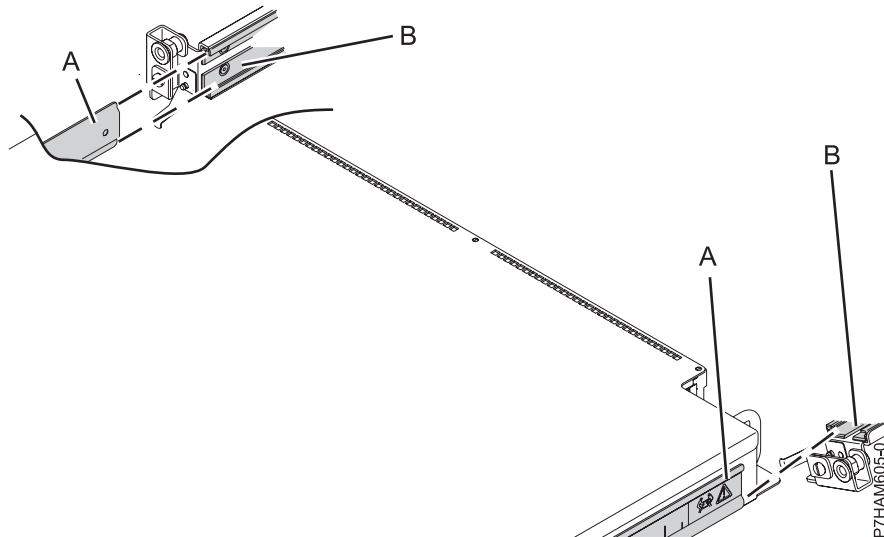


Figure 13. Reviewing the enclosure attachment to the rails

**Attention:** Due to the precision required to align and connect these parts, you must use two people to move the enclosure. Using fewer than two people can result in damage to the enclosure.

- b. Position one person on each side of the PCIe storage enclosure and lift the enclosure. At the front of the rack, position the rear of the enclosure in front of the rails.

- c. On one side of the enclosure, insert the chassis bracket guide (A) into the rail sheath (B) opening, as shown in Figure 14. Repeat this operation on the other side.

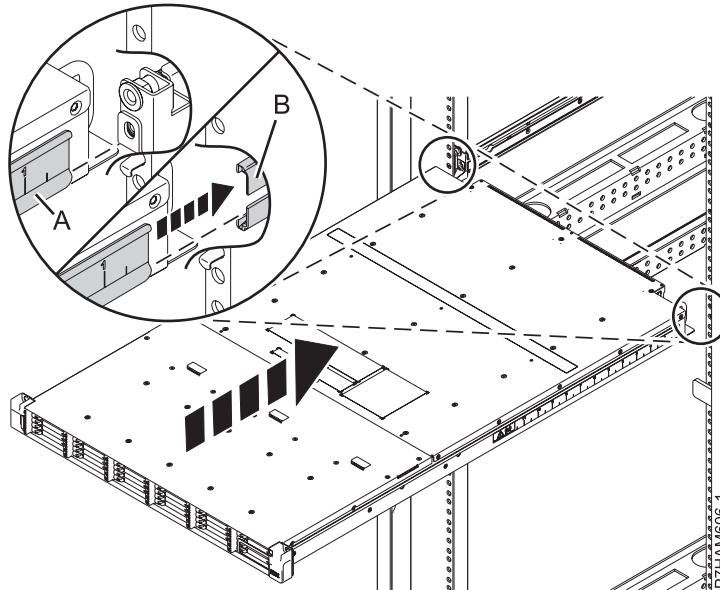


Figure 14. Fitting the enclosure into the rail sheath

- d. When the chassis bracket guides are firmly seated on both sides of the enclosure, slide the enclosure gently into the rack cabinet, as shown in Figure 15.

**CAUTION:**

Ensure that no one's fingers are located between the enclosure and the cable management bracket when you slide the enclosure into the rack cabinet.

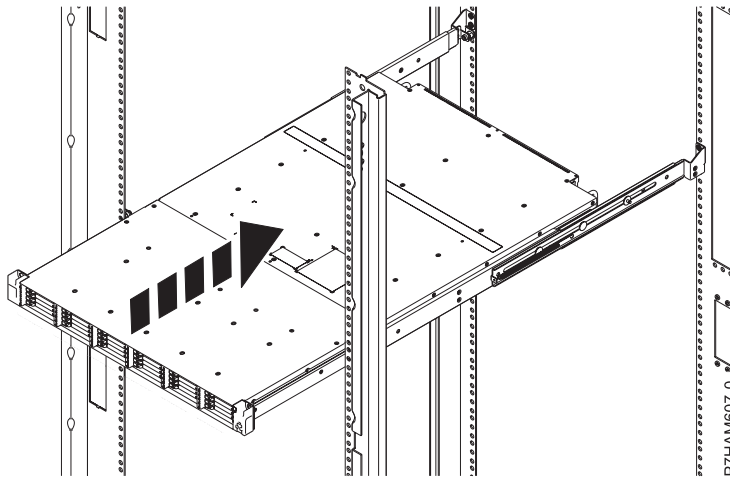


Figure 15. Sliding the disk drive enclosure into the rack

- e. Secure the front of the enclosure to the rack flanges by applying the securing screws (A) through the top open holes in each bracket and into the top EIA holes, as shown in Figure 16 on page 15.

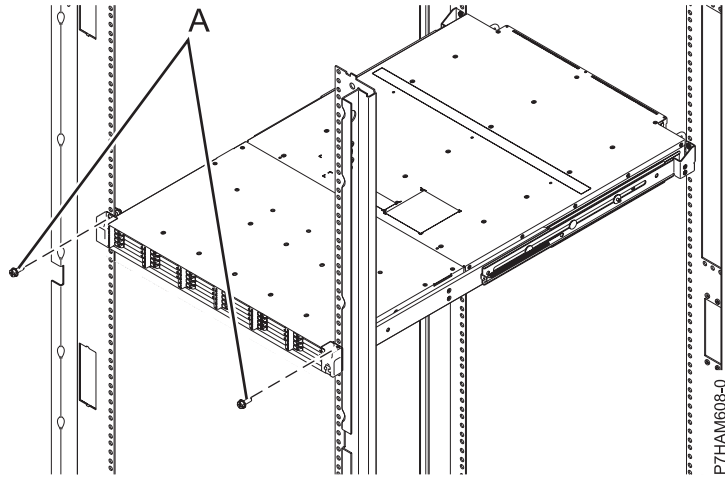


Figure 16. Securing the front of the enclosure to the rack

- f. At the front panel of the enclosure, hold the service card (A) with its handle away from the enclosure and facing upward, as shown in Figure 17. Align the other end of the service card with the bottom of the last bank of solid-state drives (SSDs) on the right of the enclosure (B). Gently slide the service card into the space between the bottom SSD slot and the sheet metal of the chassis (C).

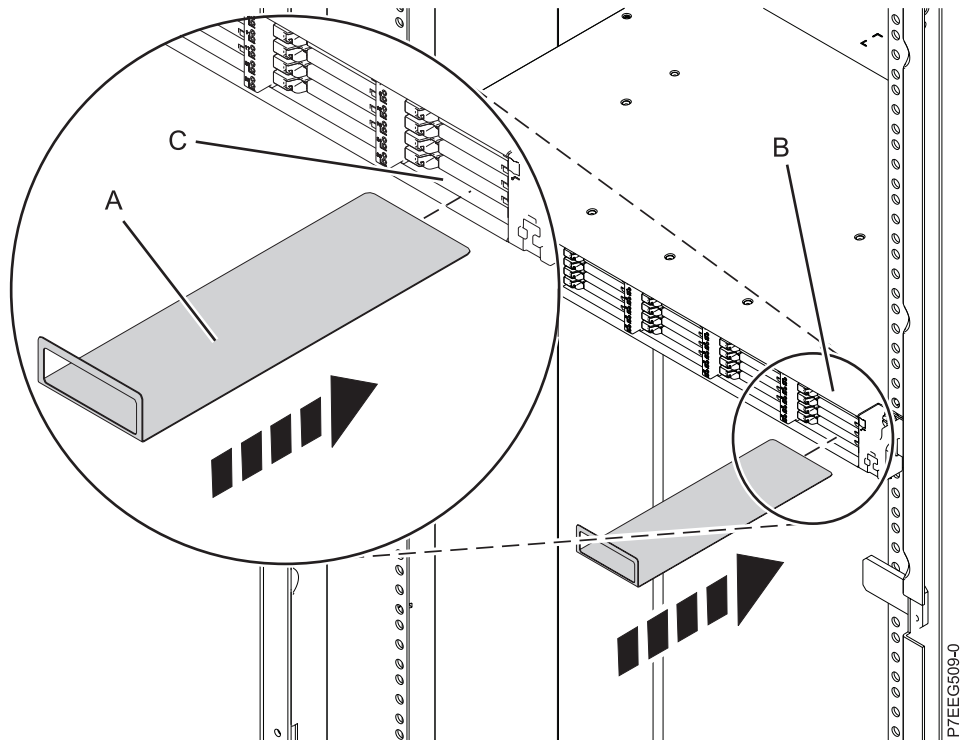


Figure 17. Inserting the service card

- g. Install the six SSD EMC bezels (A) to cover the slots that contain the SSDs, as shown in Figure 18 on page 16.

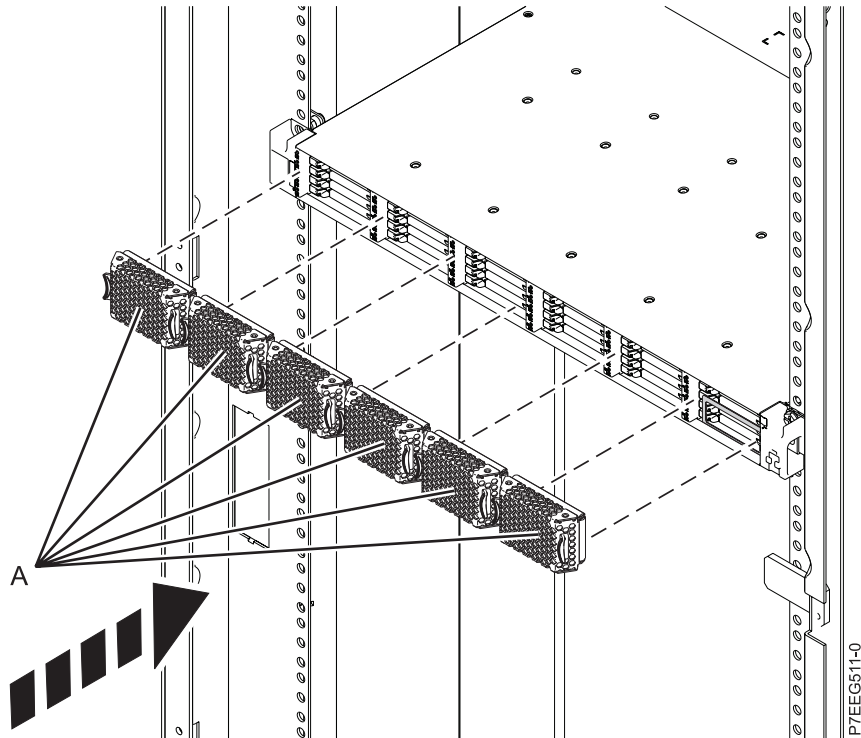


Figure 18. Installing the SSD EMC bezels

- h. At the rear of the rack, install the power cables (A), as shown in Figure 19. Use Velcro ties to secure the power cords to the cable management bracket.

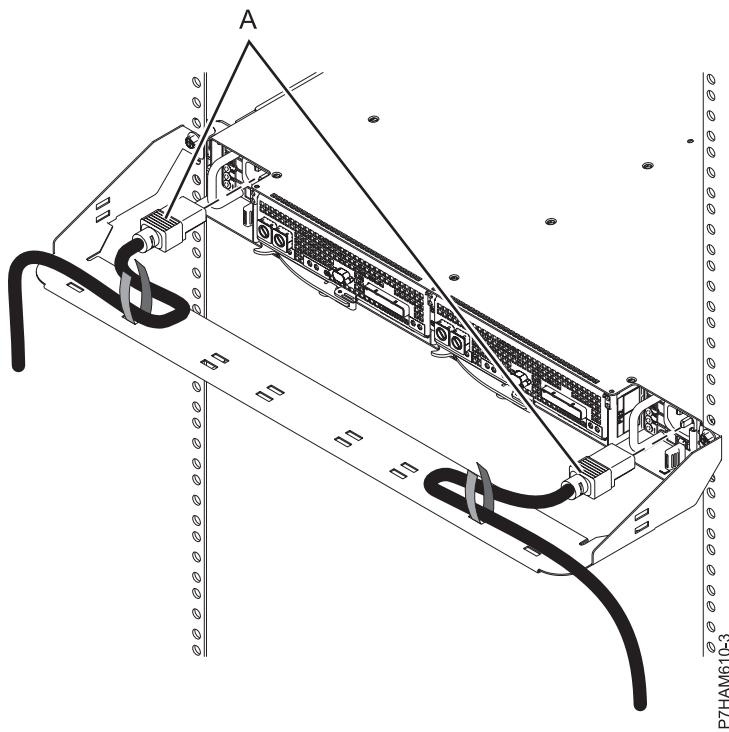


Figure 19. Installing the power cords

7. If you have SSDs that require installation to the PCIe storage enclosure, see Removing and installing a solid-state drive for a 5888 PCIe storage enclosure (<http://publib.boulder.ibm.com/infocenter/systems/scope/hw/topic/p7eeg/p7eegdiskunit.htm>) and select the topic that supports the server to which you are installing this PCIe storage enclosure.
8. Identify the configuration and cable requirements for adding the PCIe storage enclosure to the system.

**Note:** This enclosure uses PCIe cables to connect to the system.

a. Identify the configuration option that you will use to add the PCIe storage enclosure to the system. The following examples provide possible configurations:

- Connect a server that has one PCIe GX++ adapter to a single storage enclosure, as shown in the following figure.

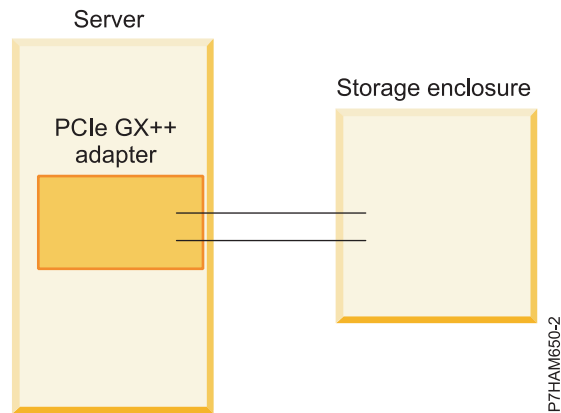


Figure 20. Example of a server that has one PCIe GX++ adapter connected to a single storage enclosure

- Connect a server that has two PCIe GX++ adapters to two storage enclosures, as shown in the following figure.

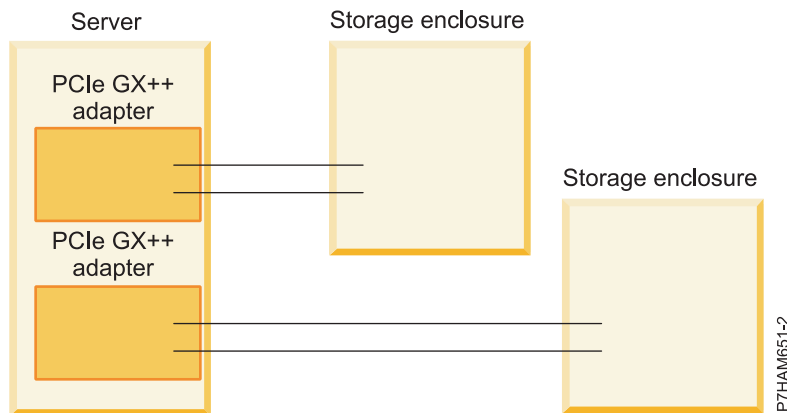


Figure 21. Example of a server that has two PCIe GX++ adapters connected to two storage enclosures

- Connect a server that has two PCIe GX++ adapters to a single storage enclosure, as shown in the following figure.

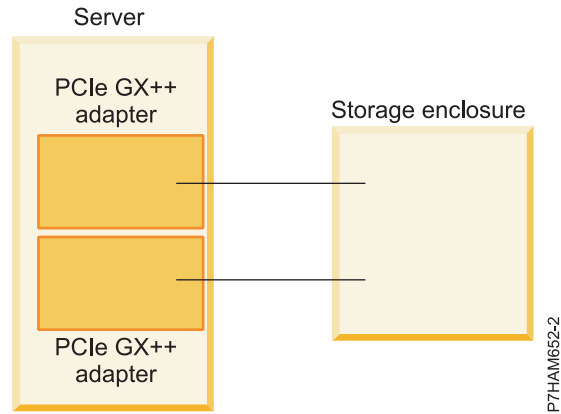


Figure 22. Example of a server that has two PCIe GX++ adapters connected to a single storage enclosure

- Connect a server that has two PCIe GX++ adapters to two storage enclosures for high availability, as shown in the following figure.

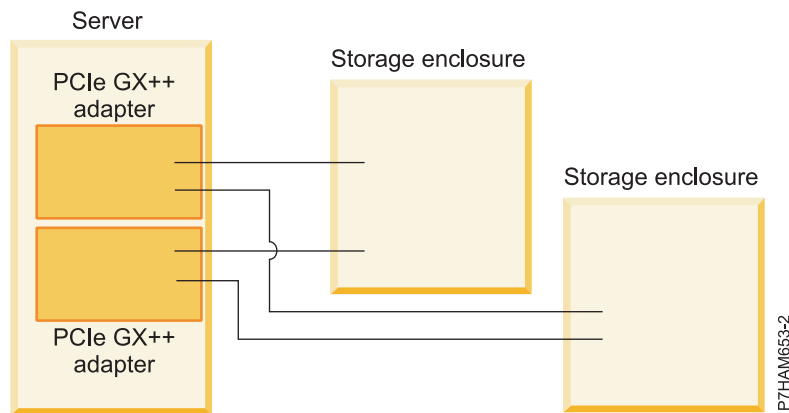


Figure 23. Example of a server that has two PCIe GX++ adapters connected to two storage enclosures for high availability

- Connect two servers, each with a PCIe GX++ adapter, to a single storage enclosure for high availability, as shown in the following figure.

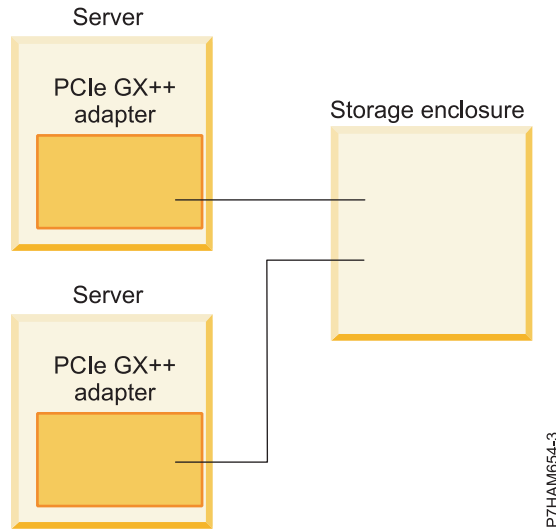


Figure 24. Example of two servers, each with a PCIe GX++ adapter, connected to a single storage enclosure for high availability

- b. Review connector information pertaining to the hardware in your configuration as follows:
  - 1) Adapter cables attach to ports at the rear of the systems in which the adapters are installed. To identify the PCIe port location for the system in your configuration, see “Server connectors” on page 23.
  - 2) Adapters are cabled to the 5888 by using ports at the rear of the enclosure. To learn about the enclosure ports used in the following options, see “Enclosure connectors” on page 26.
9. Cable the PCIe storage enclosure to the system as follows:
  - a. Complete all applicable prerequisites for installing your PCIe storage enclosure. For detailed procedures related to preparing to connect your PCIe storage enclosure, see Preparing to connect your PCIe storage enclosures ([http://publib.boulder.ibm.com/infocenter/systems/scope/hw/topic/p7ham/p7ham\\_pcistor\\_prepkick.htm](http://publib.boulder.ibm.com/infocenter/systems/scope/hw/topic/p7ham/p7ham_pcistor_prepkick.htm)).
  - b. Add the PCIe storage enclosure to the system as follows:
    - 1) If the system is not already powered off, remove power from the system. For details, see Stopping a system or logical partition (<http://publib.boulder.ibm.com/infocenter/systems/scope/hw/topic/p7haj/crustopsys.htm>).

**Important:** If the PCIe storage enclosure is connected to two systems, complete this step for each system.

    - 2) If the system has a rear cover, remove or open it.

**Important:** If the PCIe storage enclosure is connected to two systems, complete this step for each system.

    - 3) Locate the PCIe GX++ adapter or adapters to which the PCIe storage enclosure will be connected.

**Note:** This procedure assumes that the PCIe GX++ adapters are already installed. If the adapters are not installed, stop now and follow the instructions that came with the GX adapters to install them. After the PCIe GX++ adapters are installed, continue with the steps in this procedure to add the PCI storage enclosure.

    - 4) Using PCIe cables, connect the PCIe storage enclosure to the PCIe GX++ adapters that you identified in step 9b3.

**Note:** If you are connecting a PCIe cable to an unused PCIe connector that is covered with a plastic or metal clip, remove the clip before installing the PCIe cable.

- 5) If the system has a rear cover, close it.

**Important:** If the PCIe storage enclosure is connected to two systems, complete this step for each system.

- 6) If the power cords for the PCIe storage enclosure are not connected to the power source, connect them now. Then connect the power cords to the power supplies on the PCIe storage enclosure.
- 7) Record the current date and time for use later in the procedure when checking for serviceable events.
- 8) Power on the system. For details, see Starting the system or logical partition (<http://publib.boulder.ibm.com/infocenter/systems/scope/hw/topic/p7haj/crustartsys.htm>).
- 9) Verify the PCIe hardware topology by completing the steps in Verifying the PCIe hardware topology ([http://publib.boulder.ibm.com/infocenter/systems/scope/hw/topic/p7ham/p7ham\\_pcistor\\_conntopverify.htm](http://publib.boulder.ibm.com/infocenter/systems/scope/hw/topic/p7ham/p7ham_pcistor_conntopverify.htm)).

While you are completing the verification steps of that procedure, confirm that the PCIe links that connect the PCIe storage enclosure being added have Link Status column values of Operational and valid I/O Enclosure Port column values. The I/O Enclosure Port column value looks similar to Uxxxx.001.yyyyyyy-P1-Cz-T3, where xxxx is the feature code of the PCIe storage enclosure connected by the PCIe link, yyyyyyy is the serial number of the PCIe storage enclosure connected by the PCIe link, and z is either 1 or 2. An example of an actual I/O Enclosure Port column value is UEDR1.001.6BAH004-P1-C1-T3.

**Important:** If the PCIe storage enclosure is connected to two systems, complete this step for each system.

**Requirement:** All PCIe hardware topology problems that are discovered in this step must be corrected before continuing with this procedure.

- 10) Check for and handle new serviceable events that were generated during the procedure by completing the steps in Checking for new serviceable events ([http://publib.boulder.ibm.com/infocenter/systems/scope/hw/topic/p7ham/p7ham\\_genfile\\_checkevents.htm](http://publib.boulder.ibm.com/infocenter/systems/scope/hw/topic/p7ham/p7ham_genfile_checkevents.htm)). Use the date and time information that you recorded in step 9b7 as the start time for searching for new serviceable events.

**Important:** If the PCIe storage enclosure is connected to two systems, complete this step for each system.

- 11) Verify the new configuration. For details, see Verifying that the new configuration is functioning ([http://publib.boulder.ibm.com/infocenter/systems/scope/hw/topic/p7ham/p7ham\\_pcistor\\_connverify.htm](http://publib.boulder.ibm.com/infocenter/systems/scope/hw/topic/p7ham/p7ham_pcistor_connverify.htm)).
  - 12) If the system is managed by an HMC, is not in the manufacturing default configuration, and the I/O slots associated with the connection to the PCIe storage enclosure are not assigned to logical partitions, you can now assign them. For information about adding I/O slots to partitions dynamically, see Adding physical I/O devices and slots dynamically (<http://publib.boulder.ibm.com/infocenter/systems/scope/hw/topic/iphath/iphbldlpariopaddp6.htm>).
10. Configure the SSDs of the PCIe storage enclosure as required for your operating system and system configuration.
    - a. Review the following information:



The 5888 PCIe storage enclosure can hold up to 30 solid state drives (SSDs). The SSDs are physically organized in a single device partition within the enclosure. The devices cannot be split into separate physical groups. The SSDs are controlled by the dual PCIe2 SAS RAID controllers contained within the PCIe storage enclosure.

The 5888 PCIe storage enclosure is supported by the following operating systems:

- AIX®
- Linux
- VIOS

**Note:** VIOS does not support the 5888 PCIe storage enclosure for an IBM i client.

To determine the level of software that you need to support the PCIe storage enclosure feature, see IBM Prerequisite ([http://www-912.ibm.com/e\\_dir/eServerPrereq.nsf](http://www-912.ibm.com/e_dir/eServerPrereq.nsf)).

**Tip:** If you are planning to configure RAID arrays, ensure that you have the minimum number of available disks for each RAID level:

**RAID 0**

Minimum of one drive per array

**RAID 5**

Minimum of three drives per array

**RAID 6**

Minimum of four drives per array

**RAID 10**

Minimum of two drives per array

For additional SAS RAID controller information for the AIX operating system, see SAS RAID controller for AIX (<http://publib.boulder.ibm.com/infocenter/systems/scope/hw/topic/p7ebj/p7ebjkickoff.htm>).

For additional SAS RAID controller information for the Linux operating system, see SAS RAID controller for Linux (<http://publib.boulder.ibm.com/infocenter/systems/scope/hw/topic/p7ebk/p7ebkkickoff.htm>).



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## Reference information

Use the information in this section as needed to complete enclosure installation and configuration tasks.

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### Connector locations

Learn about 12X, system power control network (SPCN), and PCIe connector locations.

### Server connectors

Learn about connector locations for servers.

### Model 8202-E4C connector locations

Learn about connector locations on rack-mounted models.

The 8202-E4C server provides cable connector locations for the following enclosures:

- Support for expansion units, as shown in the following figure, is as follows:
  - The card installed in the C1 slot can contain two 12X double data rate (DDR) cable ports. However, the C1 slot cannot provide both 12X DDR and PCIe cable ports.
  - The server contains a serial-attached SCSI (SAS) port.
- Support for disk drive enclosures, as shown in the following figure, is as follows:
  - The server contains a SAS port.
- Support for PCIe storage enclosures, as shown in the following figure, is as follows:
  - The card installed in the C1 slot can contain two PCIe cable ports. However, the C1 slot cannot provide both PCIe and 12X DDR cable ports.
  - The server contains a SAS port.

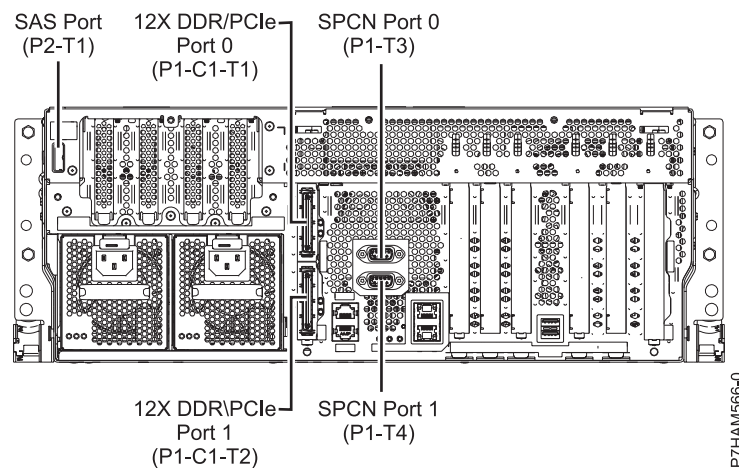


Figure 25. Model 8202-E4C connections for expansion units, disk drive enclosures, and PCIe storage enclosures

### Model 8205-E6C connector locations

Learn about connector locations on rack-mounted models.

The 8205-E6C server provides cable connector locations for the following enclosures:

- Support for expansion units, as shown in the following figure, is as follows:

- The card installed in the C1 slot can contain two 12X double data rate (DDR) cable ports. However, the C1 slot cannot provide both 12X DDR and PCIe cable ports.
- The card installed in the C8 slot can contain two 12X DDR cable ports. However, the C8 slot cannot provide both 12X DDR and PCIe cable ports.
- The port card type installed in the C1 slot can differ from the port card type installed in the C8 slot.
- The server contains a serial-attached SCSI (SAS) port.
- Support for disk drive enclosures, as shown in the following figure, is as follows:
  - The server contains a SAS port.
- Support for PCIe storage enclosures, as shown in the following figure, is as follows:
  - The card installed in the C1 slot can contain two PCIe cable ports. However, the C1 slot cannot provide both PCIe and 12X DDR cable ports.
  - The card installed in the C8 slot can contain two PCIe cable ports. However, the C8 slot cannot provide both PCIe and 12X DDR cable ports.
  - The port card type installed in the C1 slot can differ from the port card type installed in the C8 slot.
  - The server contains a SAS port.

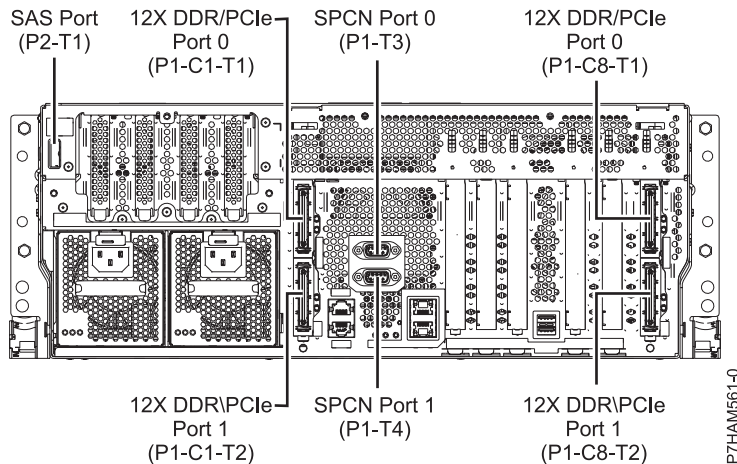


Figure 26. Model 8205-E6C connections for expansion units, disk drive enclosures, and PCIe storage enclosures

## Model 8231-E1C connector locations

Learn about connector locations.

The 8231-E1C server provides cable connector locations for the following enclosures:

- Support for disk drive enclosures, as shown in the following figure, is as follows:
  - The server contains a serial-attached SCSI (SAS) port.
- Support for PCIe storage enclosures, as shown in the following figure, is as follows:
  - The card installed in the C1 slot can contain one PCIe cable port.
  - The server contains a SAS port.

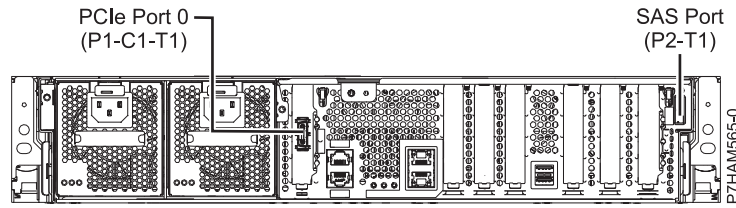


Figure 27. Model 8231-E1C connections for disk drive enclosures and PCIe storage enclosures

## Model 8231-E2C connector locations

Learn about connector locations.

The 8231-E2C server provides cable connector locations for the following enclosures:

- Support for expansion units, as shown in the following figure, is as follows:
  - The C1 slot must contain the system power control network (SPCN) card, and the C8 slot must contain the card with two 12X double data rate (DDR) cable ports.

**Note:** Installing the 12X DDR cable ports at this location causes both the C8 and C6 slot space to be occupied.

- The server cannot support both 12X DDR cable ports and PCIe cable ports at the same time.
- The server contains a serial-attached SCSI (SAS) port.
- Support for disk drive enclosures, as shown in the following figure, is as follows:
  - The server contains a SAS port.

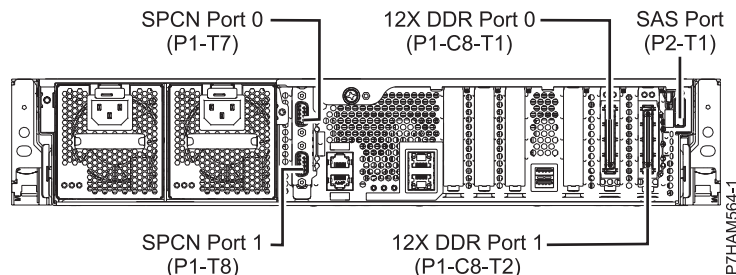


Figure 28. Model 8231-E2C connections for expansion units and disk drive enclosures

- Support for PCIe storage enclosures, as shown in the following figure, is as follows:
  - The card installed in the C1 slot can contain one PCIe cable port, and the card installed in the C8 slot can contain one PCIe cable port.
  - The server cannot support both PCIe cable ports and 12X DDR cable ports at the same time.
  - The server contains a SAS port.

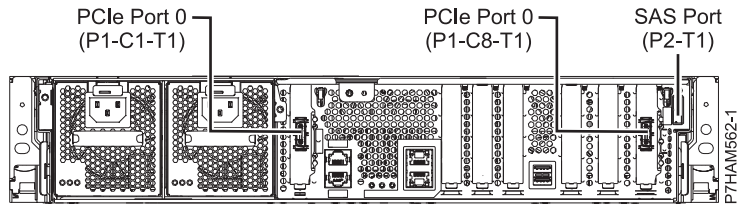


Figure 29. Model 8231-E2C connections for PCIe storage enclosures

## Enclosure connectors

Learn about connector locations for I/O enclosures.

### Model 5888 connector locations

Learn about connector locations.

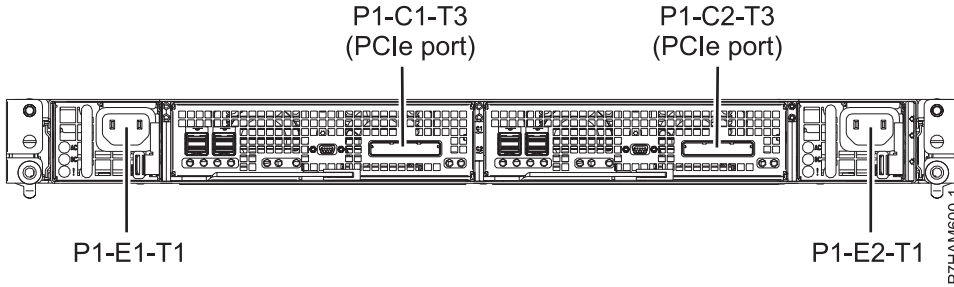


Figure 30. Model 5888 connector locations

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## Class A Notices

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## 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



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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 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.

### **European Community Compliance 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 non-recommended modification of the product, including the fitting of non-IBM option cards.

This product has been tested and found to comply with the limits for Class A Information Technology Equipment according to European Standard EN 55022. The limits for Class A equipment were derived for commercial and industrial environments to provide reasonable protection against interference with licensed communication equipment.

European Community contact:  
IBM Deutschland GmbH  
Technical Regulations, Department M372  
IBM-Allee 1, 71139 Ehningen, Germany  
Tele: +49 7032 15 2941  
email: lugi@de.ibm.com

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Confirmed Harmonics Guideline (products less than or equal to 20 A per phase)**

高調波ガイドライン適合品

**Japanese Electronics and Information Technology Industries Association (JEITA)  
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高調波ガイドライン準用品

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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。

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種情況下，使用者會被要  
求採取某些適當的對策。

The following is a summary of the EMI Taiwan statement above.

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

**IBM Taiwan Contact Information:**

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

### **Electromagnetic Interference (EMI) Statement - Korea**

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### **Germany Compliance 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.

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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  
Tel: 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  
Tel: +49 7032 15 2941  
email: lugi@de.ibm.com

Generelle Informationen:

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

### **Electromagnetic Interference (EMI) Statement - Russia**

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

### **Class B Notices**

The following Class B statements apply to features designated as electromagnetic compatibility (EMC) Class B in the feature installation information.

### **Federal Communications Commission (FCC) statement**

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation.

This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.

If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

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

Properly shielded and grounded cables and connectors must be used in order to meet FCC emission limits. Proper cables and connectors are available from IBM-authorized dealers. IBM is not responsible for

any radio or television interference caused by unauthorized changes or modifications to this equipment. Unauthorized changes or modifications could void the user's authority to operate this 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 Compliance Statement**

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

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

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

### **European Community Compliance 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 non-recommended modification of the product, including the fitting of non-IBM option cards.

This product has been tested and found to comply with the limits for Class B Information Technology Equipment according to European Standard EN 55022. The limits for Class B equipment were derived for typical residential environments to provide reasonable protection against interference with licensed communication equipment.

European Community contact:  
IBM Deutschland GmbH  
Technical Regulations, Department M372  
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Tele: +49 7032 15 2941  
email: lugi@de.ibm.com

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取扱説明書に従って正しい取り扱いをして下さい。 VCCI-B

### **Japanese Electronics and Information Technology Industries Association (JEITA) Confirmed Harmonics Guideline (products less than or equal to 20 A per phase)**

高調波ガイドライン適合品

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

高調波ガイドライン準用品

**IBM Taiwan Contact Information**

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**Electromagnetic Interference (EMI) Statement - Korea**

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**Germany Compliance Statement**

**Deutschsprachiger EU Hinweis: Hinweis für Geräte der Klasse B 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 B ein.

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**Deutschland: Einhaltung des Gesetzes über die elektromagnetische Verträglichkeit von Geräten**

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

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

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Tel: +49 7032 15 2941

email: lugi@de.ibm.com

Generelle Informationen:

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

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