

# Installing the EDR1 PCIe storage enclosure

ESCALA Power7



REFERENCE  
86 A1 27FK 01



# Installing the EDR1 PCIe storage enclosure

The ESCALA Power7 publications concern the following models:

- Bull Escala E1-700 (Power 710 / 8231-E2B)
- Bull Escala E1-705 (Power 710 / 8231-E1C)
- Bull Escala E2-700 / E2-700T (Power 720 / 8202-E4B)
- Bull Escala E2-705 / E2-705T (Power 720 / 8202-E4C)
- Bull Escala E3-700 (Power 730 / 8231-E2B)
- Bull Escala E3-705 (Power 730 / 8231-E2C)
- Bull Escala E4-700 / E4-700T (Power 740 / 8205-E6B)
- Bull Escala E4-705 (Power 740 / 8205-E6C)
- Bull Escala E5-700 (Power 750 / 8233-E8B)
- Bull Escala M6-700 (Power 770 / 9117-MMB)
- Bull Escala M6-705 (Power 770 / 9117-MMC)
- Bull Escala M6-715 (Power 770 / 9117-MMD)
- Bull Escala M7-700 (Power 780 / 9179-MHB)
- Bull Escala M7-705 (Power 780 / 9179-MHC)
- Bull Escala M7-715 (Power 780 / 9179-MHD)

References to Power 755 / 8236-E8C models are irrelevant.

## Hardware

November 2012

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B.P.20845  
49008 ANGERS CEDEX 01  
FRANCE

**REFERENCE**  
**86 A1 27FK 01**

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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, a safety information booklet is included in the publications package shipped with the product. The booklet 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 in the booklet. You should also refer to the booklet any time you do not clearly understand any safety information in the U.S. English publications.

### Laser safety information

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

#### Laser compliance

The 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 provided power cord. Do not use the 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.

(D005a)

## 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 approved part. Recycle or discard the battery as instructed by local regulations. (C003a)

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

The following comments apply to the 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 ED/R1 PCIe storage enclosure

Use this overview as a guide to the tasks required for installing the ED/R1 PCI Express (PCIe) storage enclosure (EXP30 Ultra SSD I/O Drawer) into a rack and cabling it to a server.

### Procedure

You can use the following table to read about and complete the high-level tasks for installing the ED/R1 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>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 Installing the rack (<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 Installing the EDR1 in a rack (<a href="http://publib.boulder.ibm.com/infocenter/systems/scope/hw/topic/p7ham/p7ham_edr1_prepare.htm">http://publib.boulder.ibm.com/infocenter/systems/scope/hw/topic/p7ham/p7ham_edr1_prepare.htm</a>).</p>
<p>Power off the system, if required, to install the disk drive enclosure.</p>	<p>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>).</p>
<p>Determine where to install the disk drive enclosure in the rack.</p>	<p>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 7.</p>

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

Task	Where to find associated information
Mark the location on the rack where the PCIe storage enclosure will be installed.	If you have a rack-mounting template for the PCIe storage enclosure, use it to mark the location.  If you do not have a rack-mounting template, see step 4d2 on page 8.
Install the rail assembly in the rack.	To install the mounting hardware in the rack, see step 5 on page 9.
Install the PCIe storage enclosure on the rail assembly.	To install the PCIe storage enclosure on the rail assembly, see step 6 on page 12.
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 an EDR1 PCIe storage enclosure 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 16.
Cable the PCIe storage enclosure to the server.	To add the PCIe storage enclosure to the system configuration, see step 9 on page 18
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 25.

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## Installing the ED/R1 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.

### Before you begin

- This information is provided in printed form as a list of basic tasks for installing the ED/R1 PCIe storage enclosure. For the most current version, use the online information: Installing the EDR1 PCIe storage enclosure.
- This procedure supports the following installation scenarios:
  - Your ED/R1 PCIe storage enclosure was delivered already mounted in a rack, and you need to complete the installation.
  - Your ED/R1 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.

- Before installing the PCIe storage enclosure into a rack, read the Rack safety notices.

### About this task

To install the ED/R1 PCIe storage enclosure, complete the following tasks:

1. Choose the type of installation you are performing:
  - To complete the installation of a ED/R1 PCIe storage enclosure that was delivered already mounted in a rack, go to step 2.
  - To complete the installation of a ED/R1 PCIe storage enclosure that was delivered separately from a rack, go to step 3 on page 7.
2. Remove the shipping bracket attached at the rear of the PCIe storage enclosure as follows:
  - a. At the rear of the rack, find the rear panel of the ED/R1 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.

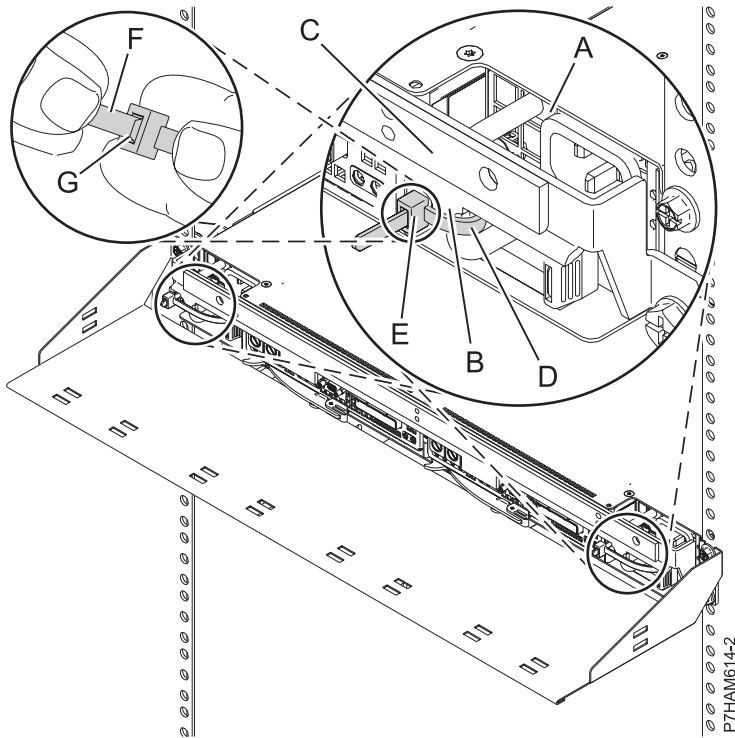


Figure 1. Power supply attachment to the rear shipping bracket

- 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 ED/R1 PCIe storage enclosure that might be required.



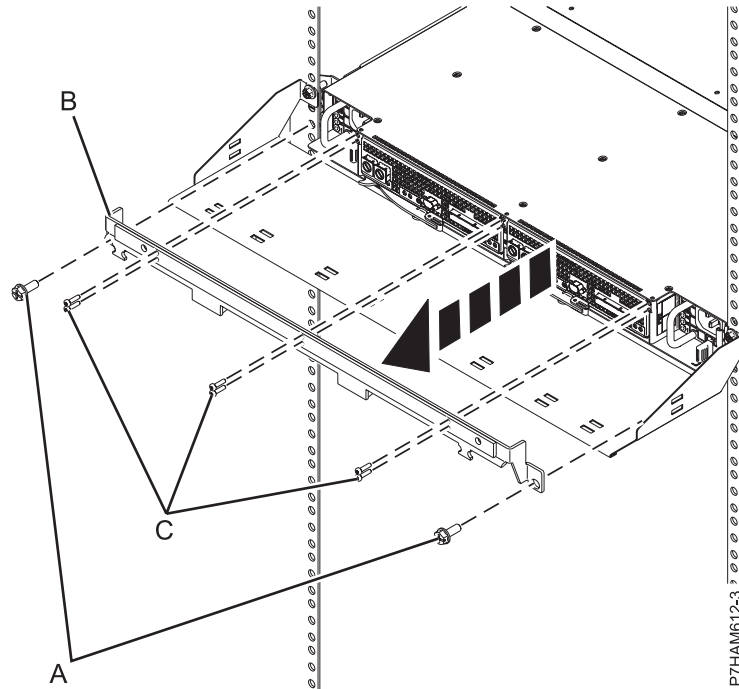


Figure 2. Removing the rear shipping bracket

- 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.

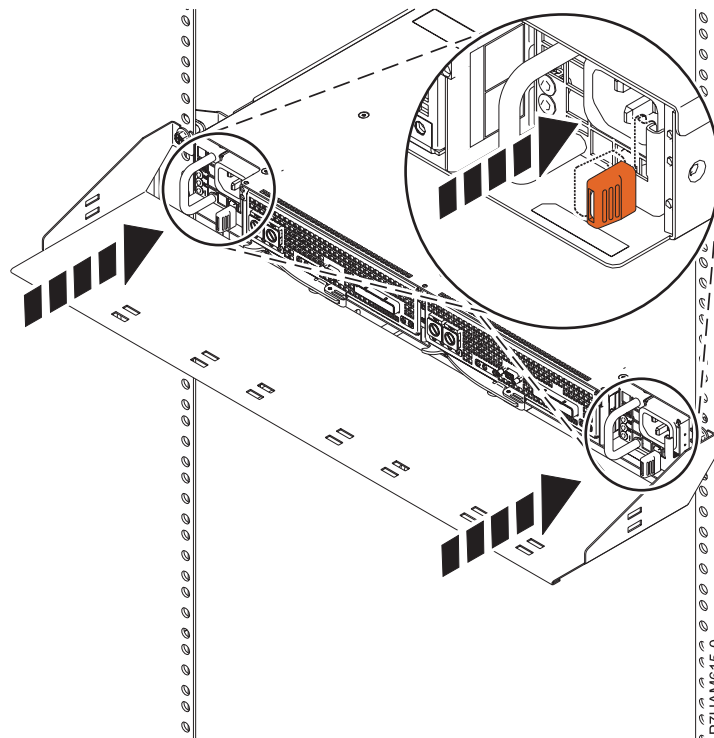


Figure 3. Docking the power supply

- e. At the front of the rack, find the front panel of the ED/R1 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**).

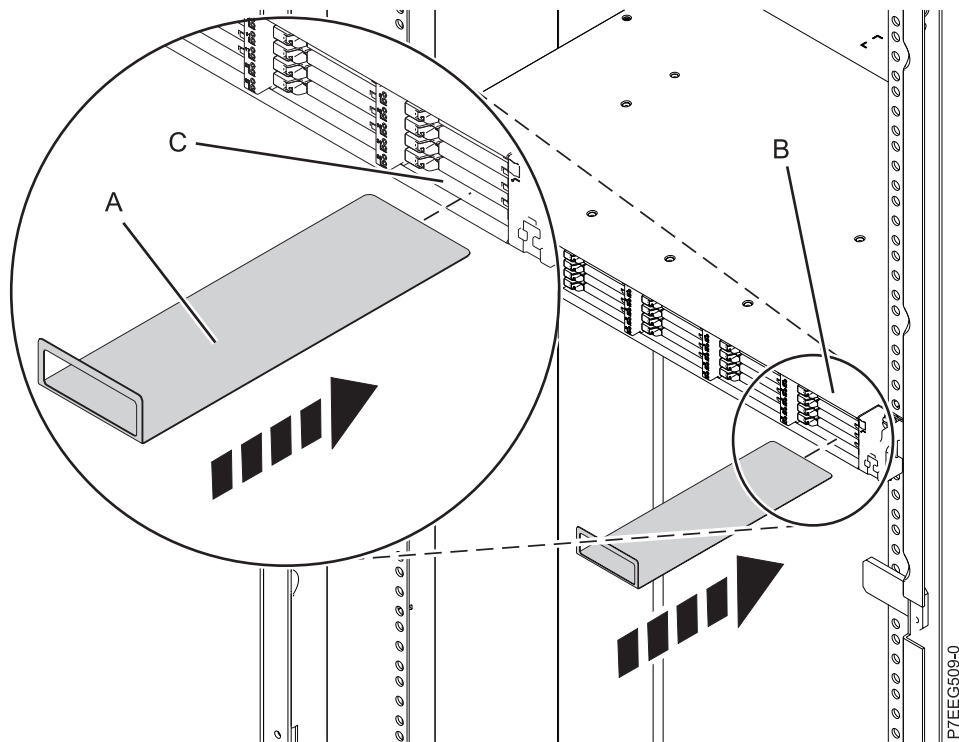


Figure 4. Inserting the service card

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

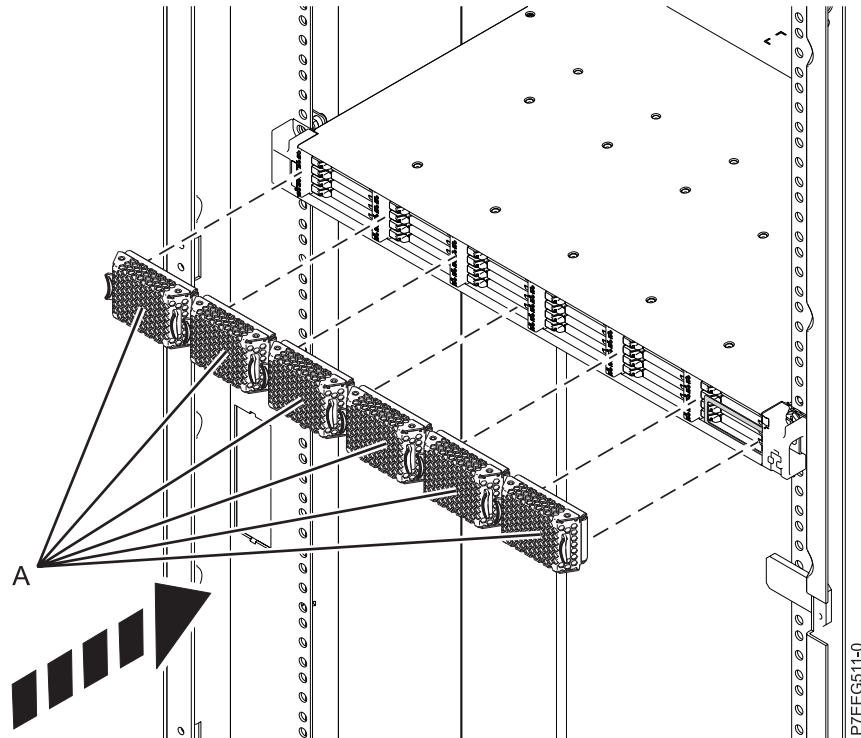


Figure 5. Installing the SSD EMC bezels

Go to step 8 on page 16.

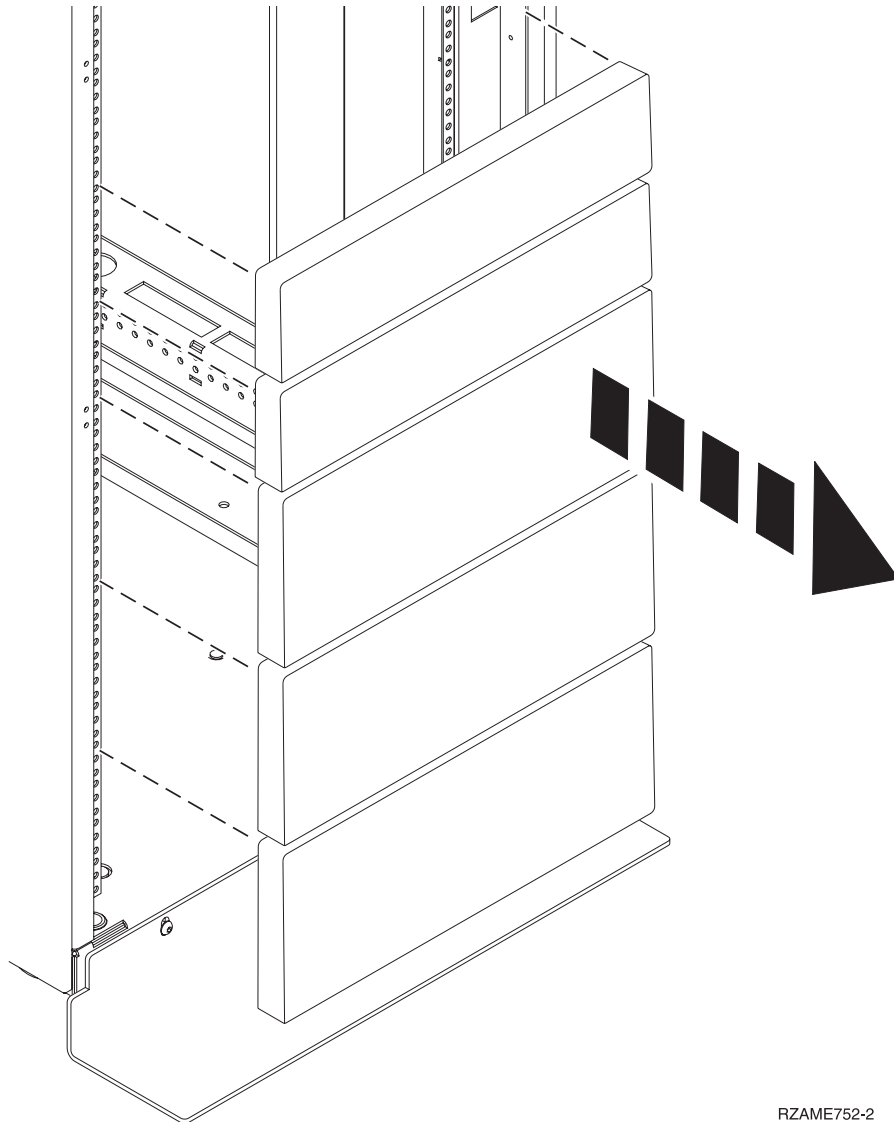
3. Unpack the PCIe storage enclosure as follows:
  - a. Refer to the kitting list provided with the rack installation kit, and complete a parts inventory.
  - b. Locate the rack-mounting hardware kit and the system rail assemblies that were included with your PCIe storage enclosure.

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 6. 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. Choose one of the following options:
  - 1) If you have a rack-mounting template, use it to mark the location.
  - 2) If you do not have a rack-mounting template, complete the following steps:
    - a) 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.

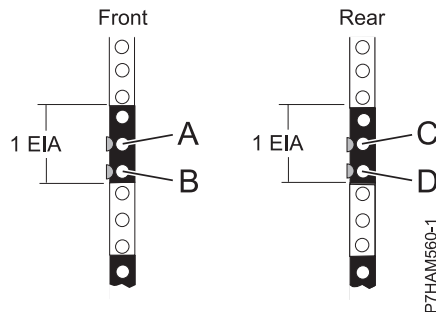


Figure 7. Marking the installation locations

- b) Repeat the last step to place two marks on the corresponding mounting holes on the front-right side of the rack.
  - c) Go to the rear of the rack. On the left side, find the EIA unit to be used for the PCIe storage enclosure.
  - d) Mark the middle mounting hole (C) of this EIA unit. Place another mark beside the bottom mounting hole (D).
  - e) 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 8 on page 10.
    - 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 8. 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.

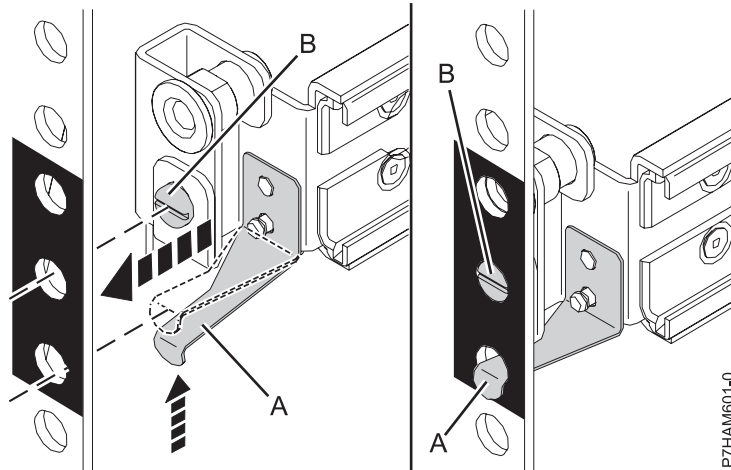


Figure 8. Mounting the rail to the front of the rack

- 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 9, and then expand the rail carefully toward the marks until the rail end meets the rear rack flange.

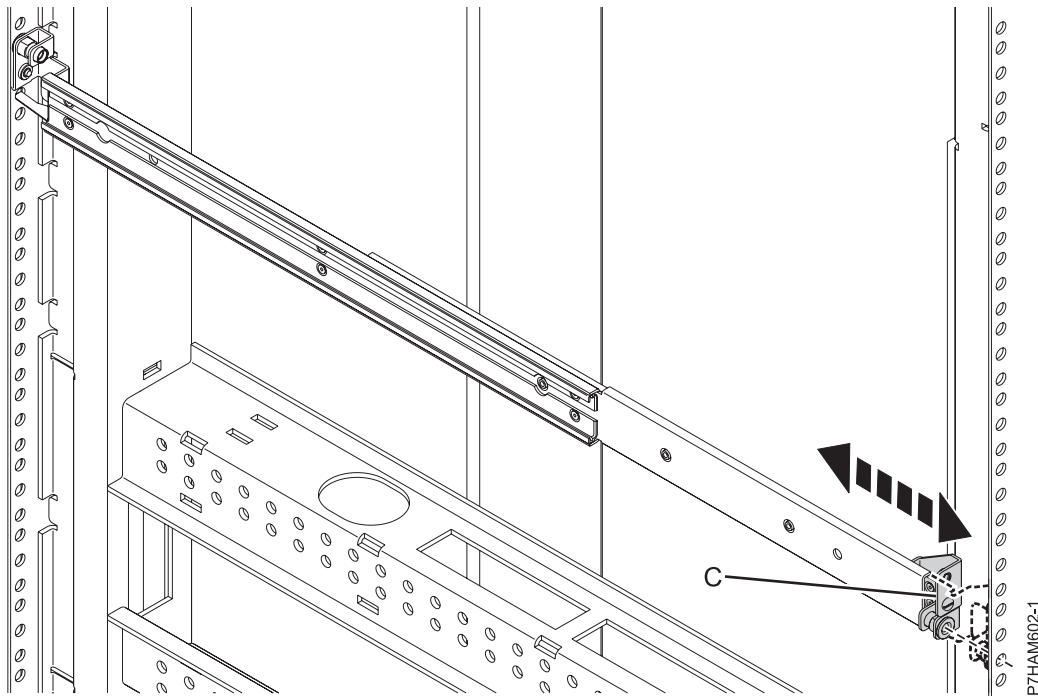


Figure 9. Expanding the rail to the rear of the rack

- e. Seat the alignment screw (D) of the rail into the middle EIA hole that you marked previously, as shown in Figure 10.

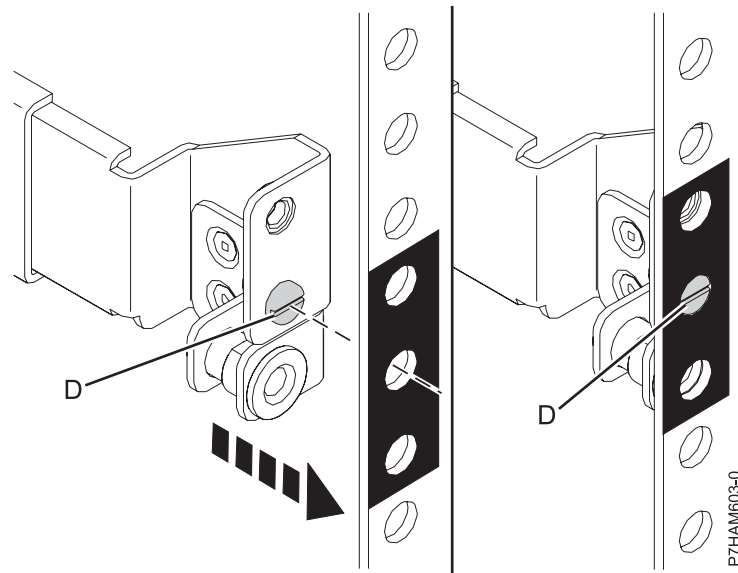


Figure 10. Mounting the rail to the rear of the rack

- f. Repeat step 5c on page 10 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 11 on page 12. 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.**

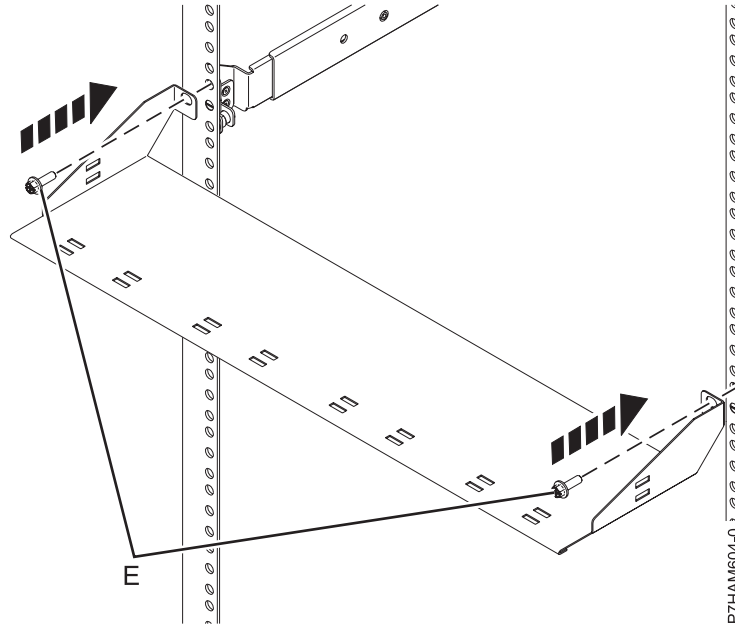


Figure 11. Mounting the cable management bracket

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 12 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 12, 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.

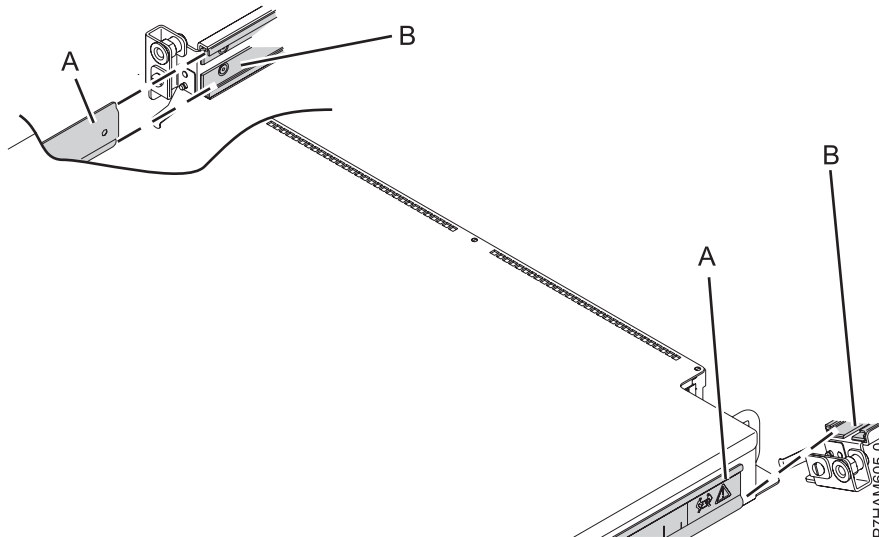


Figure 12. Reviewing the enclosure attachment to the rails

**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 13. Repeat this operation on the other side.

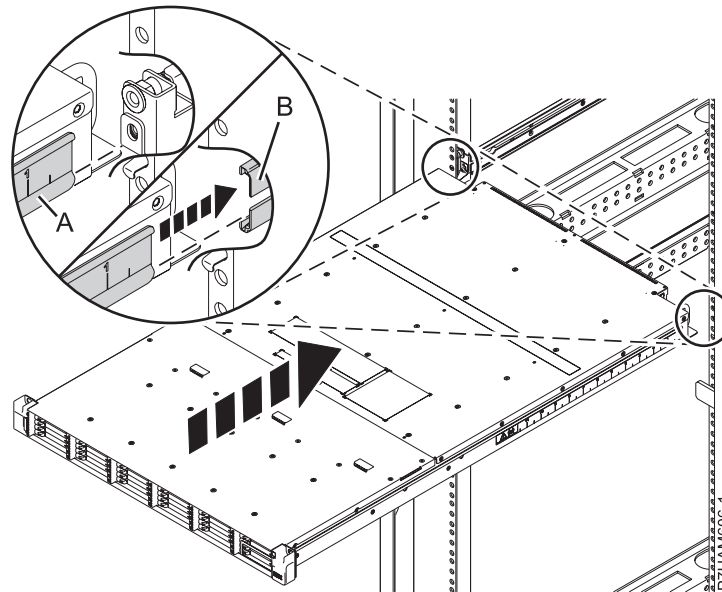


Figure 13. Fitting the enclosure into the rail sheath

- 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 14.

**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.

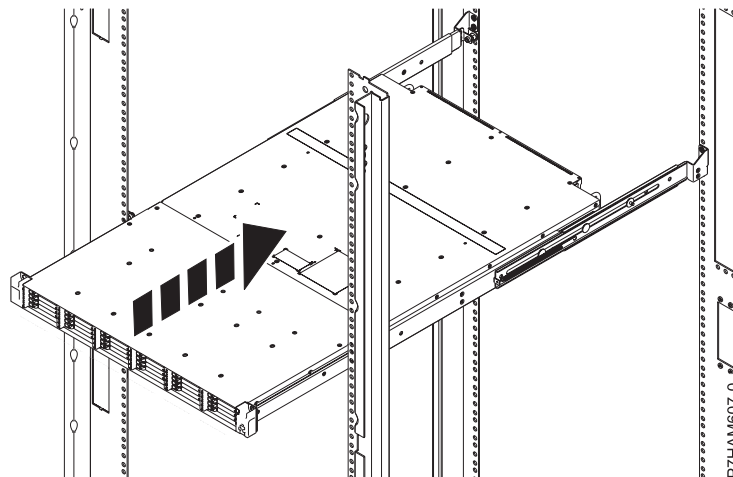


Figure 14. Sliding the disk drive enclosure into the rack

- 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 15 on page 14.

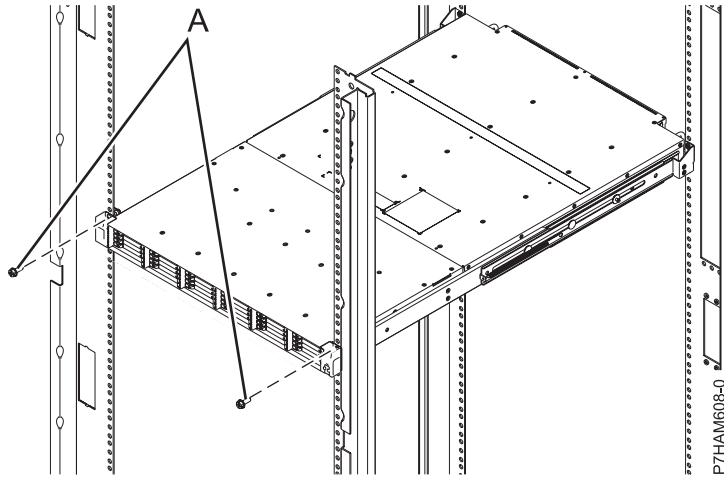


Figure 15. Securing the front of the enclosure to the rack

- 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 16. 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).

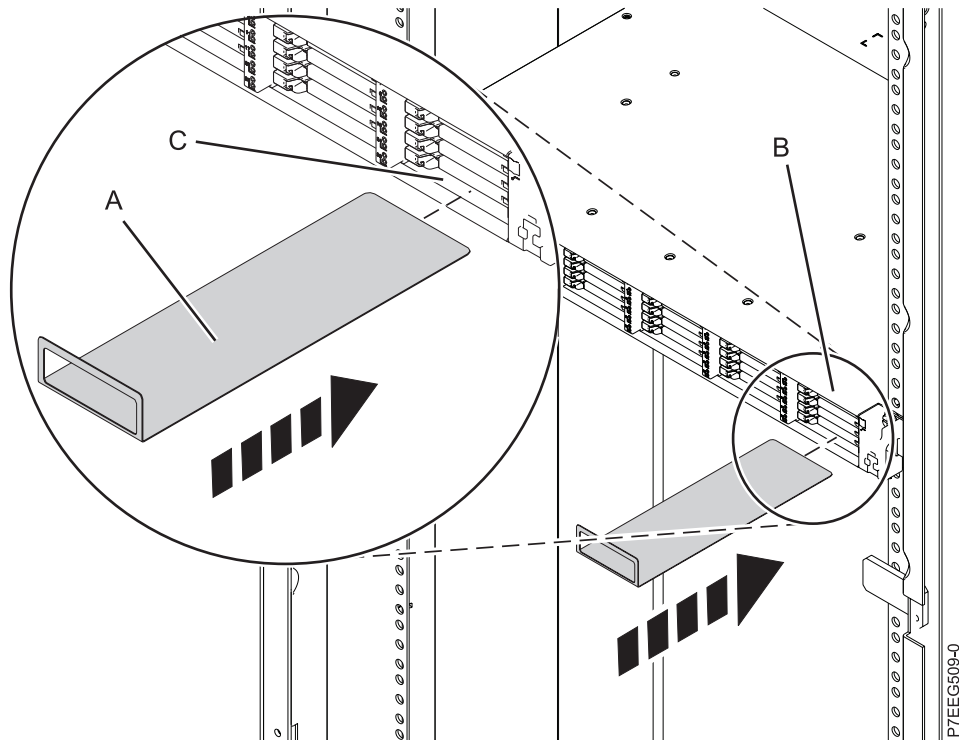


Figure 16. Inserting the service card

- g. Install the six SSD EMC bezels (A) to cover the slots that contain the SSDs, as shown in Figure 17 on page 15.

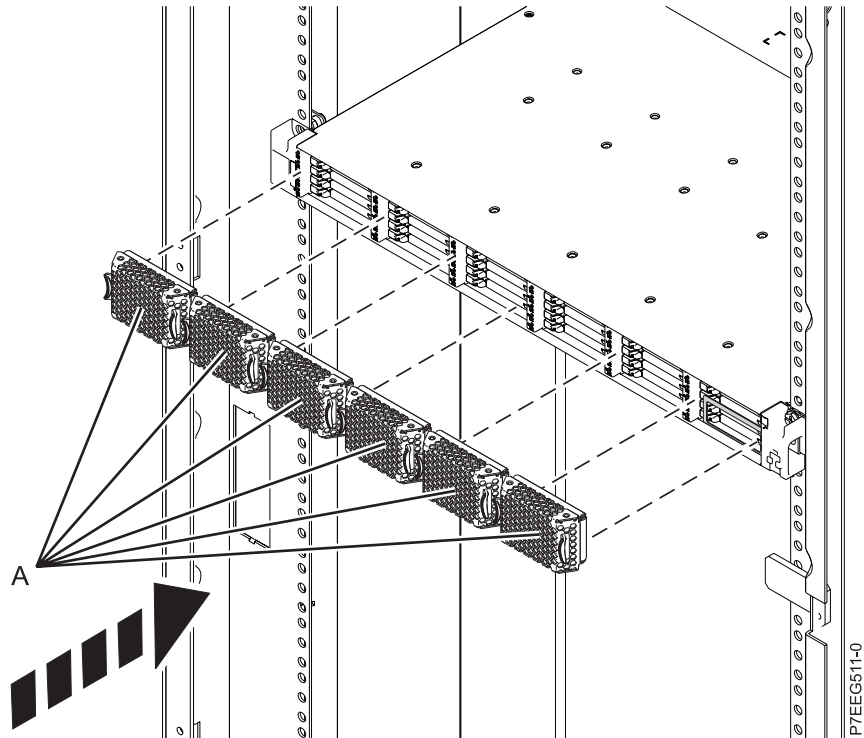


Figure 17. Installing the SSD EMC bezels

- h. At the rear of the rack, install the power cables (A), as shown in Figure 18. Use Velcro ties to secure the power cords to the cable management bracket.

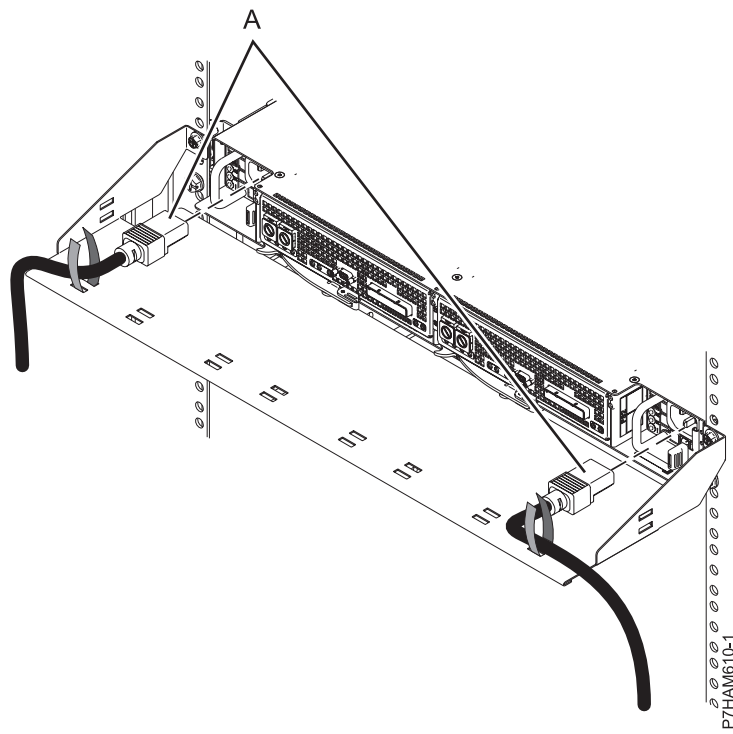


Figure 18. Installing the power cords

7. If you have SSDs that require installation to the PCIe storage enclosure, see Removing and installing a solid-state drive for an EDR1 PCIe storage enclosure 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.

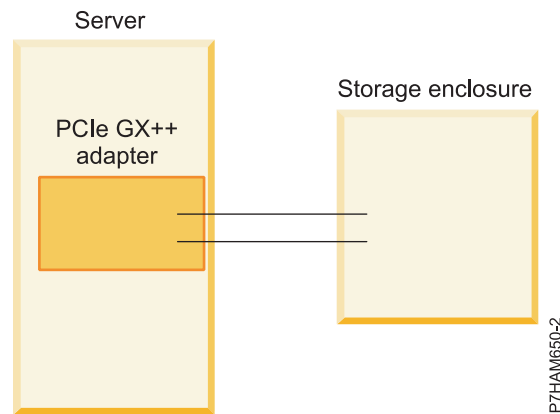


Figure 19. Example of a server that has one PCIe GX++ adapter connected to a single storage enclosure

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

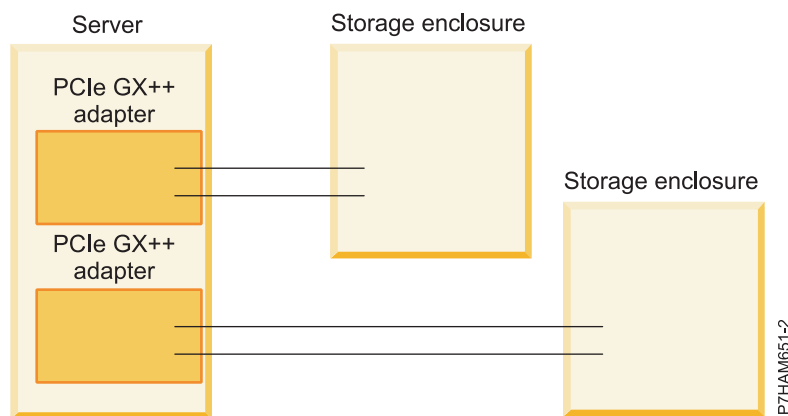


Figure 20. Example of a server that has two PCIe GX++ adapters connected to two storage enclosures

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

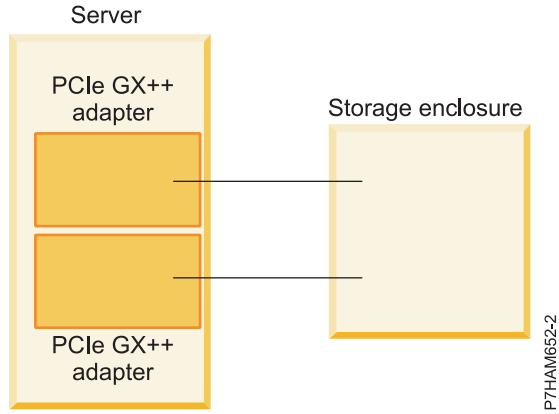


Figure 21. Example of a server that has two PCIe GX++ adapters connected to a single storage enclosure

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

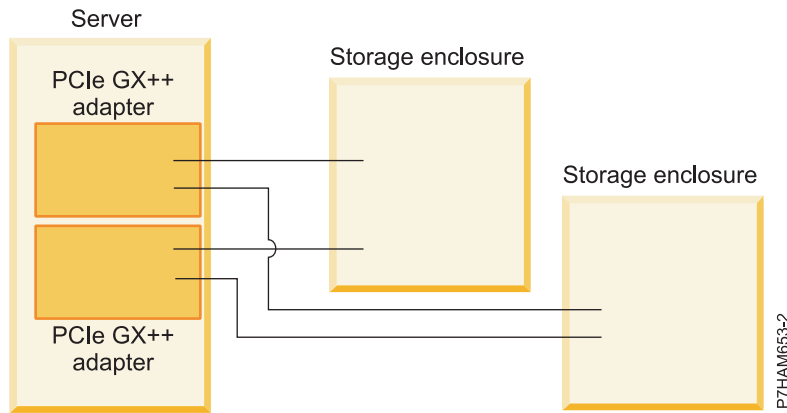


Figure 22. Example of a server that has two PCIe GX++ adapters connected to two storage enclosures for high availability

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

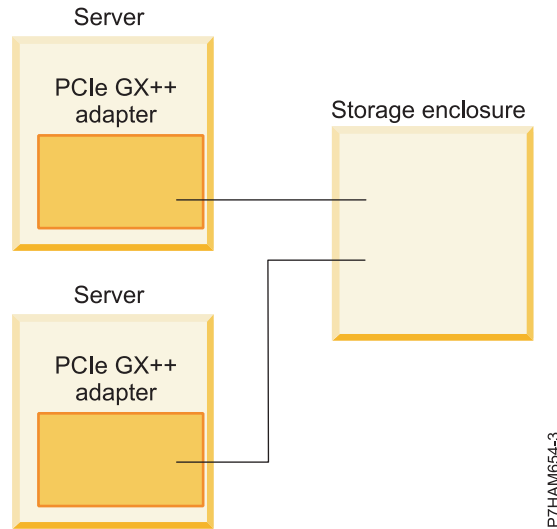


Figure 23. Example of two servers, each with a PCIe GX++ adapter, connected to a single storage enclosure for high availability

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

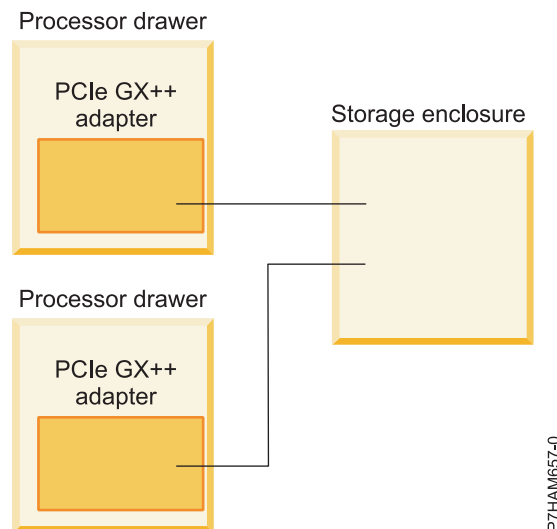


Figure 24. Example of two processor drawers, each with a PCIe GX++ adapter, connected to a single storage enclosure for high availability

- 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 29.
  - 2) Adapters are cabled to the ED/R1 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 31.
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.

b. Add the PCIe storage enclosure to the system by choosing one of the following options:

- To add the PCIe storage enclosure to the system with the system powered on (concurrently), complete the following steps:
  - 1) Record the current date and time for use later in the procedure when checking for serviceable events.
  - 2) Verify the existing 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)). All PCIe hardware topology problems that are discovered in this step must be corrected before continuing with this procedure.

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

- 3) 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.

- 4) 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 adapters to install them. After the PCIe GX++ adapters are installed, continue with the steps in this procedure to connect the PCI storage enclosure.

- 5) Using PCIe cables, connect the PCIe storage enclosure to the GX adapters that were identified in step 9b4.

**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.

- 6) Identify the PCIe link information that is associated with the connections to the PCIe storage enclosure by completing the following steps.

**Note:** Two PCIe links connect a PCIe storage enclosure.

**Important:** If the PCIe storage enclosure is connected to two systems, complete this step for each system. Each system will host one of the PCIe links that connect the PCIe storage enclosure.

- a) Determine the location codes of the PCIe connectors on the system to which you connected the PCIe storage enclosure.

- b) Choose one of the following options:

- If your system is managed by a Hardware Management Console (HMC), complete the following steps:

- i. From the navigation bar, expand **Systems Management**.
- ii. Click **Servers**.
- iii. Select the server you are working with.
- iv. In the Tasks area, expand **Hardware Information**.
- v. Click **PCIe Hardware Topology**.

- If your system is not managed by an HMC, complete the following steps:

- i. Access the Advanced System Management Interface (ASMI) by using an authority level of administrator or authorized service provider. For details about using the ASMI, see Managing the Advanced System Management Interface (<http://publib.boulder.ibm.com/infocenter/systems/scope/hw/topic/p7hby/asmi.htm>).

- ii. In the ASMI navigation area, expand **System Configuration**.
  - iii. Click **PCIe Hardware Topology**.
- c) Scan the PCIe Hardware Topology data for entries with Host Port column values that match the location codes of the PCIe GX++ adapter connectors that you connected PCIe cables to in step 9b5 on page 19. For each match, complete the following steps:
- i. Select the entry and click **Identify Indicators**.
  - ii. On the Identify Indicators display, select the entry with a Location column value that matches the Host Port column value from the PCIe Hardware Topology entry that you selected in step 9b6ci.
  - iii. Click **Activate LED**.
  - iv. Record the link identifier and the I/O slot identifier string for the PCIe link entry that you identified in step 9b6cii. The link identifier is in the Link ID column, and the I/O slot identifier string is in the I/O Slots column.
- d) Visually inspect the identify indicators for the PCIe connectors to which you connected the PCIe storage enclosure to verify that they are active.
- e) For each identify indicator that you recorded in step 9b6civ that is active, complete the following steps:
- i. On the Identify Indicators display, select the entry with a Location column value that matches the Host Port column value from the PCIe Hardware Topology entry or entries that you selected in step 9b6ci.
  - ii. Click **Deactivate LED**.
- f) For each identify indicator that you recorded in step 9b6civ that is not active, complete the following steps.

**Note:** Identify indicators are not active if the PCIe cables are connected to the wrong PCIe connectors or the PCIe connector location codes were calculated incorrectly.

- i. On the Identify Indicators display, select the entry with a Location column value that matches the Host Port column value from the PCIe Hardware Topology entry or entries that you selected in step 9b6ci.
  - ii. Click **Deactivate LED**.
  - iii. Restart the procedure beginning at step 9b4 on page 19. If the problem persists with the entry or entries that you selected in step 9b6ci, contact your next level of support for assistance.
- 7) 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.

- 8) 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.
- 9) During the time that the PCIe storage enclosure is powering on and initializing, complete the following steps:
- a) Verify that the green chassis power light-emitting diode (LED) comes on solid. This LED is located on the front of the enclosure, and it has an overlay with a lightning bolt symbol.
  - b) Verify that the green **AC good** LED and **DC good** LED on each of the two power supplies come on solid. These LEDs are located on the power supplies near the connectors for the power cords, and are clearly labeled **AC** and **DC**.
  - c) Verify that the amber fault LED on each power supply is off. This LED is labeled with an exclamation point (!).



**Important:** The PCIe storage enclosure usually requires no more than 5 minutes to power on and initialize. If any of the LED states previously described cannot be verified after 5 minutes have elapsed, there could be problems with the PCIe storage enclosure. Verify that the power cords are securely connected to the power supplies and the power source. If the problem persists, contact your next level of support for assistance.

- 10) For each of the two input/output (I/O) slots that you recorded in step 9b6civ on page 20, power on the I/O slot by choosing one of the following options.

**Important:** If the PCIe storage enclosure is connected to two systems, complete this step for each system. Each system will host one of the I/O slots that connect the PCIe storage enclosure.

- If the I/O slot is assigned to a partition that is powered on, choose one of the following options.

**Note:** If your system is not managed by an HMC and is powered on to the firmware running state, choose one of the following options. The system is in firmware running state if there are active partitions.

- If the I/O slot is assigned to a partition that is powered on and running the Virtual I/O Server (VIOS) or AIX® operating system, continue with step 9b11.
- If the I/O slot is assigned to a partition that is powered on and running the operating system, continue with step 9b12 on page 22.
- If the I/O slot is assigned to a partition that is powered on and running the Linux operating system, continue with step 9b13 on page 22.
- If the I/O slot is not assigned to a partition that is powered on, continue with step 9b14 on page 23.

**Note:** If your system is powered on to firmware standby state, choose this option. The system is in firmware standby state if there are no active partitions.

- 11) Complete the following steps:
  - a) Log in to the operating system with admin or service level authority. If you need assistance, contact the system administrator.
  - b) Choose one of the following options:
    - If the partition is running the VIOS operating system, type `diagmenu` at the VIOS command prompt, and press Enter.
    - If the partition is running the AIX operating system, type `diag` at the AIX command prompt, and press Enter.
  - c) On the DIAGNOSTIC OPERATING INSTRUCTIONS display, press Enter to continue.
  - d) On the FUNCTION SELECTION display, use the arrow keys to select **Task Selection (Diagnostics, Advanced Diagnostics, Service Aids, etc.)**, and press Enter.
  - e) On the TASKS SELECTION LIST display, use the arrow keys to select **Hot Plug Task**, and press Enter.
  - f) On the Hot Plug Task display, use the arrow keys to select **PCI Hot Plug Manager**, and press Enter.
  - g) On the PCI Hot Plug Manager display, use the arrow keys to select **Replace/Remove a PCI Hot Plug Adapter**, and press Enter.
  - h) On the Replace/Remove a PCI Hot Plug Adapter display, use the arrow keys to select the entry that has the identifier string of the I/O slot in the Slot column, and press Enter.
  - i) On the Replace/Remove a PCI Hot Plug Adapter display, use the Tab key to select the **Replace** operation, and press Enter.

**Note:** The **Replace** operation is the default selection.

- j) Follow the online instructions to complete the replace operation. However, do not perform the steps to physically remove and replace the adapter.
  - k) If you have another I/O slot to power on, return to step 9b10 on page 21. Otherwise, continue with step 9b15 on page 23.
- 12) Complete the following steps:
- a) Log in to the operating system with admin or service level authority. If you need assistance, contact the system administrator.
  - b) At the command prompt, type `strsst` and press Enter.
  - c) Type the service tools user ID and service tools password on the System Service Tools (SST) Sign On display, and press Enter.
  - d) Select the **Start a service tool** option, and press Enter.
  - e) Select the **Hardware service manager** option, and press Enter.
  - f) Select the **Packaging hardware resources (systems, frames, cards)** option, and press Enter.
  - g) On the Packaging Hardware Resources display, locate the entry that contains the I/O slot. To make this identification, scan the display for an entry that has a Description value of System Unit and a Unit ID that matches the U label portion of the I/O slot identifier string. The U label portion is the substring that begins with U and continues until the first dash (-) character.
  - h) Type 9 in the Opt column for the system unit entry that you located in step 9b12g, and press Enter.

**Note:** Specifying option 9 starts the Hardware contained within package view for the selected packaging hardware resource.

- i) On the Packaging Hardware Resources display, locate the entry for the I/O slot. To make this identification, scan the display for an entry that has a Location column value that, when appended to the Unit ID value in the upper right corner, forms the complete I/O slot identifier string.
- j) Type 3 in the Opt column for the entry that you located in step 9b12i, and press Enter.

**Note:** Specifying option 3 starts the Hardware Resource Concurrent Maintenance menu for the selected packaging hardware resource.

- k) On the Hardware Resource Concurrent Maintenance display, start the Power off domain function by pressing **F9**.
  - l) Follow the online instructions to complete the power-off operation.
  - m) On the Hardware Resource Concurrent Maintenance display, start the Power on domain function by pressing **F10**.
  - n) Follow the online instructions to complete the power-on operation.
  - o) If you have another I/O slot to power on, return to step 9b10 on page 21. Otherwise, continue with step 9b15 on page 23.
- 13) Complete the following steps:
- a) Log in to the operating system with admin or service level authority. If you need assistance, contact the system administrator.
  - b) At the Linux command prompt, type `drslot_chrp_pci -R -s io_slot_identifier` (where *io\_slot\_identifier* is the identifier string of the I/O slot), and press Enter.
  - c) Follow the online instructions to complete the replace operation. However, do not perform the steps to physically remove and replace the adapter.
  - d) If you have another I/O slot to power on, return to step 9b10 on page 21. Otherwise, continue with step 9b15 on page 23.

- 14) Complete the following steps:
- a) Choose one of the following options:
    - If your system is managed by an HMC, complete the following steps:
      - i. From the navigation bar, expand **Systems Management**.
      - ii. Click **Servers**.
      - iii. Select the server you are working with.
      - iv. In the Tasks area, expand **Hardware Information**.
      - v. Click **PCIe Hardware Topology**.
    - If your system is not managed by an HMC, complete the following steps:
      - i. Access the ASMI by using an authority level of administrator or authorized service provider. For details about using the ASMI, see Managing the Advanced System Management Interface (<http://publib.boulder.ibm.com/infocenter/systems/scope/hw/topic/p7hby/asmi.htm>).
      - ii. In the ASMI navigation area, expand **System Configuration**.
      - iii. Click **PCIe Hardware Topology**.
  - b) Scan the PCIe Hardware Topology data for a value in the I/O Slots column that matches the identifier string of the I/O slot, and select the entry.
  - c) Click **Probe Link**.

**Important:** If the Probe Link function fails, verify that the I/O slot is not owned by a partition that is powered on. Then choose from the following options:

- If you determine that the I/O slot is owned by a partition that is powered on, return to step 9b10 on page 21 and choose the alternative option that supports an I/O slot assigned to a partition that is powered on.
  - If you are certain the I/O slot is not owned by a partition that is powered on, contact your next level of support for assistance.
- d) If you have another I/O slot to power on, return to step 9b10 on page 21. Otherwise, continue with step 9b15.
- 15) 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.

- 16) 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 9b1 on page 19 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.

- 17) 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)).
  - 18) 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/iphat/iphbldlpariopaddp6.htm>).
- To add the PCIe storage enclosure to the system with the system powered off (nonconcurrently), complete the following steps:
    - 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 9r3.

**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.yyyyyy-P1-Cz-T3, where xxxx is the feature code of the PCIe storage enclosure connected by the PCIe link, yyyyyy 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 9r7 on page 24 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/iphlat/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 ED/R1 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.

As shown in the following figure, the ED/R1 PCIe storage enclosure (A) supports the attachment of up to two optional 58/87 disk drive enclosures (B) by using EX cables (C) for increased storage capacity.

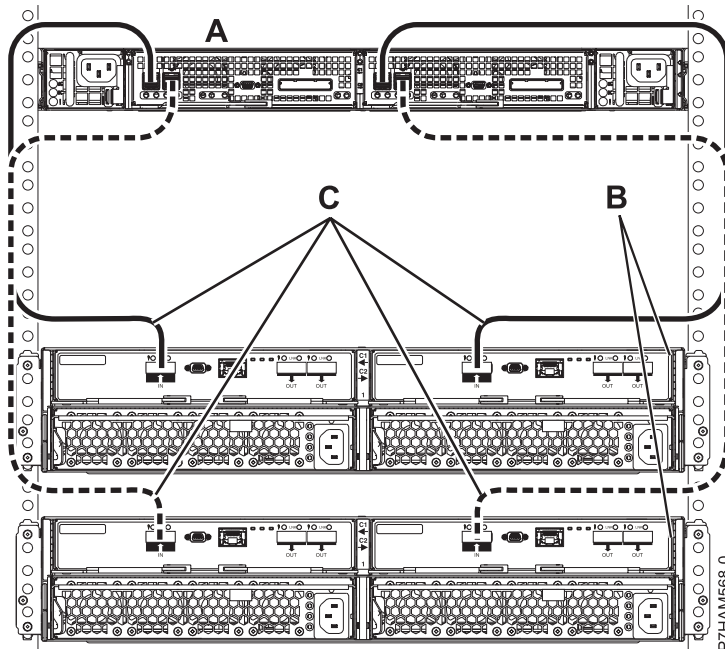


Figure 25. Connection of two 58/87 disk drive enclosures by using EX cables to a PCIe storage enclosure

For detailed information about cabling a 58/87 disk drive enclosure to the ED/R1 PCIe storage enclosure, see Serial-attached SCSI cable planning (<http://publib.boulder.ibm.com/infocenter/systems/scope/hw/topic/p7had/p7hadsascabing.htm>).

The 58/87 disk drive enclosures must contain only hard disk drives (HDDs). The internal SSDs and any HDDs from attached 58/87 disk drive enclosures are controlled by the dual PCIe2 SAS RAID controllers contained within the PCIe storage enclosure. SSDs and HDDs cannot be mixed in the same RAID array.

The ED/R1 PCIe storage enclosure is supported by the following operating systems:

- AIX
- Linux
- VIOS

**Note:** VIOS does not support the ED/R1 PCIe storage enclosure for an client.

To determine the level of software that you need to support the PCIe storage enclosure feature, see IBM Prerequisite.

**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

Best performance is achieved when the access characteristics on each disk array have a balanced workload. This happens when the two controllers have an equal number of disk arrays with active paths to the disk units.

For additional SAS RAID controller information for the AIX operating system, see SAS RAID controller for AIX.

For additional SAS RAID controller information for the Linux operating system, see SAS RAID controller for Linux .





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## Reference information

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

---

### Connector locations

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

### Server connectors

Learn about connector locations for servers.

### Model 02E/4C connector locations

Learn about connector locations on rack-mounted models.

The 02E/4C 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.

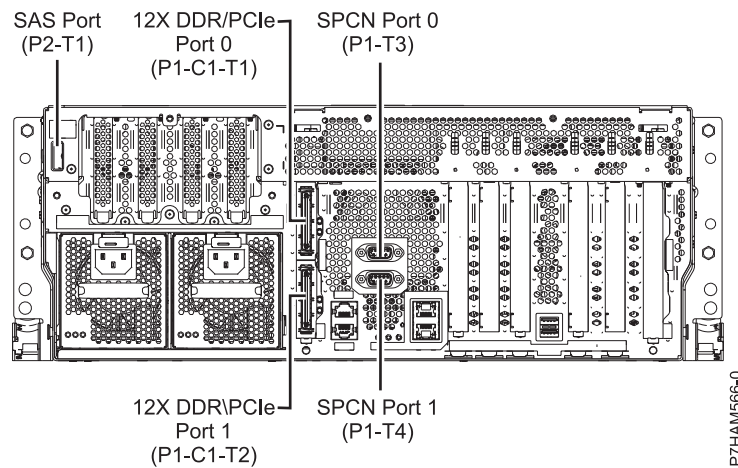


Figure 26. Model 02E/4C connections for expansion units, disk drive enclosures, and PCIe storage enclosures

- Support for disk drive enclosures, as shown in the preceding figure, is as follows:
  - The server contains a SAS port.
- Support for PCIe storage enclosures, as shown in the preceding 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.

### Model 05E/6C connector locations

Learn about connector locations on rack-mounted models.

The 05E/6C 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.

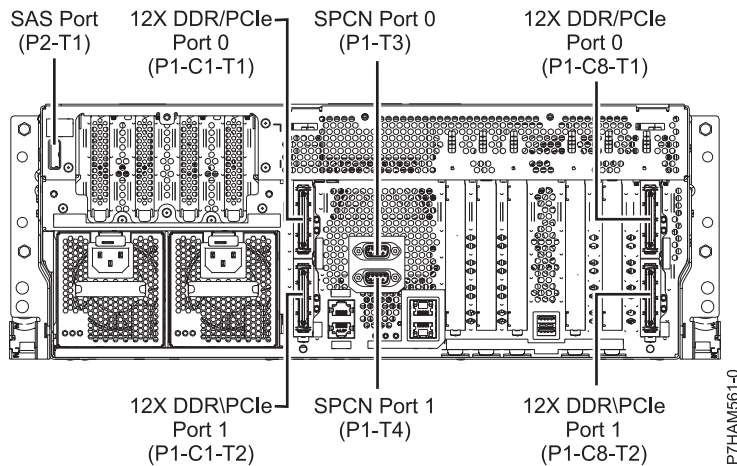


Figure 27. Model 05E/6C connections for expansion units, disk drive enclosures, and PCIe storage enclosures

- Support for disk drive enclosures, as shown in the preceding figure, is as follows:
  - The server contains a SAS port.
- Support for PCIe storage enclosures, as shown in the preceding 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.

## Model 31E/1C connector locations

Learn about connector locations.

The 31E/1C 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.

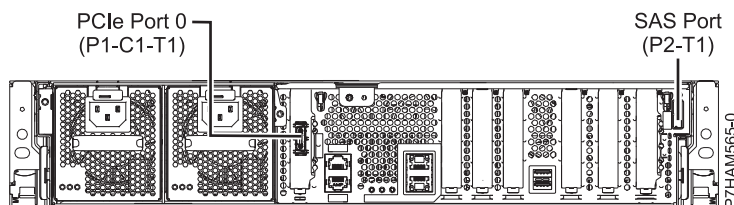


Figure 28. Model 31E/1C connections for disk drive enclosures and PCIe storage enclosures

- Support for PCIe storage enclosures, as shown in the preceding figure, is as follows:

- The card installed in the C1 slot can contain one PCIe cable port.
- The server contains a SAS port.

## Model 31E/2C connector locations

Learn about connector locations.

The 31E/2C 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.

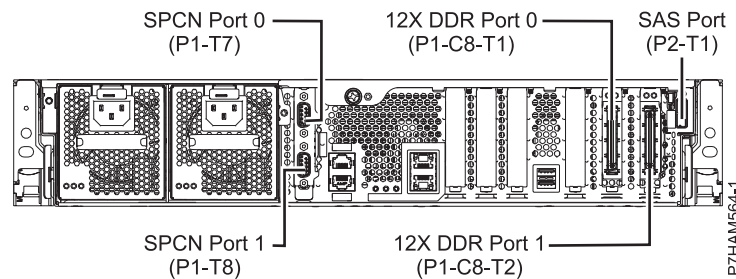


Figure 29. Model 31E/2C connections for expansion units and disk drive enclosures

- Support for disk drive enclosures, as shown in the preceding 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 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.

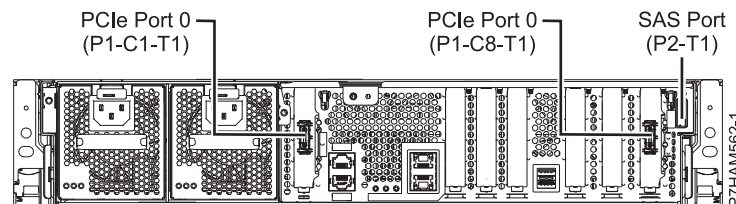


Figure 30. Model 31E/2C connections for PCIe storage enclosures

## Enclosure connectors

Learn about connector locations for I/O enclosures.

## Model ED/R1 connector locations

Learn about connector locations.

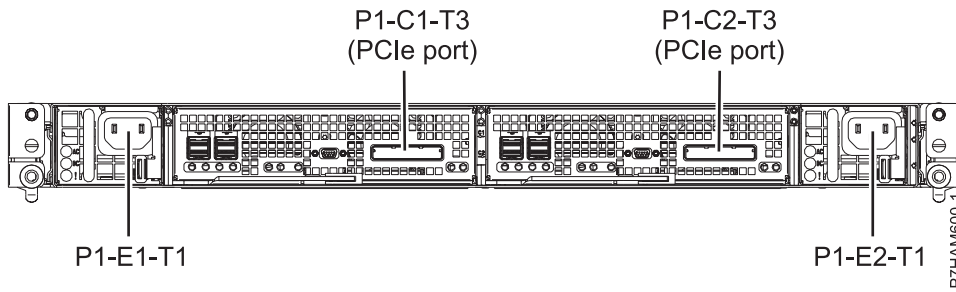


Figure 31. Model ED/R1 connector locations

## Model 58/87 connector locations

Learn about connector locations.

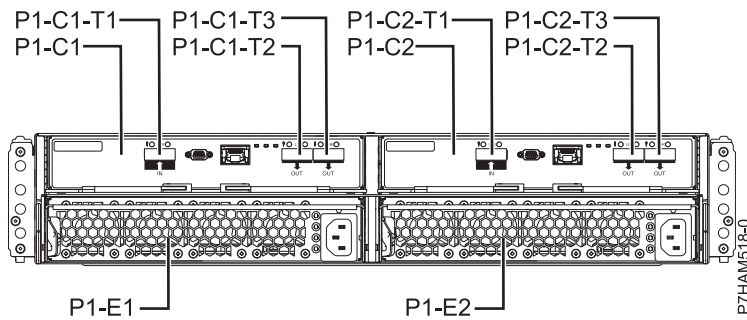


Figure 32. Model 58/87 connector locations

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## Electronic emission notices

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

## Class A Notices

The following Class A statements apply to the servers.

## 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 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.

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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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高調波ガイドライン適合品

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Confirmed Harmonics Guideline with Modifications (products greater than 20 A per phase)**

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**Electromagnetic Interference (EMI) Statement - People's Republic of China**

**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。

Declaration: This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may need to perform practical action.

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**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。

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

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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:

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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.

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- 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.

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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**

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