

Power Systems

*Installing the EMX0 PCIe Gen3 I/O
expansion drawer*



Note

Before using this information and the product it supports, read the information in [“Safety notices”](#) on page v, [“Notices”](#) on page 77, 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 POWER9™ 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:

- If IBM supplied the power cord(s), 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.
 - For AC power, disconnect all power cords from their AC power source.
 - For racks with a DC power distribution panel (PDP), disconnect the customer's DC power source to the PDP.
- When connecting power to the product ensure all power cables are properly connected.
 - For racks with AC power, 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.

- For racks with a DC power distribution panel (PDP), connect the customer's DC power source to the PDP. Ensure that the proper polarity is used when attaching the DC power and DC power return wiring.
- 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.
- Do not attempt to switch on power to the machine until all possible unsafe conditions are corrected.
- Assume that an electrical safety hazard is present. Perform all continuity, grounding, and power checks specified during the subsystem installation procedures to ensure that the machine meets safety requirements.
- Do not continue with the inspection if any unsafe conditions are present.
- Before you open the device covers, unless instructed otherwise in the installation and configuration procedures: Disconnect the attached AC power cords, turn off the applicable circuit breakers located in the rack power distribution panel (PDP), and disconnect any telecommunications systems, networks, and modems.



DANGER:

- 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. For AC power, remove the power cords from the outlets.
3. For racks with a DC power distribution panel (PDP), turn off the circuit breakers located in the PDP and remove the power from the Customer's DC power source.
4. Remove the signal cables from the connectors.
5. 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. For AC power, attach the power cords to the outlets.
5. For racks with a DC power distribution panel (PDP), restore the power from the Customer's DC power source and turn on the circuit breakers located in the PDP.
6. Turn on the devices.

Sharp edges, corners and joints may be present in and around the system. Use care when handling equipment to avoid cuts, scrapes and pinching. (D005)

(R001 part 1 of 2):



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 unless the earthquake option is to be installed.
- 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. In addition, do not lean on rack mounted devices and do not use them to stabilize your body position (for example, when working from a ladder).



- Each rack cabinet might have more than one power cord.
 - For AC powered racks, be sure to disconnect all power cords in the rack cabinet when directed to disconnect power during servicing.
 - For racks with a DC power distribution panel (PDP), turn off the circuit breaker that controls the power to the system unit(s), or disconnect the customer's DC power source, 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. (R001 part 1 of 2)

(R001 part 2 of 2):



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 or if the rack is not bolted to the floor. 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 part 2 of 2)



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 (compliance ID RACK-001 or 22U (compliance ID RR001) and above.
- Ensure that the heaviest devices are installed in the bottom of the rack cabinet.
- Ensure that there are little-to-no empty U-levels between devices installed in the rack cabinet below the 32U (compliance ID RACK-001 or 22U (compliance ID RR001) level, unless the received configuration specifically allowed it.
- If the rack cabinet you are relocating is part of a suite of rack cabinets, detach the rack cabinet from the suite.
- If the rack cabinet you are relocating was supplied with removable outriggers they must be reinstalled before the cabinet is relocated.
- 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 or in an earthquake environment bolt the rack to the floor.
 - 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)



DANGER: Hazardous voltage, current, or energy levels are present inside any component that has this label attached. Do not open any cover or barrier that contains this label. (L001)

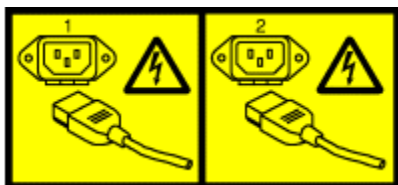
(L002)





DANGER: Rack-mounted devices are not to be used as shelves or work spaces. Do not place objects on top of rack-mounted devices. In addition, do not lean on rack-mounted devices and do not use them to stabilize your body position (for example, when working from a ladder). (L002)

(L003)



or



or

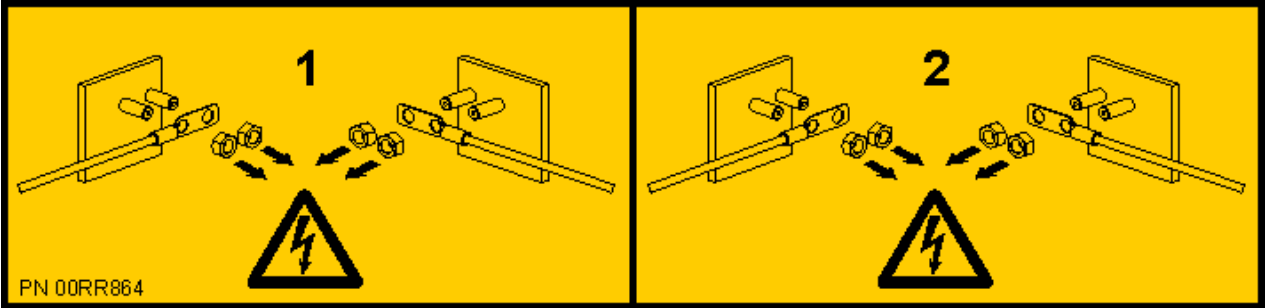


or



or





DANGER: Multiple power cords. The product might be equipped with multiple AC power cords or multiple DC power cables. To remove all hazardous voltages, disconnect all power cords and power cables. (L003)

(L007)



CAUTION: A hot surface nearby. (L007)

(L008)



CAUTION: Hazardous moving parts nearby. (L008)

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. Although shining light into one end and looking into the other end of a disconnected optical fiber to verify the continuity of optic fibers may not injure the eye, this procedure is potentially dangerous. Therefore, verifying the continuity of optical fibers by shining light into one end and looking at the other end is not recommended. To verify continuity of a fiber optic cable, use an optical light source and power meter. (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)

(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 degrees C (212 degrees 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)



CAUTION: Regarding IBM provided VENDOR LIFT TOOL:

- Operation of LIFT TOOL by authorized personnel only.
- LIFT TOOL intended for use to assist, lift, install, remove units (load) up into rack elevations. It is not to be used loaded transporting over major ramps nor as a replacement for such designated tools like pallet jacks, walkies, fork trucks and such related relocation practices. When this is not practicable, specially trained persons or services must be used (for instance, riggers or movers).
- Read and completely understand the contents of LIFT TOOL operator's manual before using. Failure to read, understand, obey safety rules, and follow instructions may result in property damage and/or personal injury. If there are questions, contact the vendor's service and support. Local paper manual must remain with machine in provided storage sleeve area. Latest revision manual available on vendor's web site.
- Test verify stabilizer brake function before each use. Do not over-force moving or rolling the LIFT TOOL with stabilizer brake engaged.
- Do not raise, lower or slide platform load shelf unless stabilizer (brake pedal jack) is fully engaged. Keep stabilizer brake engaged when not in use or motion.
- Do not move LIFT TOOL while platform is raised, except for minor positioning.
- Do not exceed rated load capacity. See LOAD CAPACITY CHART regarding maximum loads at center versus edge of extended platform.
- Only raise load if properly centered on platform. Do not place more than 200 lb (91 kg) on edge of sliding platform shelf also considering the load's center of mass/gravity (CoG).
- Do not corner load the platforms, tilt riser, angled unit install wedge or other such accessory options. Secure such platforms -- riser tilt, wedge, etc options to main lift shelf or forks in all four

(4x or all other provisioned mounting) locations with provided hardware only, prior to use. Load objects are designed to slide on/off smooth platforms without appreciable force, so take care not to push or lean. Keep riser tilt [adjustable angling platform] option flat at all times except for final minor angle adjustment when needed.

- Do not stand under overhanging load.
- Do not use on uneven surface, incline or decline (major ramps).
- Do not stack loads.
- Do not operate while under the influence of drugs or alcohol.
- Do not support ladder against LIFT TOOL (unless the specific allowance is provided for one following qualified procedures for working at elevations with this TOOL).
- Tipping hazard. Do not push or lean against load with raised platform.
- Do not use as a personnel lifting platform or step. No riders.
- Do not stand on any part of lift. Not a step.
- Do not climb on mast.
- Do not operate a damaged or malfunctioning LIFT TOOL machine.
- Crush and pinch point hazard below platform. Only lower load in areas clear of personnel and obstructions. Keep hands and feet clear during operation.
- No Forks. Never lift or move bare LIFT TOOL MACHINE with pallet truck, jack or fork lift.
- Mast extends higher than platform. Be aware of ceiling height, cable trays, sprinklers, lights, and other overhead objects.
- Do not leave LIFT TOOL machine unattended with an elevated load.
- Watch and keep hands, fingers, and clothing clear when equipment is in motion.
- Turn Winch with hand power only. If winch handle cannot be cranked easily with one hand, it is probably over-loaded. Do not continue to turn winch past top or bottom of platform travel. Excessive unwinding will detach handle and damage cable. Always hold handle when lowering, unwinding. Always assure self that winch is holding load before releasing winch handle.
- A winch accident could cause serious injury. Not for moving humans. Make certain clicking sound is heard as the equipment is being raised. Be sure winch is locked in position before releasing handle. Read instruction page before operating this winch. Never allow winch to unwind freely. Freewheeling will cause uneven cable wrapping around winch drum, damage cable, and may cause serious injury.
- This TOOL must be maintained correctly for IBM Service personnel to use it. IBM shall inspect condition and verify maintenance history before operation. Personnel reserve the right not to use TOOL if inadequate. (C048)

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.

The dc-powered system is intended to be installed in a common bonding network (CBN) as described in GR-1089-CORE.

Installing an EMX0 PCIe Gen3 I/O expansion drawer

Learn how to install an EMX0 PCIe Gen3 I/O expansion drawer (EMX0 PCIe3 expansion drawer) into a rack or remove the shipping bracket from a preinstalled EMX0 PCIe3 expansion drawer. Then, learn how to connect the EMX0 PCIe3 expansion drawer to your system and activate the PCIe link.

Notes:

- If you have a POWER9 processor-based 9080-M9S system and it is being installed at the same time as your EMX0 PCIe3 expansion drawer, the service provider completes the installation of the EMX0 PCIe3 expansion drawer. If you already have the 9080-M9S system that is installed, and you ordered an EMX0 PCIe3 expansion drawer, the installation and setup of the EMX0 PCIe3 expansion drawer is a customer task. You can complete this task yourself, or contact a service provider to complete the task for a fee.
- If you have a POWER8® processor-based 9080-MHE, 9080-MME, 9119-MHE, or 9119-MME system and it is being installed at the same time as your EMX0 PCIe3 expansion drawer, the service provider completes the installation of the EMX0 PCIe3 expansion drawer. If you already have the 9080-MHE, 9080-MME, 9119-MHE, or 9119-MME system that is installed, and you ordered an EMX0 PCIe3 expansion drawer, the installation and setup of the EMX0 PCIe3 expansion drawer is a customer task. You can complete this task yourself, or contact a service provider to complete the task for you for a fee.
- If you have any other type of system, the installation and setup of the EMX0 PCIe3 expansion drawer is a customer task. You can complete this task yourself, or contact a service provider to complete the task for you for a fee.

Installing or setting up an EMX0 PCIe3 expansion drawer

Learn how to install an EMX0 PCIe3 expansion drawer into a rack or set up a preinstalled EMX0 PCIe3 expansion drawer.

Complete the following tasks to install or set up an EMX0 PCIe3 expansion drawer:

1. [Preparing to install or set up an EMX0 PCIe3 expansion drawer](#)
2. [Completing inventory for the EMX0 PCIe3 expansion drawer](#)
3. [Determining and marking the location in the rack](#)
4. [Attaching the mounting hardware to the rack](#)
5. [Installing the EMX0 PCIe3 expansion drawer into the rack](#)

Preparing the system to install or set up an EMX0 PCIe3 expansion drawer

Find information about the prerequisites for installing your EMX0 PCIe3 expansion drawer.

About this task

Important: Changing the cable configuration of an existing EMX0 PCIe3 expansion drawer or drawers can result in unintended I/O configuration changes, including a change to the bus numbers assigned to existing expansion drawers. When bus numbers change, partition profiles cannot find existing I/O resources.

To prepare the system to install an EMX0 PCIe3 expansion drawer, complete the following steps:

Procedure

1. Ensure that a PCIe3 cable adapter is installed in the host system before you install the EMX0 PCIe3 expansion drawer.

If you are working on a POWER9 processor-based system: For all systems except the 9040-MR9 or 9080-M9S, you must power off the system to install the PCIe3 cable adapter.

If you are working on a POWER8 processor-based system: For all systems except the 8408-44E or 8408-E8E (with system firmware FW860.10 or later installed), or 9080-MHE, 9080-MME, 9119-MHE, or 9119-MME (with system firmware FW840.xx or later installed), you must power off the system to install the PCIe3 cable adapter.

To install a PCIe3 cable adapter to accommodate an EMX0 PCIe3 expansion drawer, see the following procedures:

- If your system is managed by an HMC, see [PCIe adapters](http://www.ibm.com/support/knowledgecenter/POWER9/p9haj/hmcinstall.htm) (<http://www.ibm.com/support/knowledgecenter/POWER9/p9haj/hmcinstall.htm>).
 - If your system is not managed by an HMC, see [PCIe adapters](http://www.ibm.com/support/knowledgecenter/POWER9/p9hak/pciadapters.htm) (<http://www.ibm.com/support/knowledgecenter/POWER9/p9hak/pciadapters.htm>).
 - For PCIe adapter placement rules and slot priorities for your system or expansion drawer, see [PCIe adapter placement rules and slot priorities](http://www.ibm.com/support/knowledgecenter/POWER9/p9hak/p9hak_pciadapters_slot_all_mtms.htm) (http://www.ibm.com/support/knowledgecenter/POWER9/p9hak/p9hak_pciadapters_slot_all_mtms.htm).
2. Ensure that you have installed the wanted number of PCIe3 6-slot fanout modules in the EMX0 PCIe3 expansion drawer.
- For instructions, see the following procedures:
- If your system is managed by an HMC, see [PCIe adapters](http://www.ibm.com/support/knowledgecenter/POWER9/p9haj/hmcinstall.htm) (<http://www.ibm.com/support/knowledgecenter/POWER9/p9haj/hmcinstall.htm>).
 - If your system is not managed by an HMC, see [Installing the PCIe3 6-slot fanout module in the EMX0 PCIe Gen3 I/O expansion drawer](http://www.ibm.com/support/knowledgecenter/POWER9/p9egv/p9egv_emx0_kickoff_install.htm) (http://www.ibm.com/support/knowledgecenter/POWER9/p9egv/p9egv_emx0_kickoff_install.htm).
3. Determine the level of software that you need to support the drawer.
- For instructions, see the [Power Systems Prerequisites](https://www14.software.ibm.com/support/customer/care/iprt/home) website (<https://www14.software.ibm.com/support/customer/care/iprt/home>).
4. Choose from the following options:
- If your EMX0 PCIe3 expansion drawer arrived to your site preinstalled in a rack, continue with the step [“5” on page 2](#).
 - If your EMX0 PCIe3 expansion drawer needs to be installed into a rack, continue with step [“6” on page 3](#).
5. If your EMX0 PCIe3 expansion drawer arrived to your site preinstalled in a rack, complete the following steps:
- a) Ensure that you have the following items before you begin working on your preinstalled system:
 - #1 and #2 Phillips screwdriver
 - Flat-head screwdriver
 - b) Remove the shipping bracket by completing the following steps:
 - 1) Ensure that you have the electrostatic discharge (ESD) wrist strap on and that the ESD clip is plugged into a ground jack or connected to an unpainted metal surface. If not, do so now.
 - 2) Using a #1 Phillips screwdriver or 7/32 socket, remove the two M4 screws **(B)** that secure the shipping bracket **(A)** to the EMX0 PCIe3 expansion drawer.

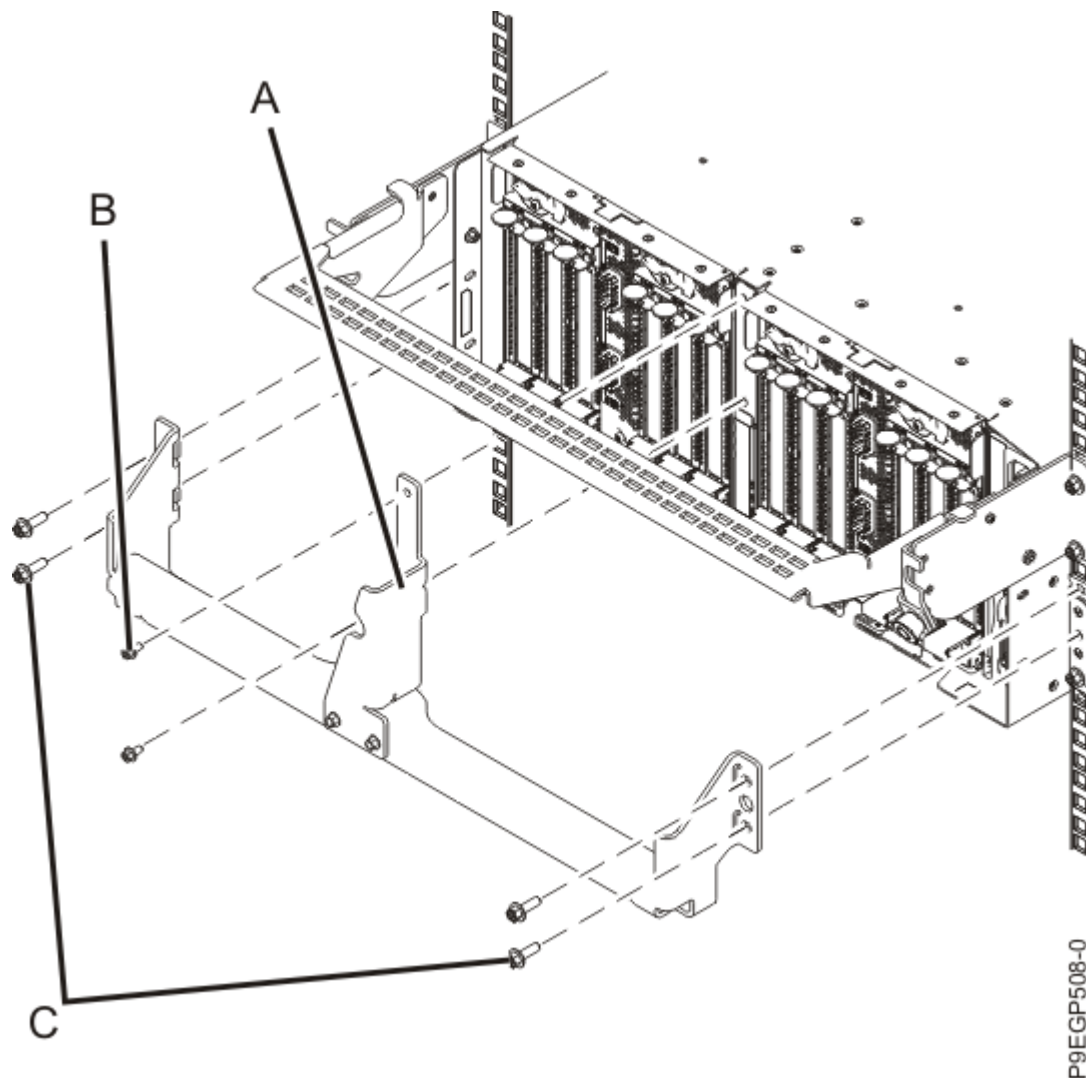


Figure 1: Removing the shipping bracket

- 3) Using a #2 Phillips screwdriver or 7 mm socket, remove the four M5 screws **(C)** that attach the shipping bracket **(A)** to the left and right flanges of the rack frame. Lift the bracket out and away from the rack frame.

Tip: Save the bracket for any future reinstallation or shipping of the drawer that might be required.

- c) Continue with [“Connecting an EMX0 PCIe3 expansion drawer to your system”](#) on page 18.
6. If you need to install your EMX0 PCIe3 expansion drawer into a rack, complete the following steps:
 - a) Ensure that you have the following items before you start your installation:

- #1 and #2 Phillips screwdriver
- Flat-head screwdriver
- Rack with four Electronic Industries Alliance (EIA) units of contiguous space

Note: If you do not have a rack that is installed, install the rack. For instructions, see [Racks and rack features](#) (http://www.ibm.com/support/knowledgecenter/POWER9/p9hbf/p9hbf_9xx_kickoff.htm).

- Help to lift the EMX0 PCIe3 expansion drawer into the rack, which requires three people.
- b) Determine where to install a new EMX0 PCIe3 expansion drawer.

Consider several elements that include size, security, and environmental factors. For more information, see [Site preparation and physical planning \(http://www.ibm.com/support/knowledgecenter/POWER9/p9ebe/p9ebe_kickoff.htm\)](http://www.ibm.com/support/knowledgecenter/POWER9/p9ebe/p9ebe_kickoff.htm).

- c) Continue with [“Completing inventory for installing the EMX0 PCIe3 expansion drawer” on page 4.](#)

Completing inventory for installing the EMX0 PCIe3 expansion drawer

Find information about completing inventory for the EMX0 PCIe3 expansion drawer.

Procedure

1. Refer to the inventory list, and verify that you received all of the parts that you ordered. At a minimum, each order contains the following items:
 - Left and right rack-mounting hardware
 - Mounting screws
 - Power supply cables
 - Expansion drawer cable pairs in 2-meter, 3-meter, 10-meter, or 20-meter lengths.

Notes:

- The 2-meter cables are used for intra-rack installations that are using a cable management bracket.
 - The 3-meter cables are used for intra-rack installations that are using a cable management arm.
 - The 10-meter cables are used for inter-rack installations.
 - The 20-meter cables might be needed for inter-rack installations that have a POWER9 processor-based 9080-M9S system or a POWER8 processor-based 9080-MHE, 9080-MME, 9119-MME, or 9119-MHE system.
2. If your shipment contains parts that are not required to complete the installation procedure, store those parts in case they are needed in the future.
 3. If you have incorrect, missing, or damaged parts, consult any of the following resources:
 - Your IBM reseller.
 - IBM Rochester manufacturing automated information at 1-800-300-8751 (United States only).
 - See the [Directory of worldwide contacts website \(http://www.ibm.com/planetwide\)](http://www.ibm.com/planetwide). Select your location to view the service and support contact information.

Determining and marking the location in the rack

Find information about determining where to install the EMX0 PCIe3 expansion drawer into the rack.

About this task

If you received a mounting template, you can use the template to mark the locations instead of using the manual method that is described in steps [“6” on page 6](#) - [“9” on page 8](#).

Procedure

1. Read the [Rack safety notices \(http://www.ibm.com/support/knowledgecenter/POWER9/p9hbf/p9hbf_racksafety.htm\)](http://www.ibm.com/support/knowledgecenter/POWER9/p9hbf/p9hbf_racksafety.htm).
2. Determine where in the rack to place the drawer in relation to other system hardware. As you plan for installing the drawer in a rack, keep in mind the following information:

Important:

- If you have a POWER9 processor-based 9040-MR9 system, the placement of your EMX0 PCIe3 expansion drawer in relation to your system is important. Consider the following requirements:

- The EMX0 PCIe3 expansion drawer must be placed above a 9040-MR9 system when possible.
- If you install an EMX0 PCIe3 expansion drawer below a 9040-MR9 system, the EMX0 PCIe3 expansion drawer must be placed at least 3 Electronic Industries Alliance (EIA) units below the system so that the cable management bracket can function properly.
- If you have a POWER9 processor-based 9008-22L, 9009-22A, 9009-41A, 9009-42A, 9223-22H, or 9223-42H system, the placement of your EMX0 PCIe3 expansion drawer in relation to your system is important. Consider the following requirements:
 - The EMX0 PCIe3 expansion drawer must be placed above an 9008-22L, 9009-22A, 9009-41A, 9009-42A, 9223-22H, or 9223-42H system when possible.
 - If you install an EMX0 PCIe3 expansion drawer below an 9008-22L, 9009-22A, 9009-41A, 9009-42A, 9223-22H, or 9223-42H system, the EMX0 PCIe3 expansion drawer must be placed at least 2 EIA units below the system so that the cable management bracket can function properly.
- If you have a POWER8 processor-based 8247-21L, 8247-22L, 8247-42L, 8284-22A, 8286-41A, 8286-42A, 8408-44E, or 8408-E8E system, the placement of your EMX0 PCIe3 expansion drawer in relation to your system is important. Consider the following requirements:
 - The EMX0 PCIe3 expansion drawer must be placed above an 8247-21L, 8247-22L, 8247-42L, 8284-22A, 8286-41A, 8286-42A, 8408-44E, or 8408-E8E system when possible.
 - If you install an EMX0 PCIe3 expansion drawer below an 8247-21L, 8247-22L, 8247-42L, 8284-22A, 8286-41A, 8286-42A, 8408-44E, or 8408-E8E system, the EMX0 PCIe3 expansion drawer must be placed at least 2 EIA units below the system so that the cable management bracket can function properly.

General location information includes the following recommendations:

- Organize larger and heavier units into the lower part of the rack.
 - Plan to install units into the lower part of the rack first.
 - Record the EIA locations in your plan.
3. If necessary, open or remove the front and rear rack doors.
 4. Attach the electrostatic discharge (ESD) wrist strap.

The ESD wrist strap must be connected to an unpainted metal surface until the service procedure is completed, and if applicable, until the service access cover is replaced.



Attention:

- Attach an electrostatic discharge (ESD) wrist strap to the front ESD jack, to the rear ESD jack, or to an unpainted metal surface of your hardware to prevent the electrostatic discharge from damaging your hardware.
 - When you use an ESD wrist strap, follow all electrical safety procedures. An ESD wrist strap is used for static control. It does not increase or decrease your risk of receiving electric shock when using or working on electrical equipment.
 - If you do not have an ESD wrist strap, just prior to removing the product from ESD packaging and installing or replacing hardware, touch an unpainted metal surface of the system for a minimum of 5 seconds. If at any point in this service process you move away from the system, it is important to again discharge yourself by touching an unpainted metal surface for at least 5 seconds before you continue with the service process.
5. If necessary, remove the filler panels to allow access to the inside of the rack enclosure where you plan to place the enclosure or drawer.

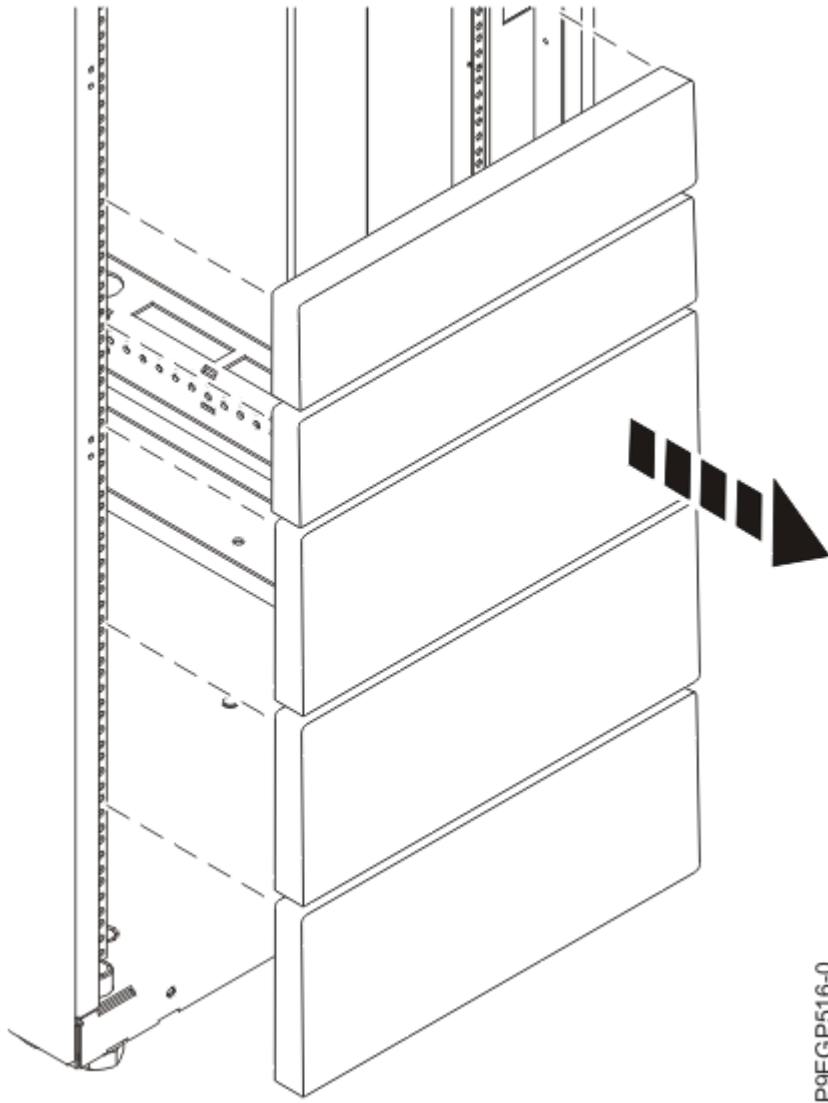


Figure 2: Removing the filler panels

6. Face the front of the rack and work from the left side to complete the following steps:

Note: If you received a mounting template, you can use the template to mark the locations instead of using the following steps.

- Make a note of both the lowest and highest EIA units to be used for the drawer.
- Use tape, a marker, or a pencil to mark the top mounting hole of the third EIA unit **(A)** from the lowest EIA unit you marked. Insert a nut clip at this location.

Note: Mark the rack so that these marks can also be seen from the rear of the rack.

- Mark the top mounting hole on the lowest EIA unit **(B)**.
- Count up two holes and place another mark beside that mounting hole **(B)**. You now have two marks on the rack **(B)**, with one mounting hole between the marks.

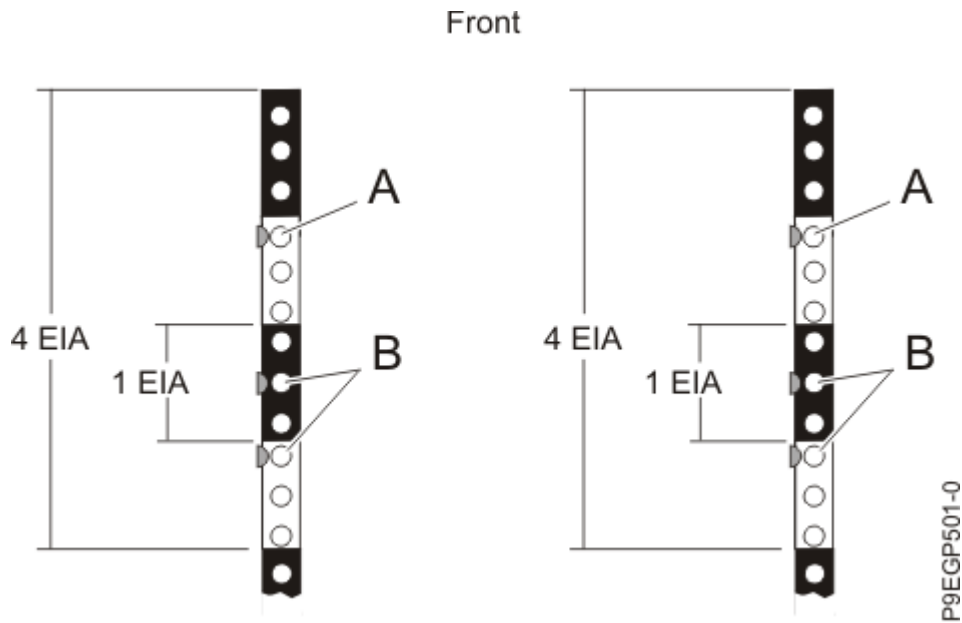


Figure 3: Marking the front installation locations

Note: During this procedure, put nut clips in the **(A)** marks. Then, during the procedure to attach the mounting hardware to the rack, put rail pins in the **(B)** marks.

7. Repeat step [“6”](#) on page 6 to place three marks on the corresponding mounting holes on the front-right side of the rack. Insert a nut clip in the **(A)** mark.
8. Go to the rear of the rack and work from the left side to complete the following steps:
 - a) Find the EIA unit that corresponds to the lowest EIA unit marked on the front of the rack.
 - b) Use tape, a marker, or a pencil to mark the top mounting hole of this EIA unit **(C)**.
 - c) Count up two holes and place another mark beside that mounting hole **(C)**. You now have two marks **(C)** on the rack, with one mounting hole between the marks.
 - d) Count up three mounting holes from where you placed your last mark, and place another mark next to that mounting hole **(D)**.
 - e) Count up three holes and place another mark beside that mounting hole **(D)**. You now have two marks on the rack **(D)**. Insert nut clips in these two locations.

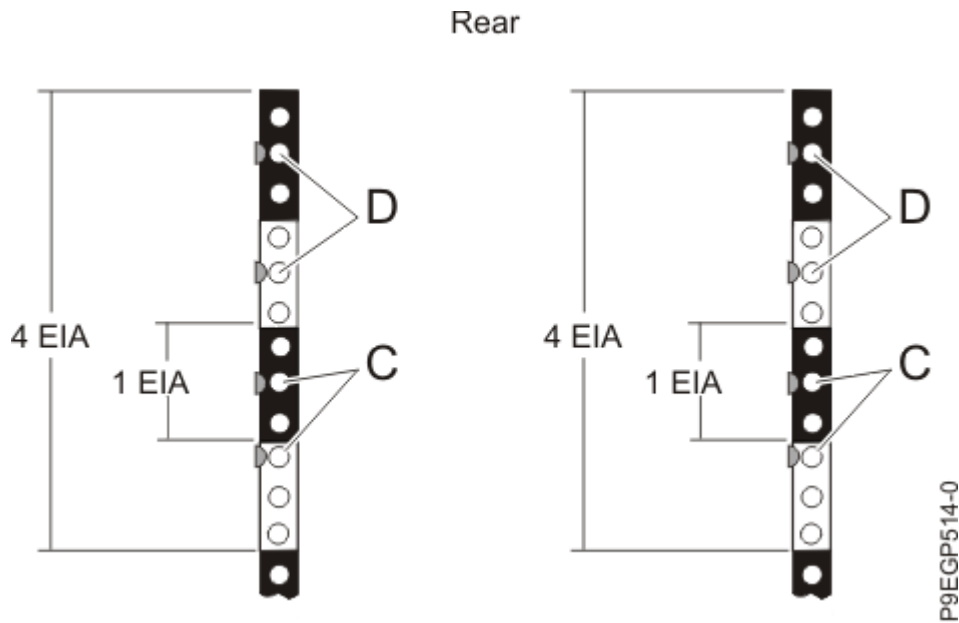


Figure 4: Marking the rear installation locations

Note: During this procedure, put nut clips in the **(D)** marks. Then, during the procedure to attach the mounting hardware to the rack, put rail pins in the **(C)** marks.

9. Repeat step “8” on page 7 to place four marks on the corresponding mounting holes on the rear-right side of the rack. Insert nut clips in the **(D)** marks.

Attaching the mounting hardware to the rack

Find information about attaching the mounting hardware to the rack and then installing the rails into the rack. The information is intended to promote safety and reliable operation, and includes illustrations of the related hardware components and shows how these components relate to each other.

About this task



Attention: To avoid rail failure and potential danger to yourself and to the unit, ensure that you have the correct rails and fittings for your rack. If your rack has square support flange holes or screw-thread support flange holes, ensure that the rails and fittings match the support flange holes that are used on your rack. Do not install mismatched hardware by using washers or spacers. If you do not have the correct rails and fittings for your rack, contact your IBM reseller.

Important: To complete this procedure, it is suggested that you use two people to attach the rail assembly to the rack. Position one person in front of the rack and one person at the back of the rack.

Procedure

1. Gather the rail kit parts that you need during this procedure.

The rail kit includes the following parts:

Note: The installation of the EMX0 PCIe3 expansion drawer does not require usage of all parts that are included in the rail kit.

- M3 flat head screws (used only with FC 5887)
- L-shaped brackets (used only with FC 5887)
- M5 slotted large round head screws and M5 slotted no head screws to accommodate various racks
- Nut clips for racks with round holes
- Nut clips for racks with square holes
- M5 black hex head screws

- Rails
2. Ensure that you have the electrostatic discharge (ESD) wrist strap on and that the ESD clip is plugged into a ground jack or connected to an unpainted metal surface. If not, do so now.
 3. Rotate down the front and back clamps **(C)** on the left and right rails.
 4. On each rail, remove the tape that is holding the spring **(B)** to the rail. Hook the end of the spring around the circular standoff on the rail.

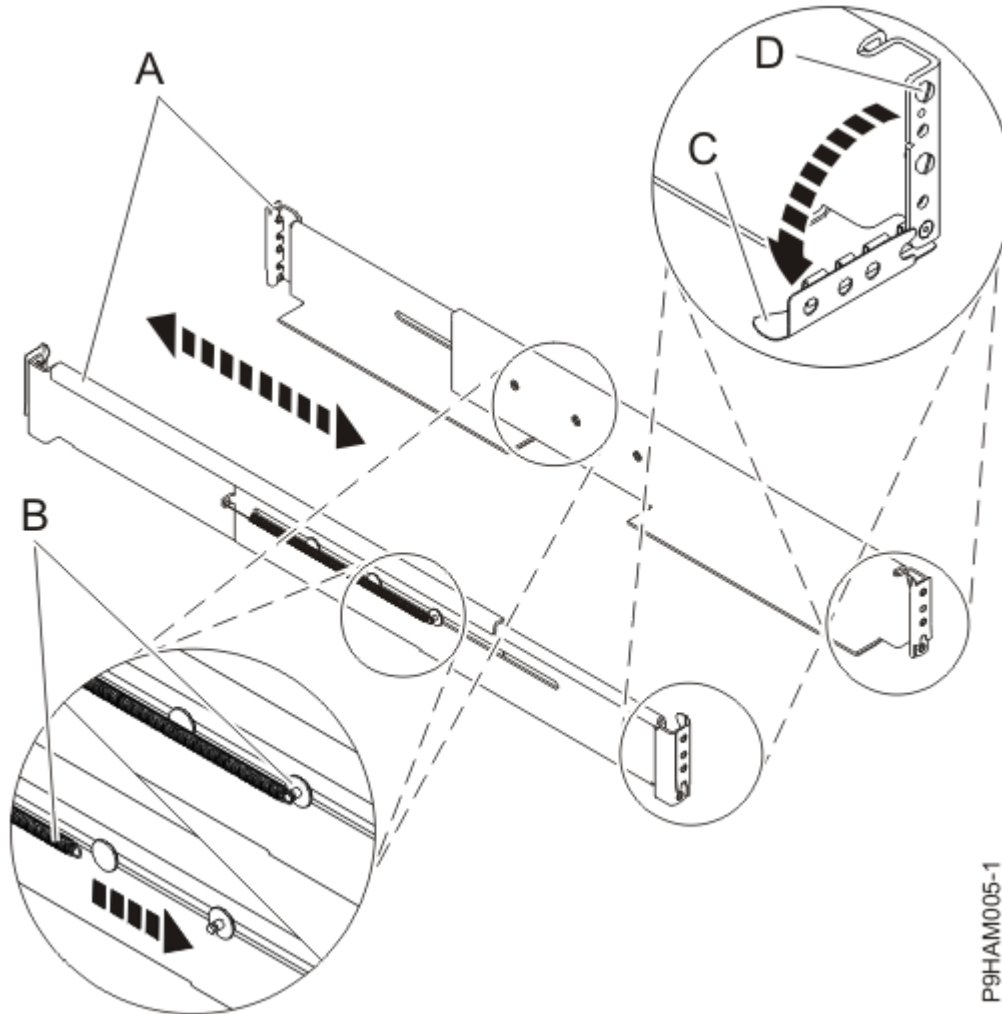


Figure 5: Installing the rails

5. Starting at the front of the rack, complete the following steps:
 - a) Extend the right rail and insert the rail pins **(D)** into the two lowest mounting holes that are marked on the rack so that the rail is facing upward.
 - b) Rotate up the front clamp **(C)** to secure the rail in place.

Remember: If your rack has square mounting holes, use the larger rail pins that are provided with the rack installation kit.

 - c) Extend the left rail and insert the rail pins **(D)** into the two lowest mounting holes that are marked on the rack. Rotate up the front clamp **(C)** to secure the rail in place.

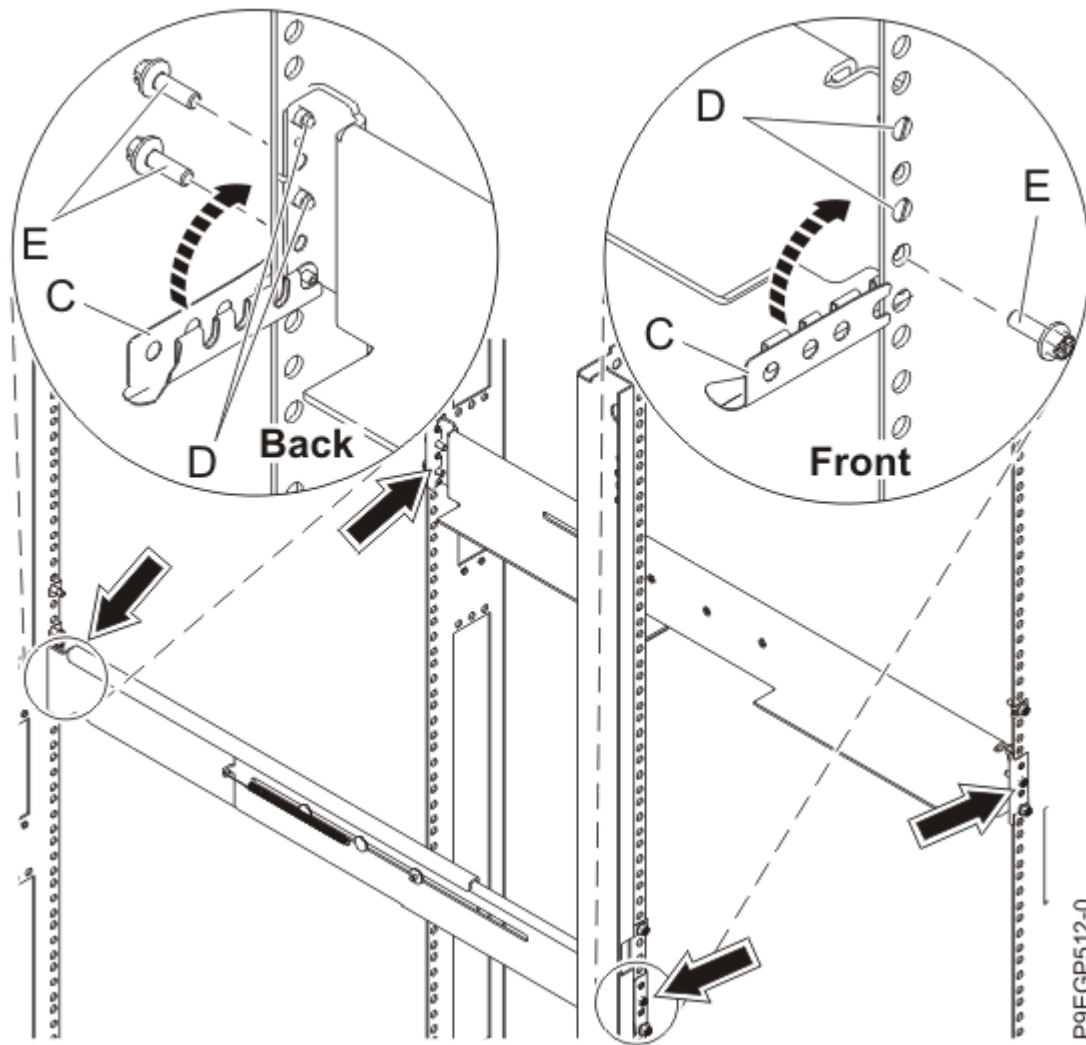


Figure 6: Attaching the rails

6. Move to the rear of the rack, and complete the following steps:
 - a) Extend the right rail, and insert the rail pins (**D**) into the two lowest mounting holes that are marked on the rack. Rotate up the back clamp (**C**) to secure the rail in place.
 - b) Extend the left rail and insert the rail pins (**D**) into the two lowest mounting holes that are marked on the rack. Rotate up the back clamp (**C**) to secure the rail in place.
 - c) Use two M5 screws (**E**), one below each rail pin (**D**) to secure the left rail to the back of the rack.
 - d) Use two M5 screws (**E**), one below each rail pin (**D**) to secure the right rail to the back of the rack.
7. Move to the front of the rack and complete the following steps:
 - a) Use one M5 screw (**E**) below the lower rail pin (**D**) to secure the left rail to the front of the rack.
 - b) Use one M5 screw (**E**), below the lower rail pin (**D**) to secure the right rail to the front of the rack.

Installing an EMX0 PCIe3 expansion drawer into a rack

Find information about installing an EMX0 PCIe3 expansion drawer into a rack.

Before you begin

Important: Three people are required to safely lift the drawer. Using fewer than three people to lift the drawer can result in injury.

About this task

To install an EMX0 PCIe3 expansion drawer into a rack, complete the following steps:

Procedure

1. Ensure that you have the electrostatic discharge (ESD) wrist strap on and that the ESD clip is plugged into a ground jack or connected to an unpainted metal surface. If not, do so now.
2. Remove the four thumb screws **(B)** that are used to secure the shipping cover **(A)** to the rear of the drawer, as shown in [Figure 7 on page 11](#). Remove the shipping cover.

Note: The shipping cover is secured to the drawer by two thumb screws on the top of the cover and one thumb screw on each side.

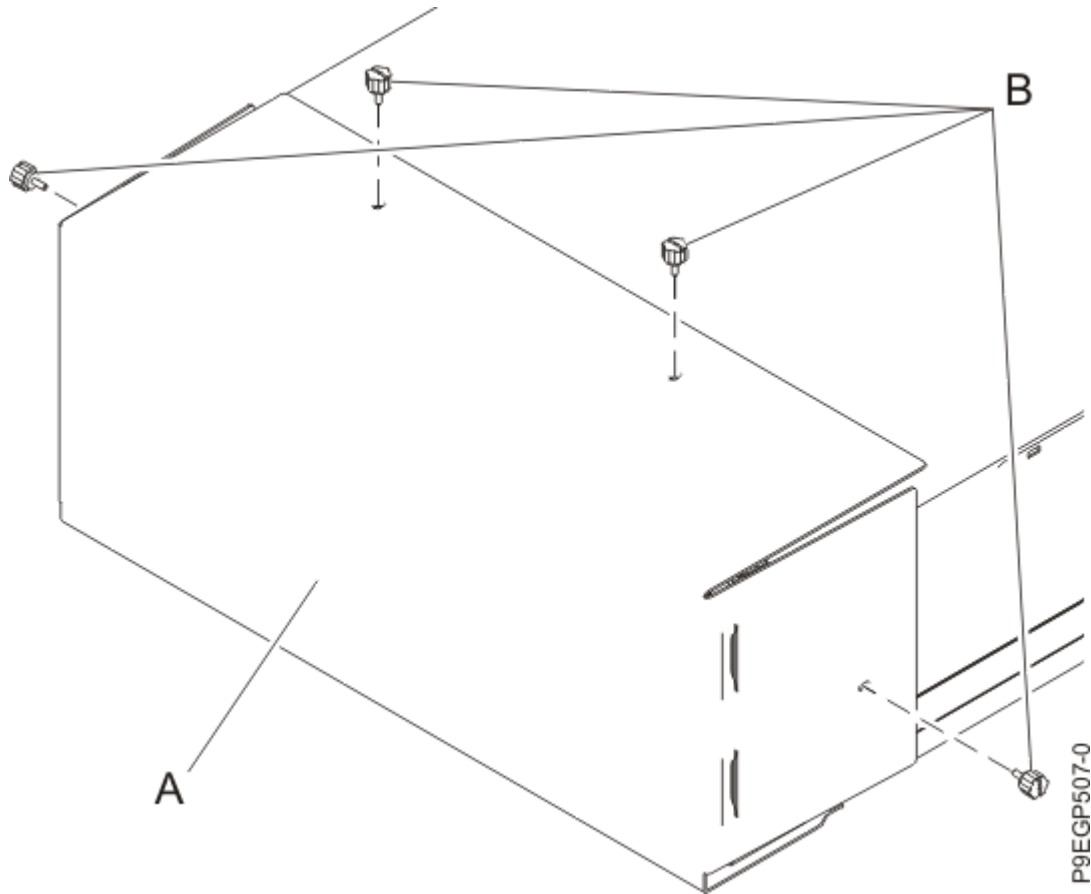


Figure 7: Removing the shipping cover

Tip: Save the shipping cover and screws that you remove for any future shipping of the drawer that might be required.

3. If the cover is installed on the front of the drawer, remove it by completing the following steps:
 - a. If there are M5 securing screws on the cover, remove them.
 - b. Using the two blue touch points on each side of the drawer, pull the cover straight out to remove the cover from the front of the drawer as shown in [Figure 8 on page 12](#).
 - c. Remove the service information card from the slot in the cover.

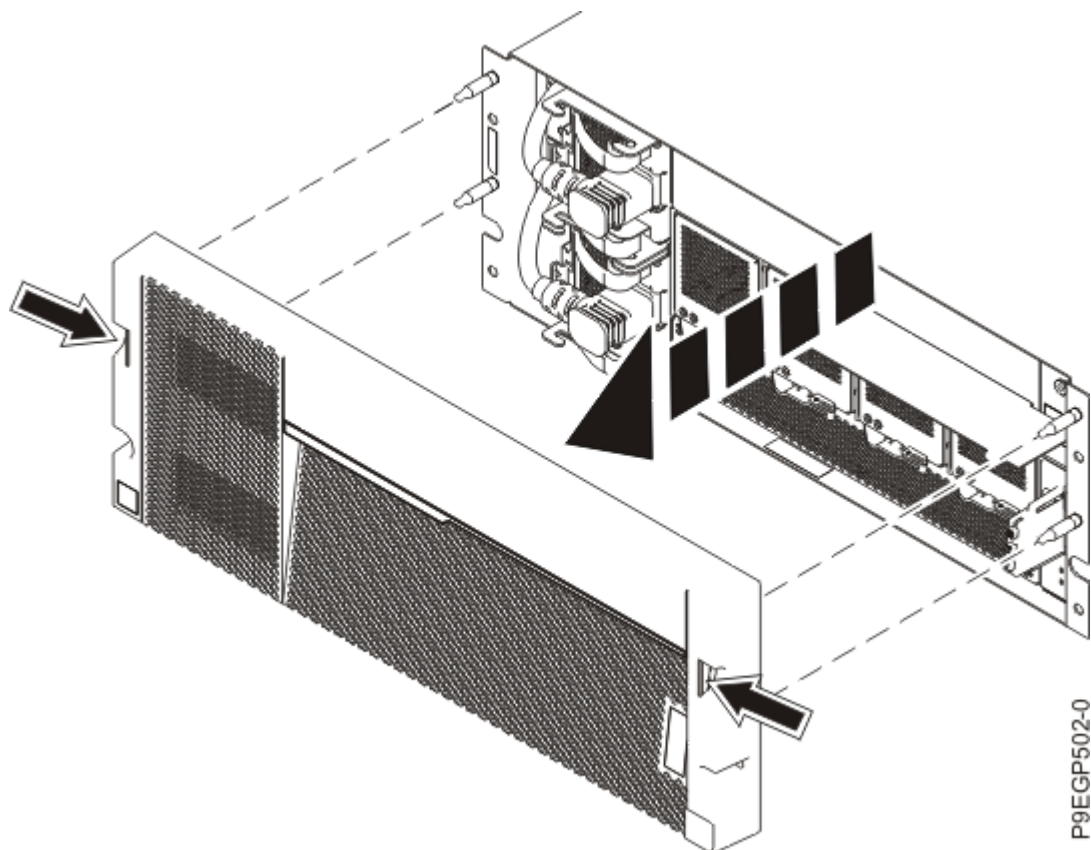


Figure 8: Removing the cover and the service information card

4. Using three people, have two people hold onto the four handles **(I)**, as shown in [Figure 9](#) on page 13, and one person in front of the drawer to guide the drawer. Lift the drawer and position it over the front of the rails.



Attention: Three people are required to safely lift the drawer. Using fewer than three people to lift the drawer can result in injury.

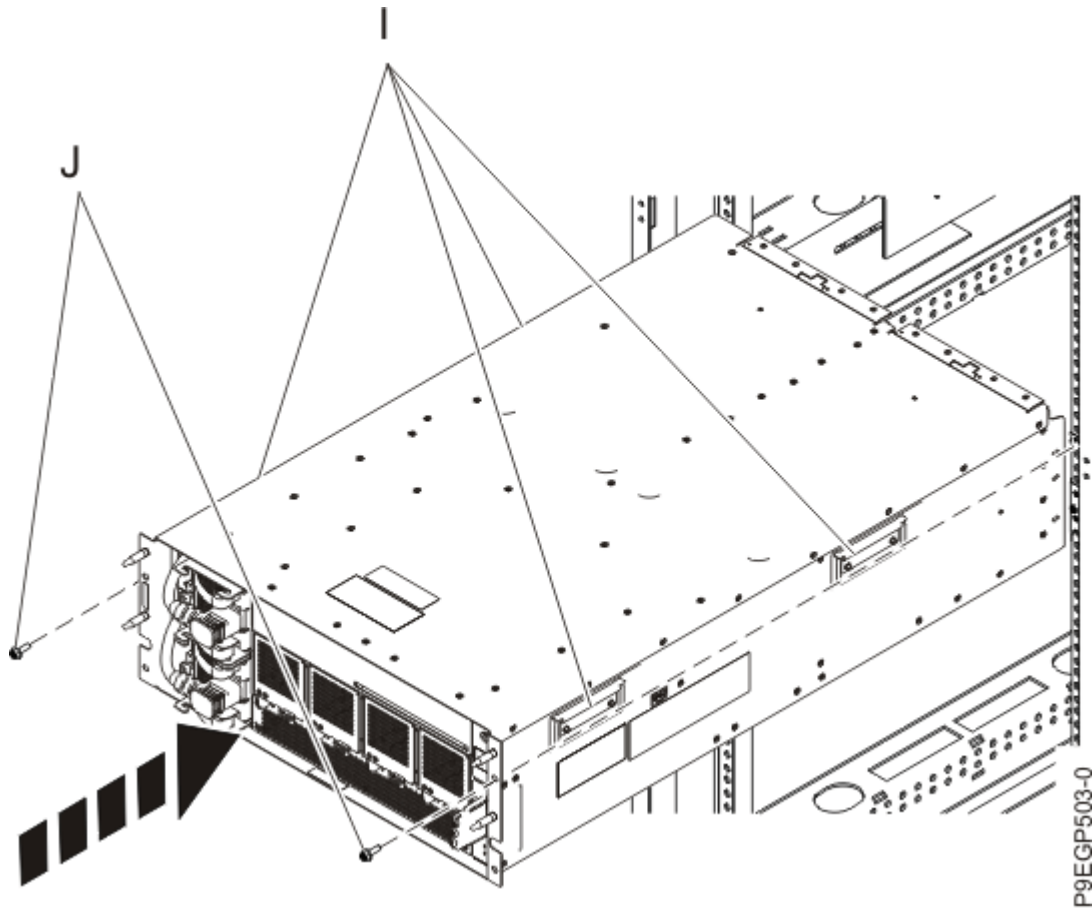


Figure 9: Installing the drawer into a rack

5. Slide the drawer into position over the slide rails and slide the drawer into the rack.
6. Install the two M5 securing screws (**J**) through the drawer and into the nut clips on the left and right rails.
See [Figure 9 on page 13](#).
7. Install the cover (**L**) onto the drawer. Press the cover into place and secure it with two M5 screws (**M**) on the left and right rails.
See [Figure 10 on page 14](#).
8. Insert the service information card (**N**) into the slot in the cover.

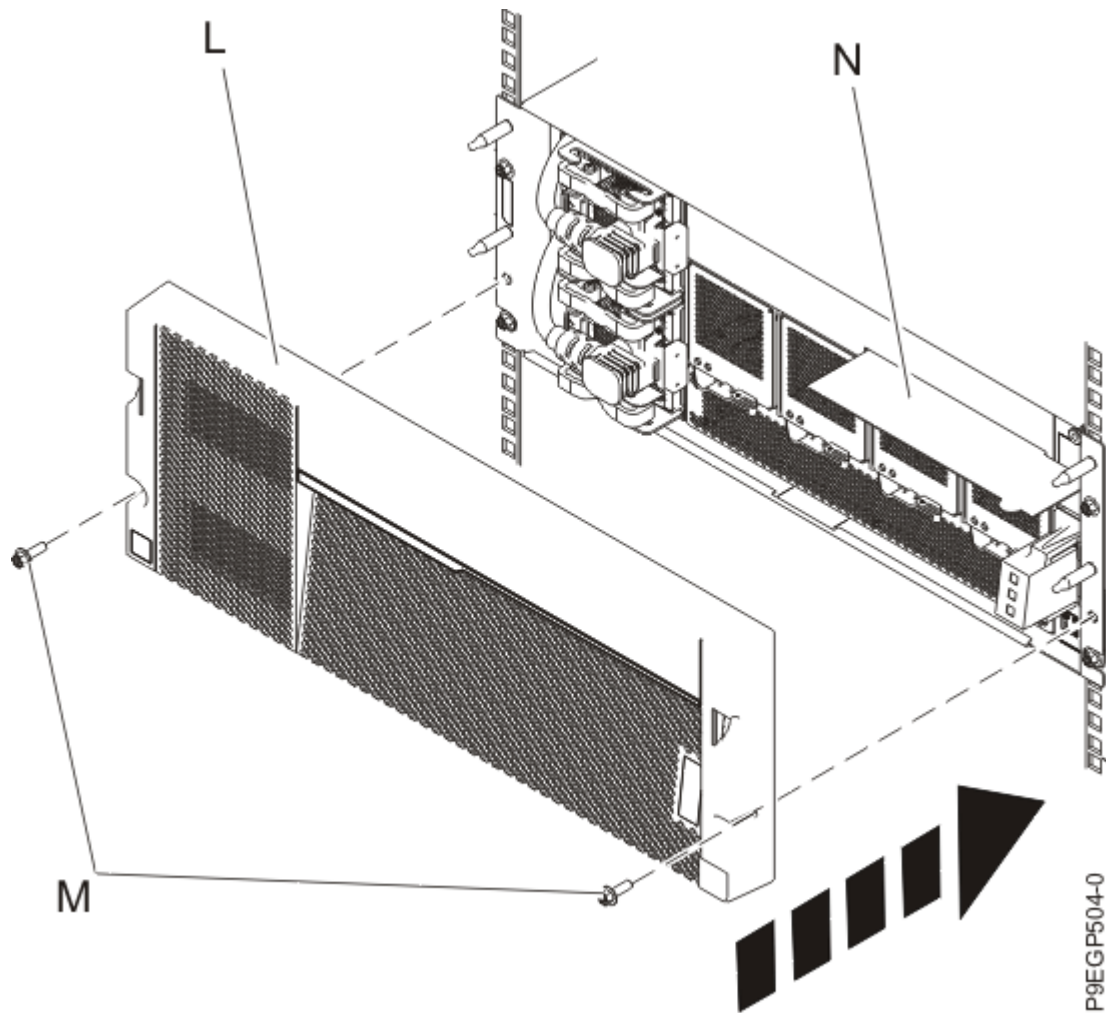


Figure 10: Installing the cover and service information card

9. Attach the cable management bracket to the rack by completing the following steps:
 - a. At the rear of the rack, partially tighten two M5 screws **(A)** directly above the drawer rail clamps where nut clips are installed. These two screws become the bottom screws that support the cable management bracket against the rack. See [Figure 11 on page 15](#).
 - b. Place the bottom of the mounting flanges on the cable management bracket **(B)** over the two M5 screws to support the bracket flanges against the rack.
 - c. Align the bracket so that its mounting flanges **(B)** align with the top holes in the rack flanges, as shown in [Figure 11 on page 15](#).
 - d. Completely tighten the top two M5 screws **(C)** above the rail clamp where nut clips are installed.
 - e. Finish tightening the bottom two M5 screws **(A)**.

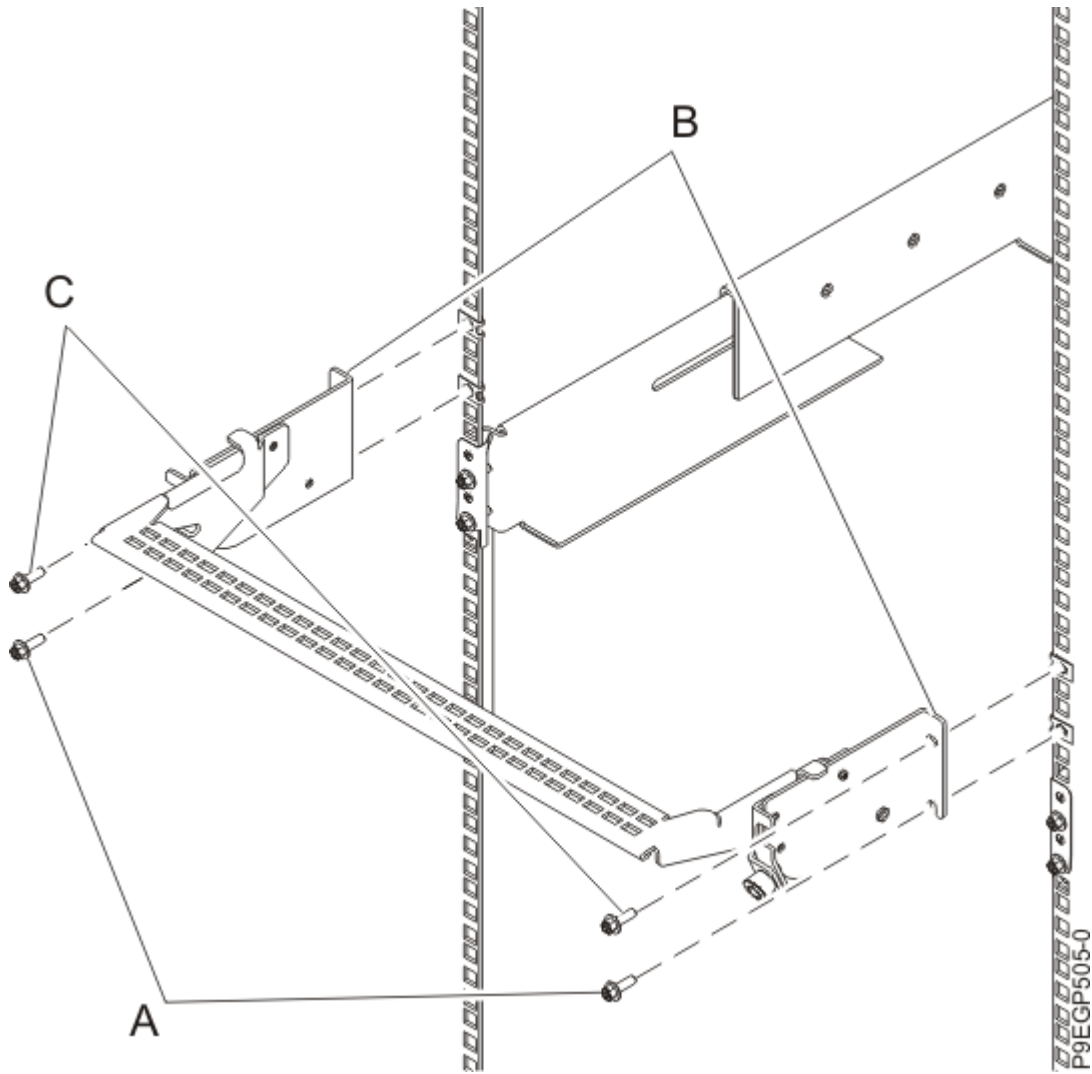
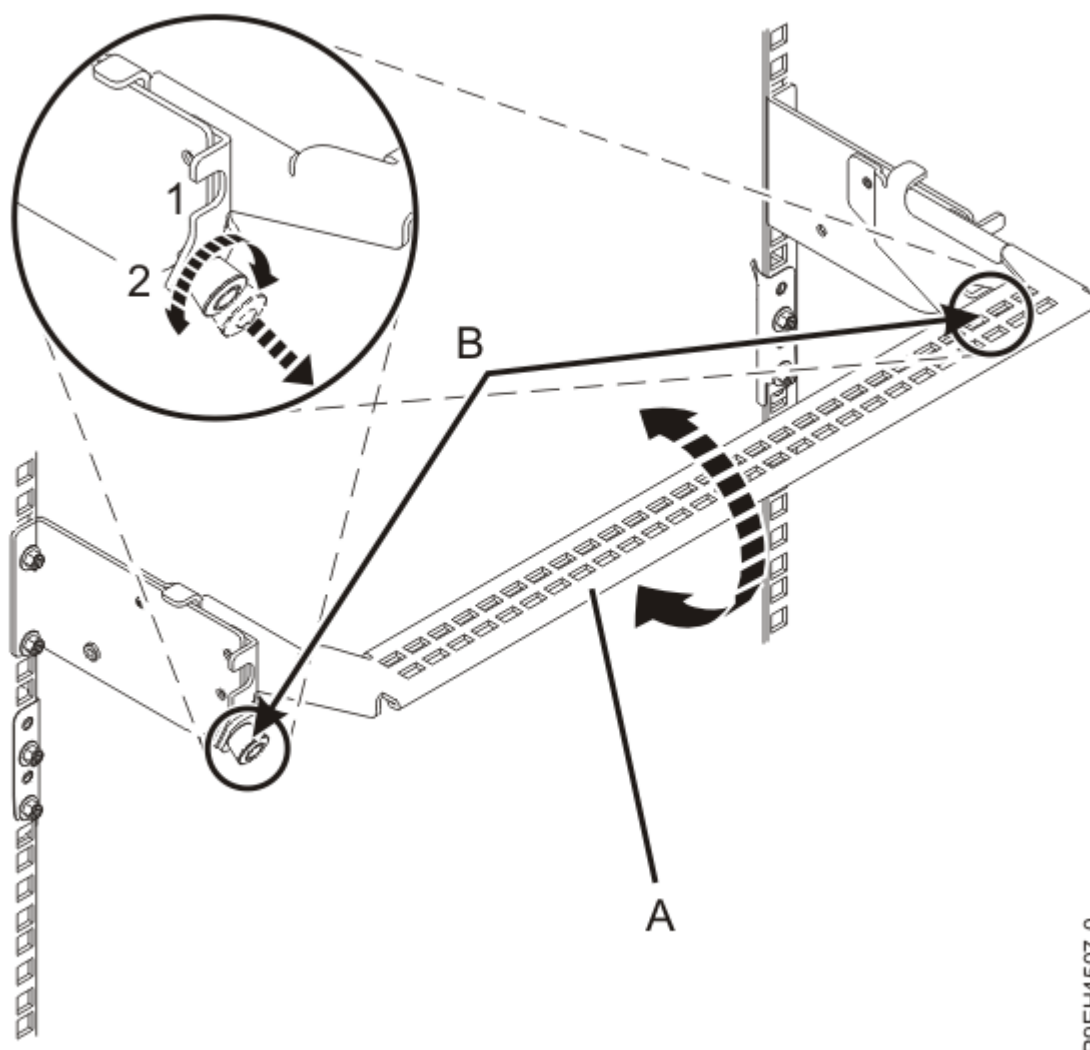


Figure 11: Installing the cable management bracket

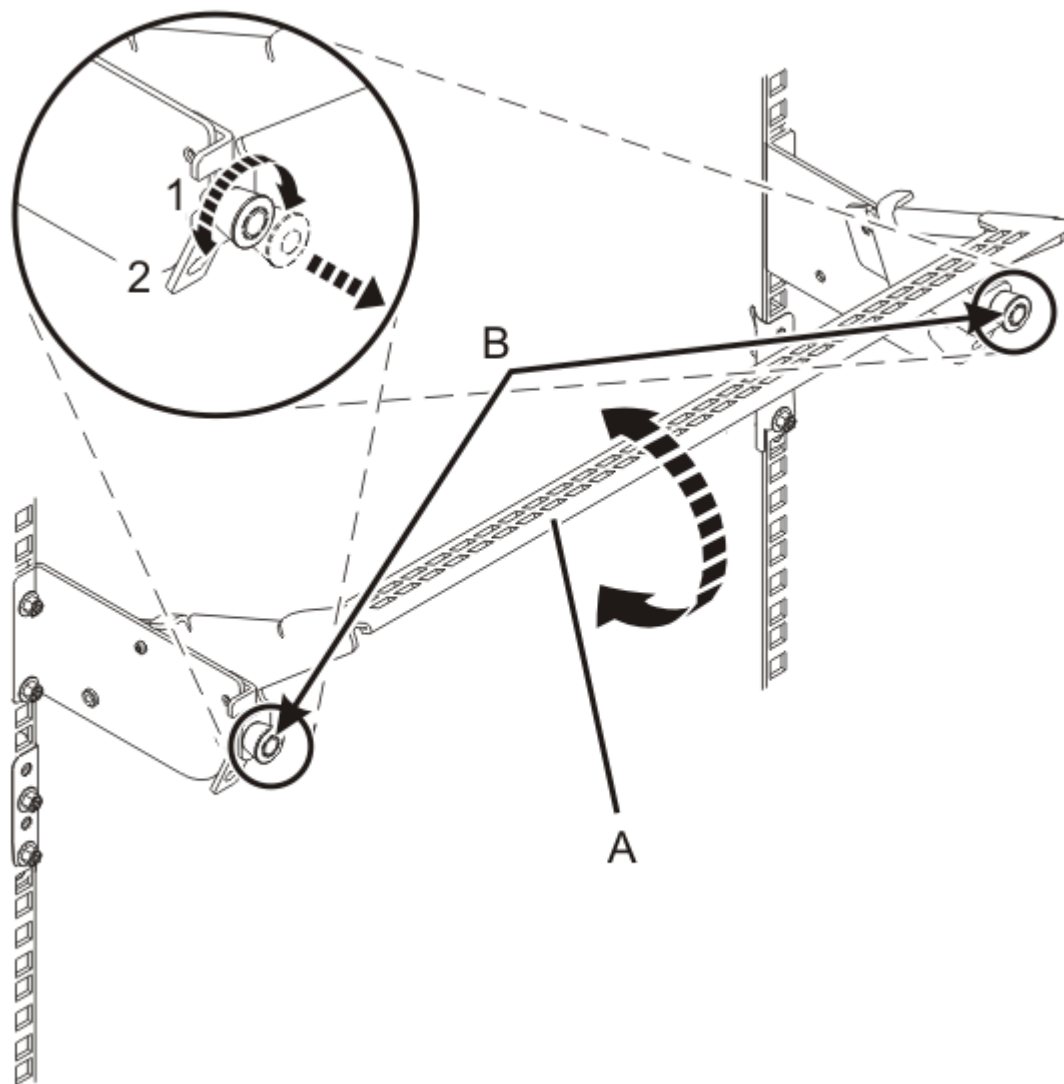
10. To put the cable management bracket in the service position, complete the following steps:
 - a. Pull out the quarter-turn fasteners **(B)** and turn them to disengage them while you lift the cable management bracket **(A)** to its raised position.
 - b. Turn the quarter-turn fasteners **(B)** to engage and lock the bracket into position.



P9EH4507-0

Figure 12: Placing the cable management bracket in the service position

11. To put the cable management bracket in the operating position, complete the following steps:
 - a. Pull the quarter-turn fasteners **(B)** out and turn them to disengage them while moving the cable management bracket **(A)** to its lower position **(2)**. See [Figure 13 on page 17](#).
 - b. Turn the quarter-turn fasteners **(B)** to engage and lock the bracket into position.



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Figure 13: Placing the cable management bracket in the operating position

12. To secure the drawer to the rack, apply the two securing screws **(B)**, as shown in [Figure 14](#) on page [18](#).

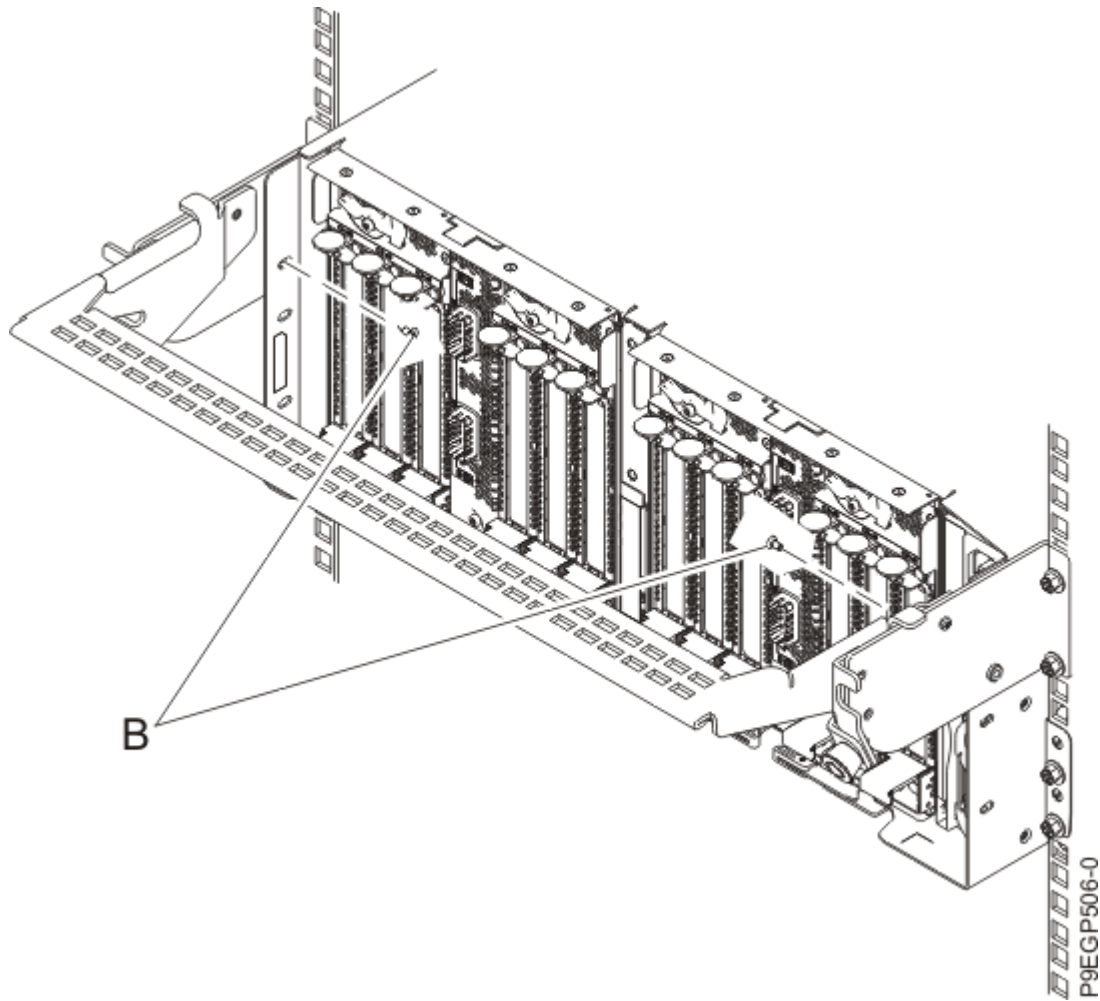


Figure 14: Applying the securing screws

13. Continue with [“Connecting an EMX0 PCIe3 expansion drawer to your system”](#) on page 18.

Connecting an EMX0 PCIe3 expansion drawer to your system

Find information about connecting an EMX0 PCIe3 expansion drawer to your system.

Preparing the system to connect an EMX0 PCIe3 expansion drawer

To prepare the system to connect an EMX0 PCIe3 expansion drawer, complete the steps in this procedure.

About this task

Remember: Before you can connect a system to an EMX0 PCIe3 expansion drawer, your system must have the required number of PCIe3 cable adapters installed and the EMX0 PCIe3 expansion drawer must have the wanted number of PCIe3 6-slot fanout modules installed.

- For instructions to install a PCIe3 cable adapter when you do not have an HMC, see [PCIe adapters \(http://www.ibm.com/support/knowledgecenter/POWER9/p9hak/pciadapters.htm\)](http://www.ibm.com/support/knowledgecenter/POWER9/p9hak/pciadapters.htm).
- For instructions to install a PCIe3 6-slot fanout module when you do not have an HMC, see [Installing the PCIe3 6-slot fanout module in the PCIe Gen3 I/O expansion drawer \(http://www.ibm.com/support/knowledgecenter/POWER9/p9egv/p9egv_emx0_kickoff_install.htm\)](http://www.ibm.com/support/knowledgecenter/POWER9/p9egv/p9egv_emx0_kickoff_install.htm).

- For instructions to install a PCIe3 cable adapter or PCIe3 6-slot fanout module when your system is managed by an HMC, see [Installing a part by using the HMC](http://www.ibm.com/support/knowledgecenter/POWER9/p9haj/hmcinstall.htm) (<http://www.ibm.com/support/knowledgecenter/POWER9/p9haj/hmcinstall.htm>).

Note: Before you attach your EMX0 PCIe3 expansion drawer to your system, ensure that you have the correct PCIe3 cable adapter and expansion drawer cables. Depending on the CCIN of the PCIe3 6-slot fanout module, use the following PCIe3 cable adapters and expansion drawer cables:

- If you have a CCIN **50CB** PCIe3 6-slot fanout module:
 - You must install one of the following PCIe3 cable adapters:
 - FC EJ08 (CCIN 2CE2)
 - FC EJ07 (CCIN 6B52)
 - FC EJ05 (CCIN 2B1C)
 - You must use one of the following expansion drawer cables: FC ECC6, FC ECC7, FC ECC8, FC ECC9, or FC ECCS.
- If you have a CCIN **50CD** PCIe3 6-slot fanout module:
 - You must install one of the following PCIe3 cable adapters:
 - FC EJ19 (CCIN 6B53)
 - FC EJ1R (CCIN 58FF)
 - FC EJ20 (CCIN 2CF5)
 - You must use one of the following expansion drawer cables: FC ECCR, FC ECCX, FC ECCY, or FC ECCZ.

Procedure

1. Determine the expansion drawer cable pair that can be used to connect the system to the EMX0 PCIe3 expansion drawer.
 - Each cable pair must be the same length. You can verify the cable lengths by viewing the length labels that are on the plug ends or near the pull tabs on each cable.
 - If your system and EMX0 PCIe3 expansion drawer are in the same rack and the system uses a cable management bracket, use the 2-meter cables.
 - If your system and EMX0 PCIe3 expansion drawer are in the same rack and the system uses a cable management arm, use the 3-meter cables.
 - If your system and EMX0 PCIe3 expansion drawer are in separate racks, use the 10-meter cables.
 - If you have a POWER9 processor-based 9080-M9S system and the EMX0 PCIe3 expansion drawer is in a separate rack, you might need to use the 20-meter cables.
 - If you have a POWER8 processor-based 9080-MHE, 9080-MME, 9119-MHE, or 9119-MME system and the EMX0 PCIe3 expansion drawer is in a separate rack, you might need to use the 20-meter cables.
2. If the system has a rear cover, remove or open it.
3. Carefully remove the expansion drawer cable pair from the packaging. Do not remove the protective covers now.

Routing, connecting, and activating the expansion drawer cable pair or pairs

To route, connect, and activate the expansion drawer cable pair or pairs, complete the steps in this procedure.

About this task

Note: During the steps in this procedure, route the expansion drawer cables but do not connect them to the host system or the EMX0 PCIe3 expansion drawer until you are told to do so.

Important: To avoid damage to the connectors on the expansion drawer cables, do not remove the protective covers until just before you need to plug the cable into the host system or the EMX0 PCIe3 expansion drawer.

Procedure

1. Ensure that you have the electrostatic discharge (ESD) wrist strap on and that the ESD clip is plugged into a ground jack or connected to an unpainted metal surface. If not, do so now.
2. Select from the following options:
 - If you are working on a POWER9 processor-based 9080-M9S system or a POWER8 processor-based 9080-MHE, 9080-MME, 9119-MHE, or 9119-MME system, you must label the cables. Continue with step [“3”](#) on page 20.
 - If you are **not** working on a POWER9 processor-based 9080-M9S system or a POWER8 processor-based 9080-MHE, 9080-MME, 9119-MHE, or 9119-MME system, continue with step [“10”](#) on page 22.
3. Locate the following items that you need later in the procedure:
 - Expansion drawer cable pairs
 - Host system label sheet
 - EMX0 PCIe3 expansion drawer label sheet
 - Labeling diagram
4. Attach the host system location labels to the expansion drawer cable.

While you are completing these steps, refer to [Figure 15 on page 21](#) as a reference.

- a) Locate the host system **(A)** that you are attaching to the EMX0 PCIe3 expansion drawer.
- b) Locate the host system serial number label sheet **(B)**.
- c) Match the host system serial number **(C)** to the serial number shown on the host system label sheet.
- d) Determine the location of the PCIe3 cable adapter on the host system where you attach the first expansion drawer cable pair.
- e) Locate the labels on the host system label sheet **(B)** that correspond to the location of the PCIe3 cable adapter on the host system.
- f) Select one of the expansion drawer cables as the top cable **(D)** that you will attach to port T1.
- g) Attach the leftmost Cx-T1 label to the connector end of the cable **(E)**.
Wrap the label with the blank end first so that the location information **(F)** is visible.
- h) Take the second label Cx-T1 from the host system label sheet **(B)** and place it on the opposite end of the cable that attaches to the EMX0 PCIe3 expansion drawer. Ensure that the label is placed more than 100 mm (4 in) from the end of the cable **(G)**.
- i) Leave the cable near where it will be plugged.
- j) Route the other end of the cable to the EMX0 PCIe3 expansion drawer to which it attaches.
- k) Leave the cable near where it will be plugged.

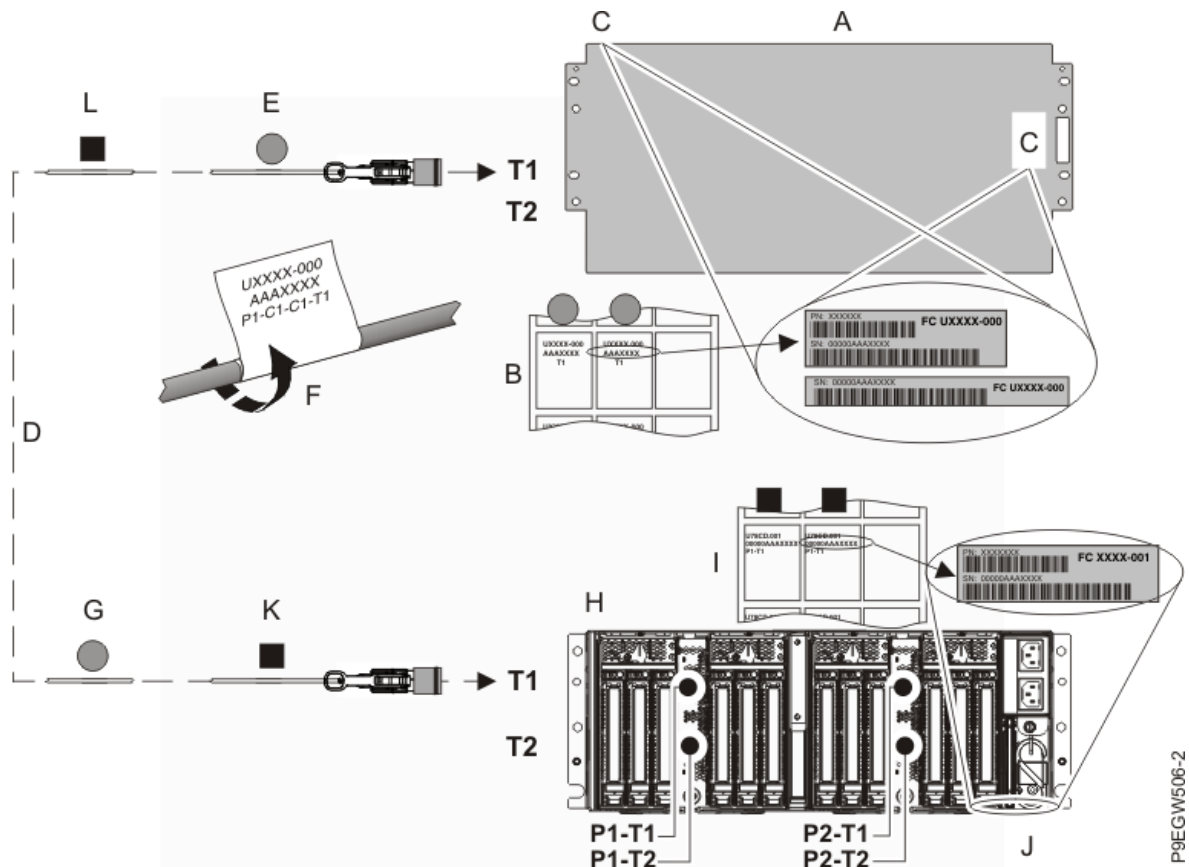


Figure 15: Labeling an expansion drawer cable

5. Attach the EMX0 PCIe3 expansion drawer location labels to the expansion drawer cable:
 - a) Locate the EMX0 PCIe3 expansion drawer **(H)** that you are connecting to the host system.
 - b) Locate the EMX0 PCIe3 expansion drawer serial number label sheet **(I)**.
 - c) Match the EMX0 PCIe3 expansion drawer serial number **(J)** to the serial number shown on the EMX0 PCIe3 expansion drawer label sheet **(I)**.
 - d) Determine the location of the I/O module on the EMX0 PCIe3 expansion drawer where you will attach the first cable pair.
 - e) Locate the labels on the EMX0 PCIe3 expansion drawer label sheet that correspond to the I/O module location.
 - f) Attach the leftmost Px-T1 label to the connector end of the cable **(K)**.
Wrap the label with the blank end first so that the location information **(F)** is visible.
 - g) Take the second Px-T1 label from the expansion drawer label sheet and place it on the opposite end of the cable greater than 100 mm (4 in) from the end of the cable **(L)**.
 - h) Select the top cable that will be attached to port P1-T1.
 - i) Leave the cable near where it will be plugged.
6. Place and route the labeled cable:

Remember: Do not connect the cable now.

 - a) Locate the connector end of the cable with the host system Cx-T1 label **(E)** and place it near the T1 port on the PCIe3 cable adapter on the host system.
Record this port for later.
 - b) Route the cable and place the connector end **(K)** near the I/O module on the EMX0 PCIe3 expansion drawer.
7. Repeat steps “4” on page 20 - “6” on page 21 for the other cable pair.

8. If you need to label and route more cable pairs, repeat steps [“4” on page 20](#) - [“7” on page 21](#).
9. Continue with step [“11” on page 22](#).
10. If you did not label the cables, follow these steps to place and route the expansion drawer cables:
Remember: Do not connect the cable now.
 - a) Place the connector end of one of the expansion drawer cables near the T1 port on the PCIe3 cable adapter on the host system. Record this port for later.
 - b) Route the cable and place the opposite connector end near the I/O module on the EMX0 PCIe3 expansion drawer.
 - c) Repeat this step for the other cable in the pair and for other cable pairs.
11. Refer to the following options to determine if you can connect and activate the expansion drawer cables when the system power is turned on:
 - If you have a POWER9 processor-based 9040-MR9 or 9080-M9S system or a POWER8 processor-based 8408-44E with system firmware FW860.10 or later installed, or 9080-MHE, 9080-MME, 9119-MHE, or 9119-MME with system firmware FW840.xx or later installed and you want to activate the link with the system power turned on, continue with step [“12” on page 22](#).
 - If you do **not** meet the criteria to connect and activate the expansion drawer cable when the system power is turned on, or you want to activate the link with the system power turned off, continue with step [“14” on page 24](#).
12. To connect the expansion drawer cables and activate the link with the **system power turned on**, complete the following steps:
 - a) Connect the power cables for the EMX0 PCIe3 expansion drawer, by completing the following steps:
 - 1) Connect the power cables into the power source.
Important: Ensure that you plug the power cables into the power source before you connect them into the power supply of the EMX0 PCIe3 expansion drawer.
 - 2) Route the power cables through the s-carabiner so that the cables clear the PCIe3 6-slot fanout module or modules.

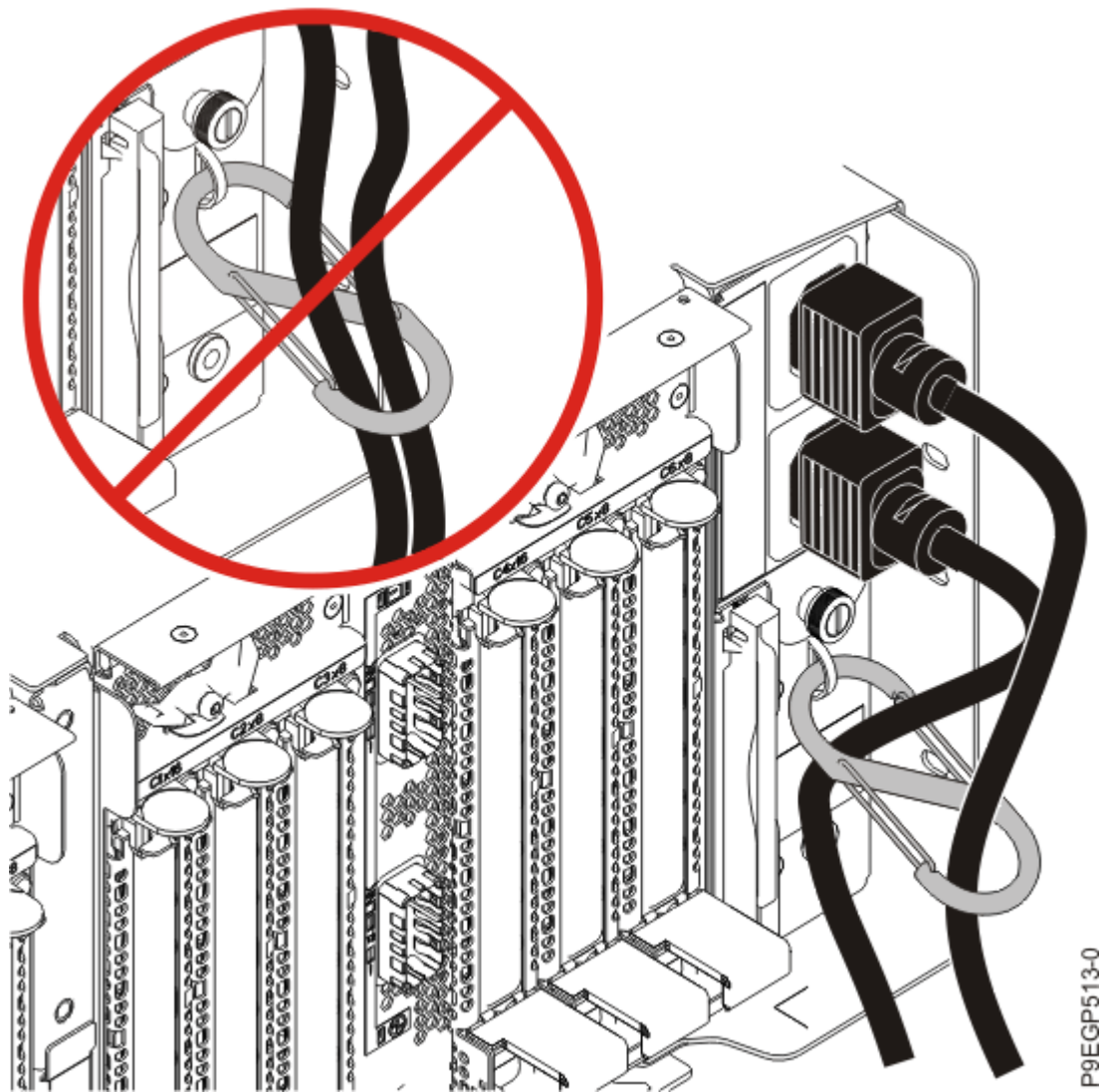


Figure 16: Routing the power cables through the s-carabiner and connecting them to the power supply

- 3) Connect the other ends of the power cables into the power supplies on the EMX0 PCIe3 expansion drawer you are installing.
- b) Connect the expansion drawer cables and activate the link with the system power turned on, by completing the following steps:
 - 1) From the HMC navigation area, click the **Resources** icon and then click **All Systems**.
 - 2) Click the system name for which you want to connect an EMX0 PCIe3 expansion drawer.
 - 3) Select **Serviceability** > **Add FRU** > **PCIe Connection**.
 - 4) Select the PCIe3 cable adapter you recorded earlier that you want to connect first. It is the cable that is located near connector **T1** on the PCIe3 cable adapter in the host system.
 - 5) Start the procedure and follow the on-screen instructions.

Note: If you arrived to this point by selecting **Serviceability** > **Add Enclosure**, a message is displayed that another service action is active on this system. Click **Proceed** even though the message indicates that doing so is not recommended.

13. Continue with step “15” on page 24.

Note: If you are using the HMC panels, they will show the remaining procedure. If you want, you can look at them here to become familiar with the steps.

14. If you did not meet the criteria to activate the PCIe link with the system power on, or you want to activate the link when the system power is turned off, complete the following steps:
- Record the current date and time. You need it when you power on the system when you are checking for serviceable events.
 - If the system is not already powered off, turn off the system.
To stop the system, see [Stopping a system](http://www.ibm.com/support/knowledgecenter/POWER9/p9haj/crustopsys.htm) (www.ibm.com/support/knowledgecenter/POWER9/p9haj/crustopsys.htm).
15. To connect the expansion drawer cables to the PCIe3 cable adapter ports on the host system and to a PCIe3 6-slot fanout module on the EMX0 PCIe3 expansion drawer, complete the following steps:
- Determine the first expansion drawer cable that you connect. It is the cable that is located near connector **T1** on the PCIe3 cable adapter in the host system that you recorded earlier
 - Remove the protective cover from the connector on the expansion drawer cable.
 - Hold the cable housing (**B**) on the short edges with the index finger and thumb on one hand.
 - Then, grasping the cover on the long edge (**A**) with the index finger and thumb on your other hand, pull off the protective cover. See [Figure 17 on page 24](#).

Note: Keep your fingers close to the closed end of the protective cover.

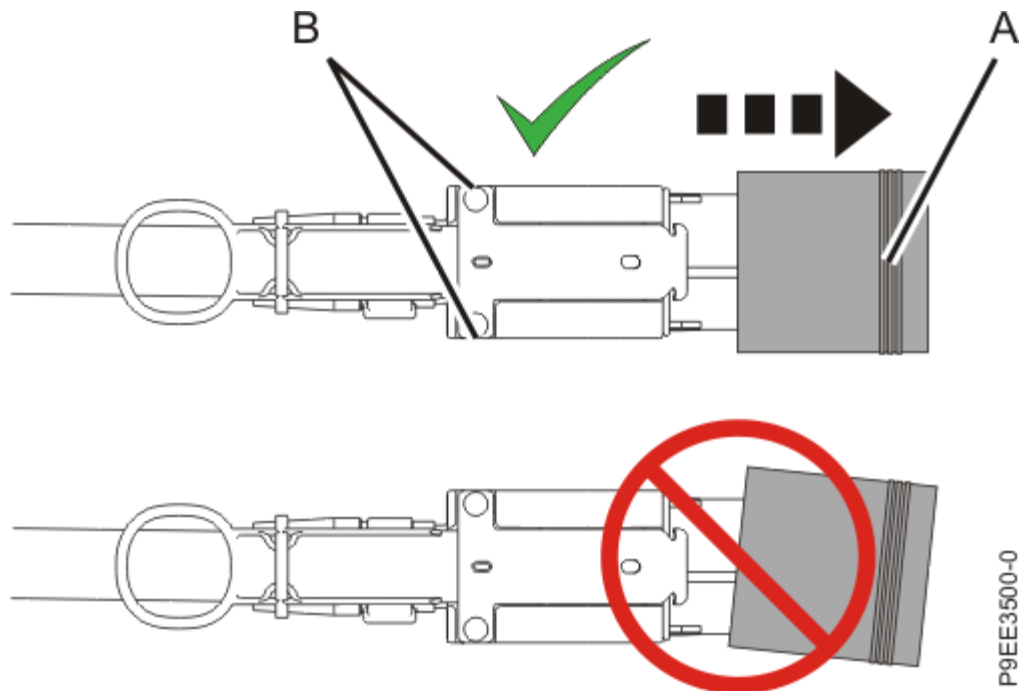


Figure 17: Removing the protective cover from the connector on the expansion drawer cable

- Connect the expansion drawer cable into the **T1** connector on the PCIe3 cable adapter in the host system.
- Remove the protective cover and connect the cable that is located near connector **T2** on the PCIe3 cable adapter in the host system.
- Remove the protective cover and connect the other end of the expansion drawer cable that is located near connector **T1** on the PCIe3 6-slot fanout module in the EMX0 PCIe3 expansion drawer.
- Remove the protective cover and connect the other end of the expansion drawer cable that is located near connector **T2** on the PCIe3 6-slot fanout module in the EMX0 PCIe3 expansion drawer.

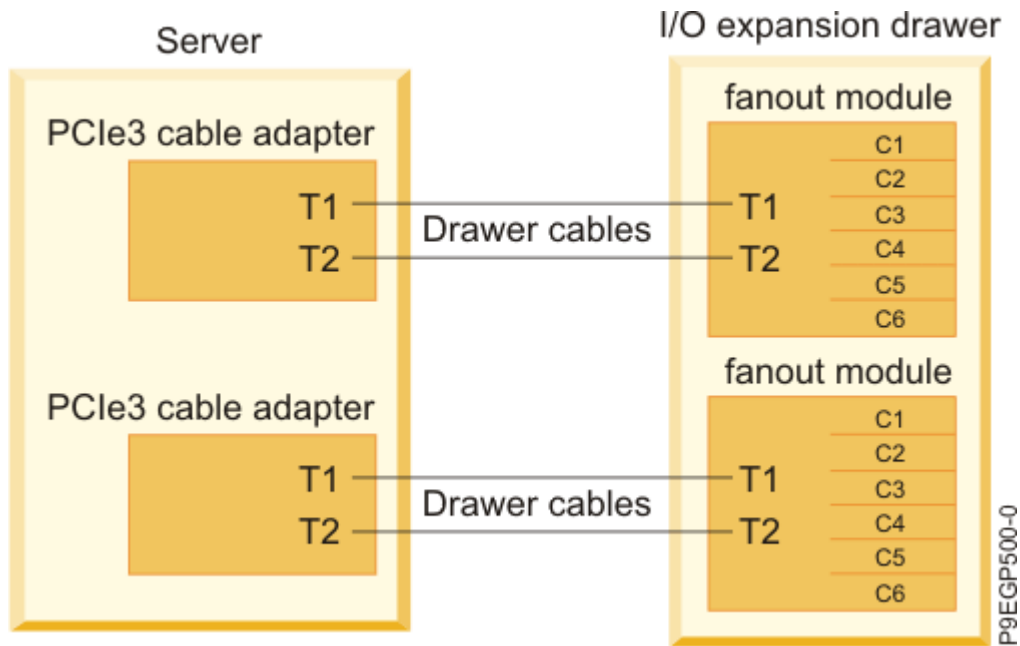


Figure 18: Connecting the expansion drawer cables

16. If you have another pair of cables to connect, repeat step [“15” on page 24](#).

17. Choose from the following options:

- If you connected the expansion drawer cables with the system power turned off, continue with step [“18” on page 25](#).
- If you left the system power turned on, continue with step [“19” on page 26](#).

18. Connect the power cables for the EMX0 PCIe3 expansion drawer, by completing the following steps:

a. Connect the power cables into the power source.

Important: Ensure that you plug the power cables into the power source before you connect them into the power supply of the EMX0 PCIe3 expansion drawer.

b. Route the power cables through the s-carabiner so that the cables clear the PCIe3 6-slot fanout module or modules.

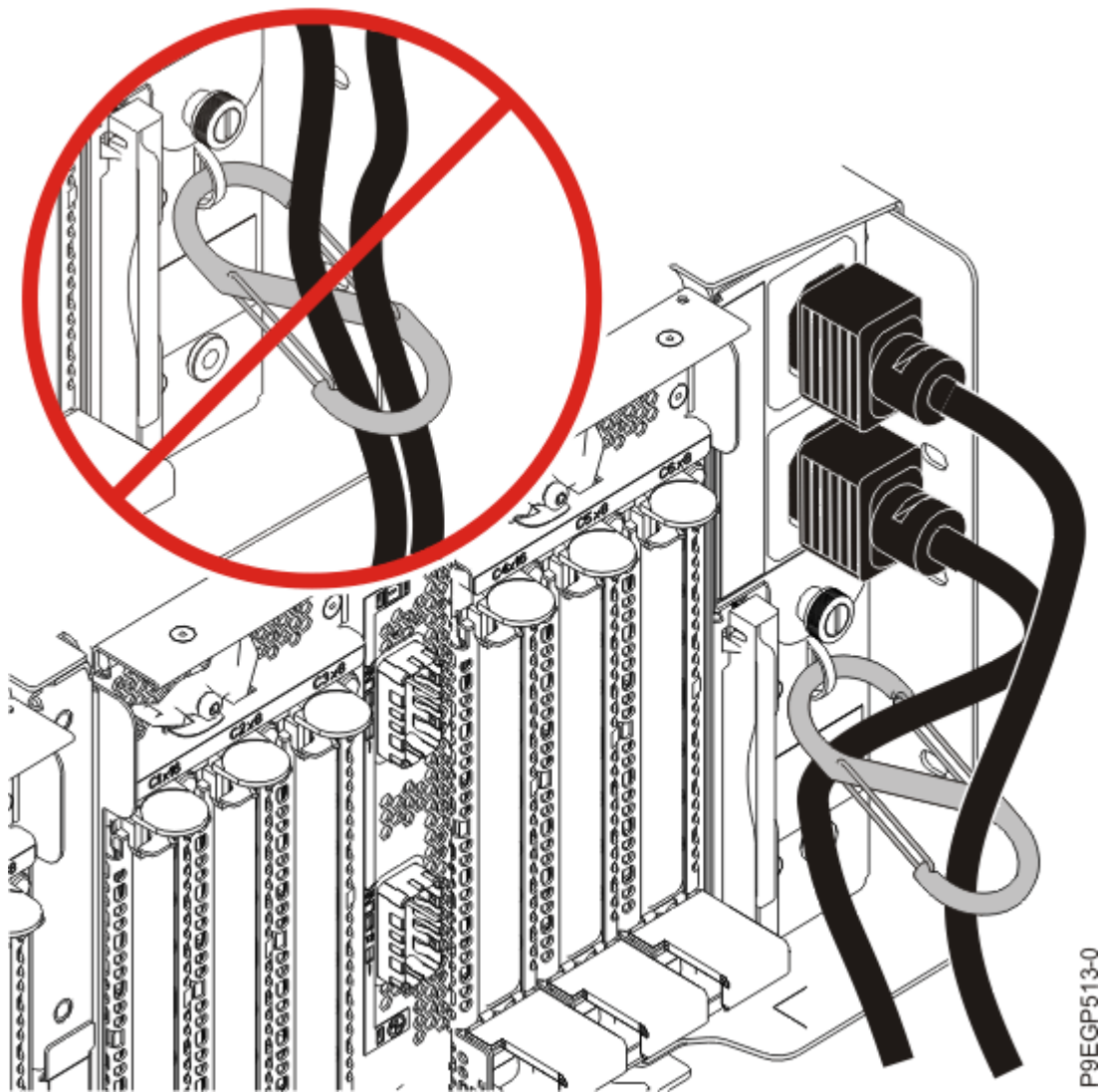


Figure 19: Routing the power cables through the s-carabiner and connecting them to the power supply

- c. Connect the other ends of the power cables into the power supplies on the EMX0 PCIe3 expansion drawer you are installing.
19. If necessary, route the cables for the PCIe adapters and expansion drawer into the cable management bracket or cable management arm and attach the cables correctly by using the hook-and-loop fastener strips.

Notes:


- If you have a cable management bracket, ensure that it is in the highest possible position so the cables have plenty of clearance to move to the lowest position.
 - If you have a cable management arm, you might want to put the system in the service position when you route the cables to ensure there is plenty of clearance.
20. Choose from the following options:
 - If you connected the expansion drawer cables with the system power turned off, continue with step “21” on page 26.
 - If you left the system power turned on, continue with step “24” on page 28.
 21. If you connected the expansion drawer cables with the system power turned off, you will need to power on the system to firmware standby state and check for serviceable events. Then, you will need

to turn on the system to the operating or running state to activate the PCIe connection. Choose from the following options:


- If your system is managed by an HMC, continue with step “22” on page 27.
- If your system is **not** managed by an HMC, use the Advanced System Management Interface (ASMI), continue with step x.

22. If you are using an HMC, complete the following steps:



- a) In the navigation area, click the **Resources** icon , and then select **All Systems**.
- b) In the content pane, select the name of the system to view the actions for that system.
- c) To enable the system to power on to the firmware standby state, complete the following steps:
 - 1) In the navigation area, select **Properties > Other properties**.
 - 2) Select the **Power-On Parameters** tab.
 - 3) Record the current setting for the **Partition start policy** field so that you can restore the setting later in this procedure.
 - 4) Set the **Partition start policy** field to **User-Initiated**. Click **OK**.
- d) In the navigation area, select **System Actions > Operations > Power on** and click **OK**.
- e) In the content area, observe the system that you are working with until the value in the Status column changes to Standby.
- f) To reset the **Partition start policy** field to its original value, complete the following steps:
 - 1) In the navigation area, select **Properties > Other properties**.
 - 2) Select the **Power-On Parameters** tab.
 - 3) Set the **Partition start policy** field to the value that you recorded earlier.
- g) To start any logical partitions that are currently stopped by using an HMC, complete the following steps:



- 1) In the navigation area, click the **Resources** icon , and then click **All Systems**.
 - 2) Click the system name in which you want to activate the logical partition.
 - 3) Select the logical partition name that you want to activate.
 - 4) In the navigation area, click **Actions > Activate**.
 - 5) Click **Finish**.
 - h) Continue with step “24” on page 28.
23. If you are using an ASMI, complete the following steps:
- a) Access the ASMI by using an authority level of administrator or authorized service provider.
 - b) In the ASMI navigation area, expand **Power/Restart Control**.
 - c) Click **Power On/Off System**.
 - d) Record the current setting for the **Server firmware start policy** field so that you can restore the setting later in this procedure.
 - e) Set the **Server firmware start policy** field to **Standby (User-Initiated)**.
 - f) Click **Save settings and power on**.
 - g) Periodically, click **Power On/Off System** again to refresh the information on the display until the value of the **Current system firmware state** field changes to Standby.
 - h) To reset the **Server firmware start policy** field to its original value, complete the following steps:
 - 1) In the ASMI navigation area, expand **Power/Restart Control**.
 - 2) Click **Power On/Off System**.

i) If you are not using an HMC, power on the system to running state by choosing one of the following options:

- Power on one or more logical partitions. For instructions, see [“Starting a system” on page 60](#).

Notes:

- If you start a partition while the system is in the standby state, the system changes from the standby state into the operating or running state.
 - This option is only available if you have an HMC.
 - Power off the system and then power it back on. For instructions, see [“Stopping a system” on page 63](#) and [“Starting a system” on page 60](#).
24. You have completed the steps to route, connect, and activate the PCIe link for the expansion drawer cable.

Preparing your system for operation after connecting an EMX0 PCIe3 expansion drawer to your system

To prepare your system for operation, complete the steps in this procedure.

Procedure

1. If the system has a rear door, close or replace it.
2. Verify that the system or logical partition recognized the EMX0 PCIe3 expansion drawer.
Verify the installed part. For instructions, see [Verifying the installed part](http://www.ibm.com/support/knowledgecenter/POWER9/p9haj/pxhaj_hsmverify.htm) (www.ibm.com/support/knowledgecenter/POWER9/p9haj/pxhaj_hsmverify.htm).
3. If the system has logical partitions, you can now assign I/O slots in the expansion drawer that was added to the logical partitions.
For instructions, see [Managing physical I/O devices and slots dynamically](http://www.ibm.com/support/knowledgecenter/POWER9/p9hat/p9hat_dlpariopp6.htm) (http://www.ibm.com/support/knowledgecenter/POWER9/p9hat/p9hat_dlpariopp6.htm).
4. You have completed the steps to install an EMX0 PCIe3 expansion drawer.
If you were directed here from another procedure, return to that procedure now.

Reference information

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

Planning for cables

Learn how to develop plans for cabling your server and devices.

Cable management

These guidelines ensure that your system and its cables have optimal clearance for maintenance and other operations. The guidelines also provide guidance in correctly cabling your system and using the appropriate cables.

The following guidelines provide cabling information for installing, migrating, relocating, or upgrading your system:

- Position drawers in racks to allow enough space, where possible, for cable routing on the bottom and top of the rack, and between drawers.
- Shorter drawers must not be placed between longer drawers in the rack (for example, placing a 19-inch drawer between two 24-inch drawers).
- When a specific cable plugging sequence is required, for example, for concurrent maintenance (symmetric multiprocessing cables), label the cables and note the sequence order.
- To facilitate cable routing, install cables in the following order:

1. Power cables
2. Communications (serial attached SCSI, InfiniBand, remote input/output, and peripheral component interconnect express) cables

Note: Install and route the communications cables, starting with the smallest diameter first and then progressing to the largest diameter. This applies to installing them into the cable management arm and retaining them to the rack, brackets, and other features that might be provided for cable management.

- Install and route the communications cables, starting with smallest diameter first and then progressing to the largest diameter.
- Use the innermost cable-management bridge lances for power cables.
- Use the middle cable-management bridge lances for communications cables.
- The outermost row of cable-management bridge lances is available for use when routing cables.
- Use the cable raceways on the sides of the rack to manage excess power cables.
- Four cable-management bridge lances are on the top of the rack. Use these bridge lances to route the cables from one side of the rack to the other, by routing to the top of the rack, where possible. This routing helps to avoid having a cable bundle that blocks the cable exit opening at the bottom of the rack.
- Use the cable management brackets that are provided with the system to maintain concurrent maintenance routing.
- Maintain a minimum bend diameter of 101.6 mm (4 in.) for communications (SAS, IB, and PCIe) cables.
- Maintain a minimum bend diameter of 50.8 mm (2 in.) for power cables.
- Use the shortest-length cable available for each point-to-point connection.
- If cables must be routed across the rear of a drawer, leave enough slack to reduce the tension on the cables for maintenance of the drawer.
- When routing cables, leave enough slack around the power connection on the power distribution unit (PDU) so that the wall-to-PDU power cord can be attached to the PDU.

- Use hook-and-loop fasteners where necessary.

Note:

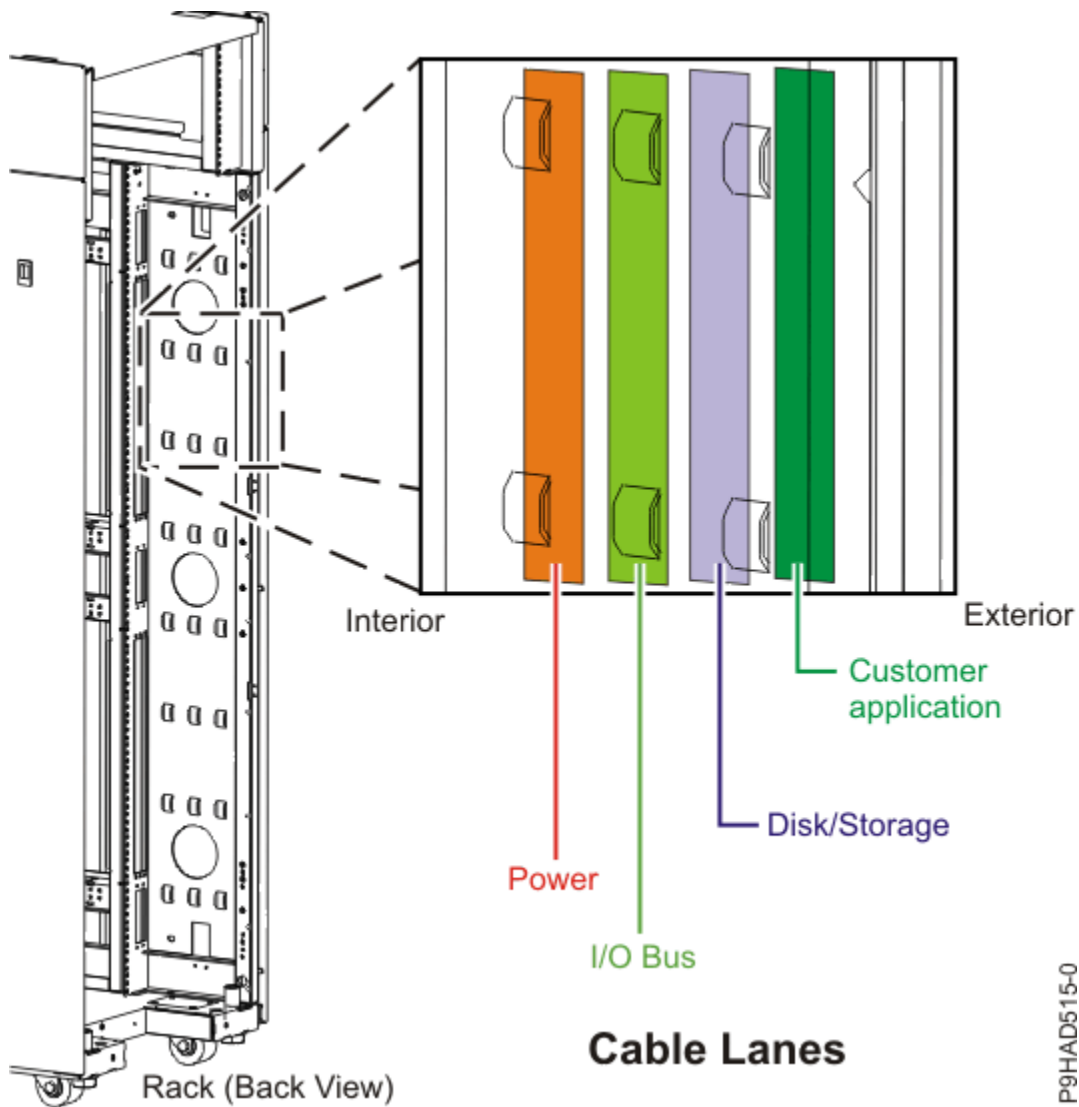


Figure 20: Cable management bridge lances

P9HAD515-0

Cable bend radius

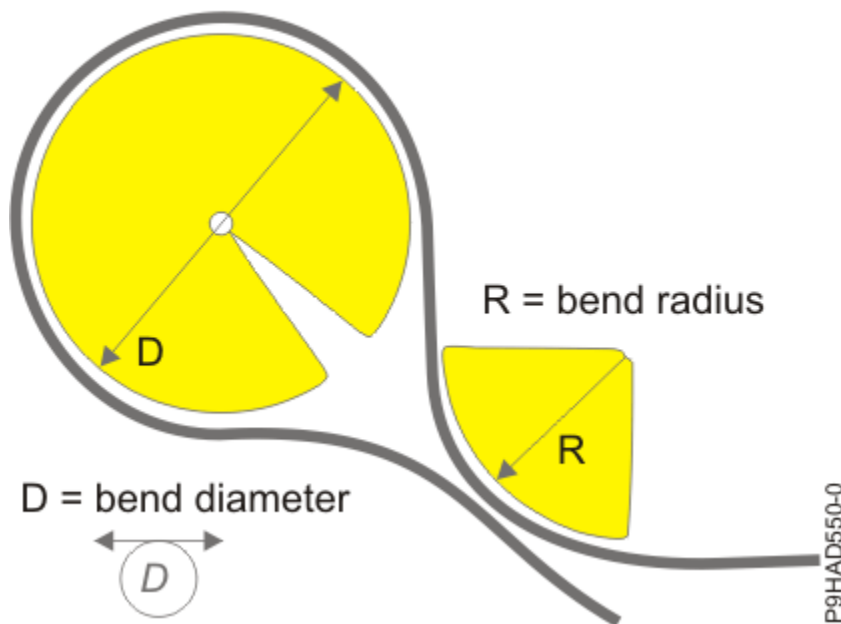


Figure 21: Cable bend radius

Power cord routing and retention

Proper power cord routing and retention ensures that your system remains connected to a power supply.

The primary purpose of power cord retention is to prevent unexpected power loss to your system that can potentially cause system operations to stop functioning.

Different types of power cord retention are available. Some of the most commonly used types of retention include:

- Cable management arms
- Rings
- Clamps
- Plastic straps
- Hook-and-loop fasteners

Power cord retainers are typically found at the rear of the unit and on the chassis or pedestal near the alternating current (AC) power cord input.

Systems that are rack-mounted and are on rails must use the provided cable management arm.

Systems that are rack-mounted, but are not on rails must use the provided rings, clamps, or straps.

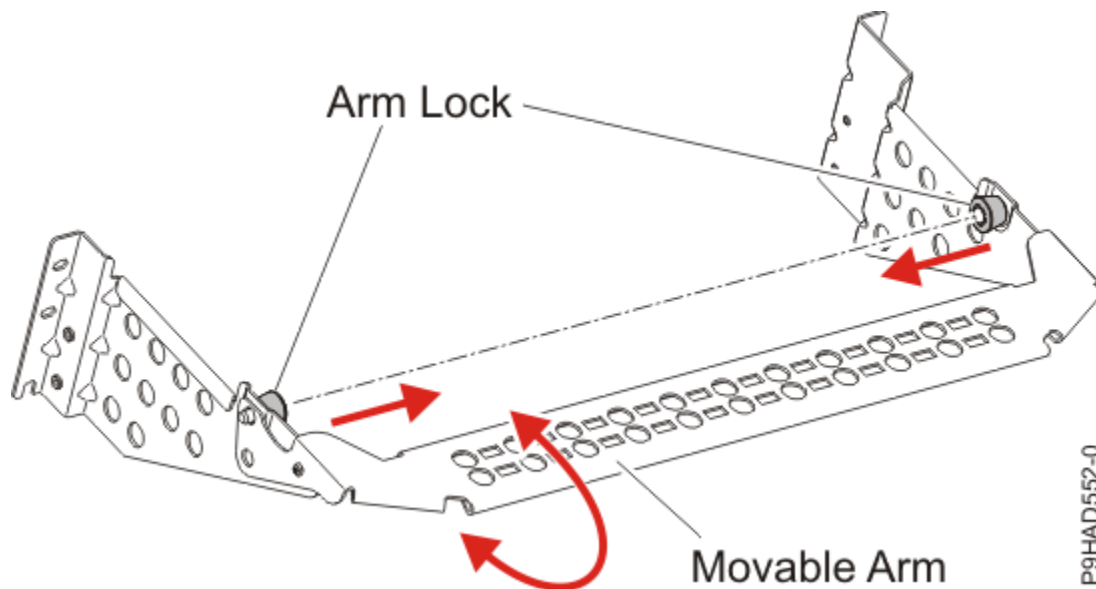


Figure 22: Cable management bracket

Planning for serial-attached SCSI cables

Serial-attached SCSI (SAS) cables provide serial communication for transfer of data for directly attached devices, such as hard disk drives, solid-state drives, and CD-ROM drives.

SAS cable overview

Serial-attached SCSI (SAS) is an evolution of the parallel SCSI device interface into a serial point-to-point interface. SAS physical links are a set of four wires that are used as two differential signal pairs. One differential signal transmits in one direction while the other differential signal transmits in the opposite direction. Data might be transmitted in both directions simultaneously. SAS physical links are contained in ports. A port contains one or more SAS physical links. A port is a wide port if there are more than one SAS physical link in the port. Wide ports are designed to enhance performance and provide redundancy in case an individual SAS physical link fail.

There are two types of SAS connectors, mini SAS and mini SAS high density (HD). High-density cables are typically needed to support 6 Gb/s SAS.

Each SAS cable contains four SAS physical links that are typically organized into either a single 4x SAS port or two 2x SAS ports. Each end of the cable uses a mini SAS or mini SAS HD 4x connector. Review the following design and installation criteria before you install SAS cables:

- Only specific cabling configurations are supported. Many configurations can be constructed that are not supported and will either not function correctly or generates errors. See [“SAS cabling configurations”](#) on page 37 for figures of the supported cabling configurations.
- Each mini-SAS 4x connector is keyed to help prevent cabling an unsupported configuration.
- HD SAS cables have a key that prevents the cable retention from latching if the cable is oriented incorrectly. HD SAS cables slide in easily and latch correctly if they are inserted with the blue release tab on the right side of the card connector.
- Each cable end has a label that graphically describes the correct component port to which it is connected, such as:
 - SAS adapter
 - Expansion drawer
 - System external SAS port
 - Internal SAS disk slots connection.

- Cable routing is important. For example, YO and X cables must be routed along the right side of the rack frame (as viewed from the rear) when you connect to a disk expansion drawer. Additionally, X cables must be attached to the same numbered port on both SAS adapters to which it connects.
- When a choice of cable lengths is available, select the shortest cable that provides the needed connectivity.
- Always use care when you insert or remove a cable. The cable should slide easily into the connector. Forcing a cable into a connector can cause damage to the cable or connector. When you remove a cable, pull straight back on the blue release tab. Do not pull the blue release tab off to the side, otherwise breakage might occur. After the cable latch is released, pull on the black cable to remove it from the connector.
- New SAS cables with mini-SAS HD narrow connectors are required for any PCIe3 SAS adapter connection. These cables are also compatible with earlier PCIe2 SAS adapters.
- Not all cabling configurations are supported when you use solid-state drives (SSD). See *Installing and configuring Solid State Drives* for more information.

Supported SAS cable information

The following table contains a list of the supported serial-attached SCSI (SAS) cable types and their designed usage.

<i>Table 1: Functions for supported SAS cables.</i>	
Cable type	Function
AA cable	This cable is used to connect between the top one or two ports on two PCIe3 caching SAS RAID adapters.
AE cable	These cables are used to connect a SAS adapter to a media expansion drawer.
YO cable	This cable is used to connect a SAS adapter to a disk expansion drawer. The cable must be routed along the right side of the rack frame (as viewed from the rear) when you connect to a disk expansion drawer.
X cable	This cable is used to connect two SAS adapters to a disk expansion drawer in a RAID configuration. The cable must be routed along the right side of the rack frame (as viewed from the rear) when you connect to a disk expansion drawer.
AE1 cable	This 4 m (13.1 ft) SAS cable connects a PCIe3 SAS adapter to a SAS tape drive or DVD I/O enclosure. The AE cable has two connectors, one mini-SAS HD narrow connector and one mini-SAS connector. The mini-SAS HD Narrow connector attaches to a PCIe3 SAS adapter. The mini-SAS connector attaches to a SAS tape drive or DVD enclosure.
YE1 cable	This 3 m (9.8 ft) SAS cable connects a PCIe3 SAS adapter to one or two SAS tape drives in an I/O enclosure. The YE1 cable has three connectors, one mini-SAS HD (High Density) narrow connector and two mini-SAS connectors. The Mini-SAS HD Narrow connector attaches to a PCIe3 SAS adapter. Each mini-SAS connector attaches to a different SAS tape drive.

<i>Table 1: Functions for supported SAS cables. (continued)</i>	
Cable type	Function
AS cable	This 3 m (9.8 ft) SAS cable is used to attach a DCS3700 to PCIe3 LP RAID SAS adapter.

The following table contains specific information about each supported SAS cable for PCIe SAS adapters.

<i>Table 2: Supported SAS cables for PCIe SAS adapters.</i>			
Name	Length	IBM part number	Feature code
SAS 4x AE cable	3 m (9.8 ft)	44V4163	3684
	6 m (19.6 ft)	44V4164	3685

The following table contains specific information about each supported SAS cable feature with narrow HD connectors for PCIe3 SAS adapters.

<i>Table 3: Supported SAS cables for PCIe3 SAS adapters.</i>			
Name	Length	IBM part number	Feature code
HD SAS AA12 narrow connector cable, SAS adapter to SAS adapter	0.6 m (1.9 ft)	01AF505	ECE0
	1.5 m (4.9 ft)	01AF506	ECE2
	3 m (9.8 ft)	01AF507	ECE3 ¹
	4.5 m (14.8 ft) AOC ²	78P4917	ECE4
HD SAS X12 narrow connector cable, SAS adapter to storage enclosure	3 m (9.8 ft)	01AF504	ECDJ
	4.5 m (14.8 ft) AOC ²	78P4918	ECDK
	10 m (32.8 ft) AOC ²	78P4919	ECDL
HD SAS YO12 narrow connector cable, two SAS adapters to storage enclosure	1.5 m (4.9 ft)	01AF502	ECDT
	3 m (9.8 ft)	01AF503	ECDU
	4.5 m (14.8 ft) AOC ²	78P4920	ECDV
	10 m (32.8 ft) AOC ²	78P4921	ECDW
HD SAS AA narrow connector cable, SAS adapter to SAS adapter	0.6 m (1.9 ft)	00E6287	ECC0
	1.5 m (4.9 ft)	00E6288	ECC2
	3 m (9.8 ft)	00E6289	ECC3
	6 m (19.6 ft)	00E6290	ECC4

Table 3: Supported SAS cables for PCIe3 SAS adapters. (continued)

Name	Length	IBM part number	Feature code
HD SAS X narrow connector cable	3 m (9.8 ft)	00E6297	ECBJ
	6 m (19.6 ft)	00E6298	ECBK
	10 m (32.8 ft)	00E6299	ECBL
	15 m (49.2 ft)	00E6300	ECBM
HD SAS YO narrow connector cable	1.5 m (4.9 ft)	00E6292	ECBT
	3 m (9.8 ft)	00E6293	ECBU
	6 m (19.6 ft)	00E6294	ECBV
	10 m (32.8 ft)	00E6295	ECBW
	15 m (49.2 ft)	00E6296	ECBX
HD SAS AE1 narrow connector cable	4 m (13.1 ft)	46C2900	ECBY/5507
HD SAS YE1 narrow connector cable	3 m (9.8 ft)	46C2902	ECBZ/5509
HD SAS AS narrow connector cable	3 m (9.8 ft)	00FW799	ECC5
1. Can be used to attach just a bunch of disks (JBOD) storage enclosures to adapters. 2. Active optical cables (AOC).			

The following table contains cable label information. The graphic labels are designed to match the correct component port to which the cable end is to be attached.

Table 4: SAS cable labeling.

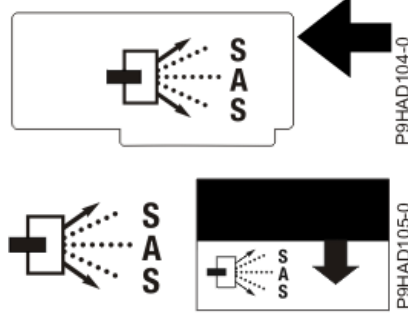
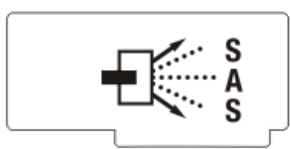
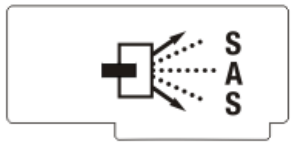
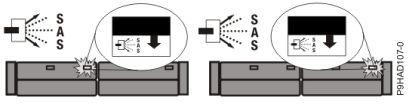
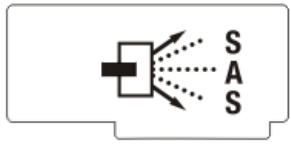
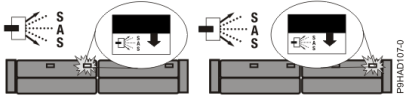
Name	Connects	Label
SAS 4x AE cable	SAS adapter to a media expansion drawer or two SAS adapters to a disk expansion drawer in a unique JBOD configuration	

Table 4: SAS cable labeling. (continued)		
Name	Connects	Label
SAS AA cable	SAS adapter to SAS adapter	 P9HAD104-0
SAS YO cable	SAS adapter to a disk expansion drawer	 P9HAD104-0  P9HAD107-0
SAS X cable	Two SAS adapters to a disk expansion drawer in a RAID configuration	 P9HAD104-0  P9HAD107-0

Cable section lengths

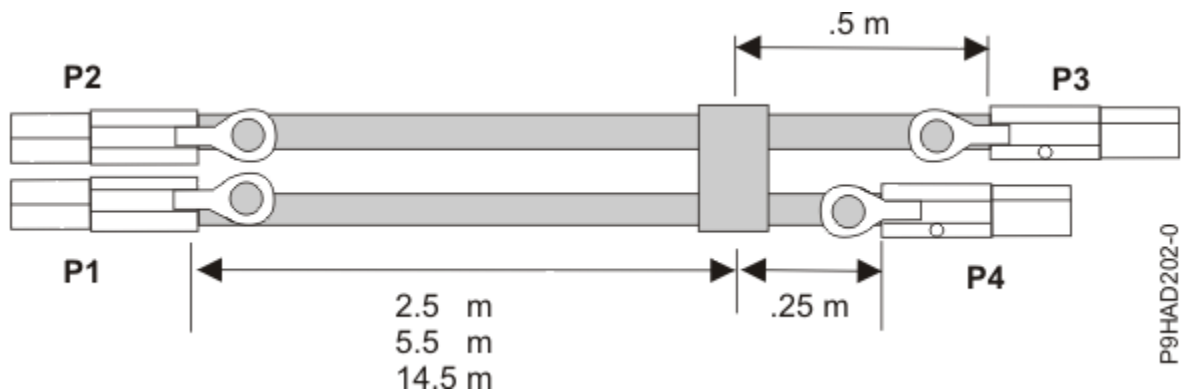


Figure 23: SAS external X cable assembly cable lengths

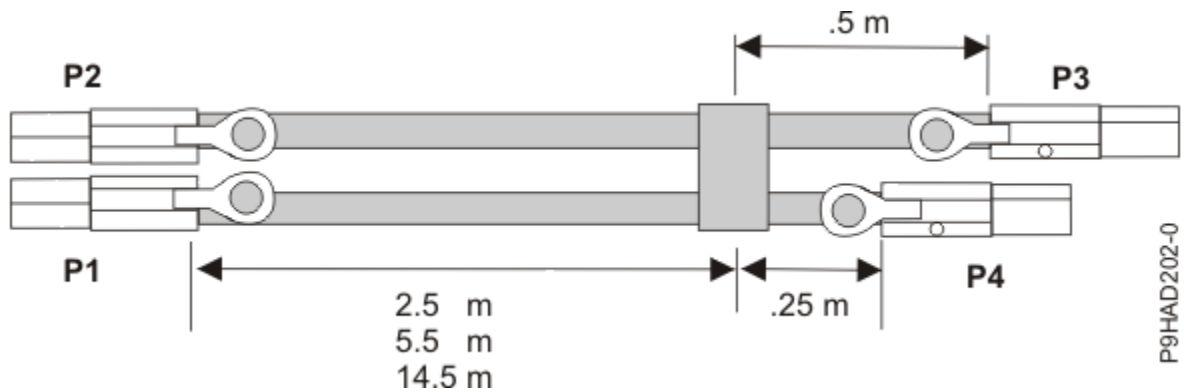


Figure 24: SAS external YO-cable assembly cable lengths

SAS cabling configurations

The following sections provide the typical supported SAS cabling configurations. Many configurations can be constructed that are not supported and will either not function correctly or generates errors. To avoid problems, restrict cabling to only the general types of configurations that are shown in the following sections.

- [“SAS adapter to media expansion drawer” on page 37](#)
- [“SAS adapter to expansion drawer combinations” on page 38](#)
- [“System external SAS port to disk expansion drawer” on page 39](#)
- [“Two RAID SAS adapters with HD connectors to disk expansion drawer in a multi-initiator high availability \(HA\) mode \(dual storage adapter configuration\)” on page 40](#)

SAS adapter to media expansion drawer

Figure 25 on page 38 illustrates connecting a SAS adapter to a media expansion drawer. It is also possible to connect a second media expansion drawer to the second port of the SAS adapter.

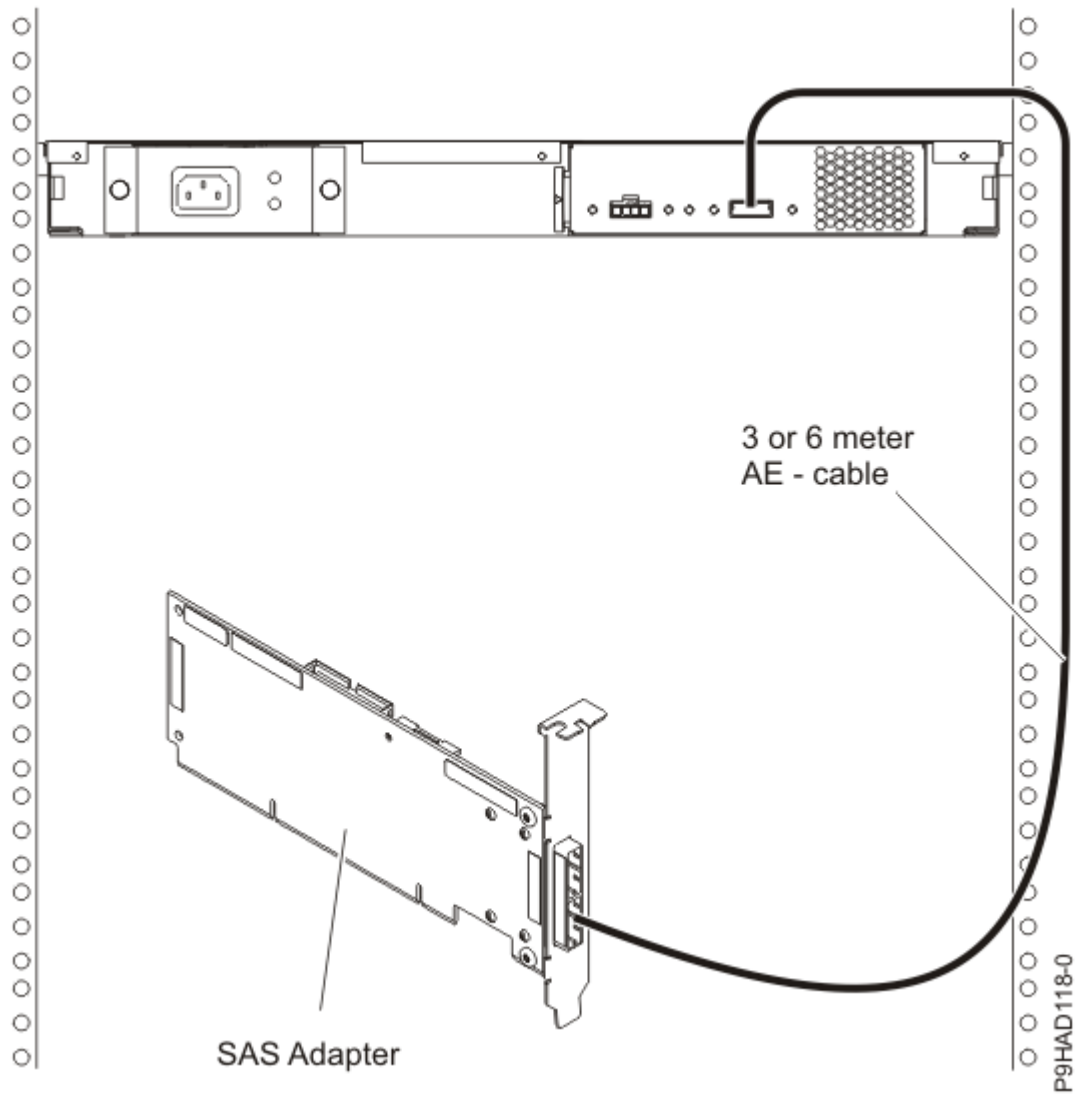


Figure 25: SAS adapter to a media expansion drawer

SAS adapter to expansion drawer combinations

Figure 26 on page 39 illustrates connecting a PCIe SAS adapter to both a disk expansion drawer and a media expansion drawer on separate adapter ports.

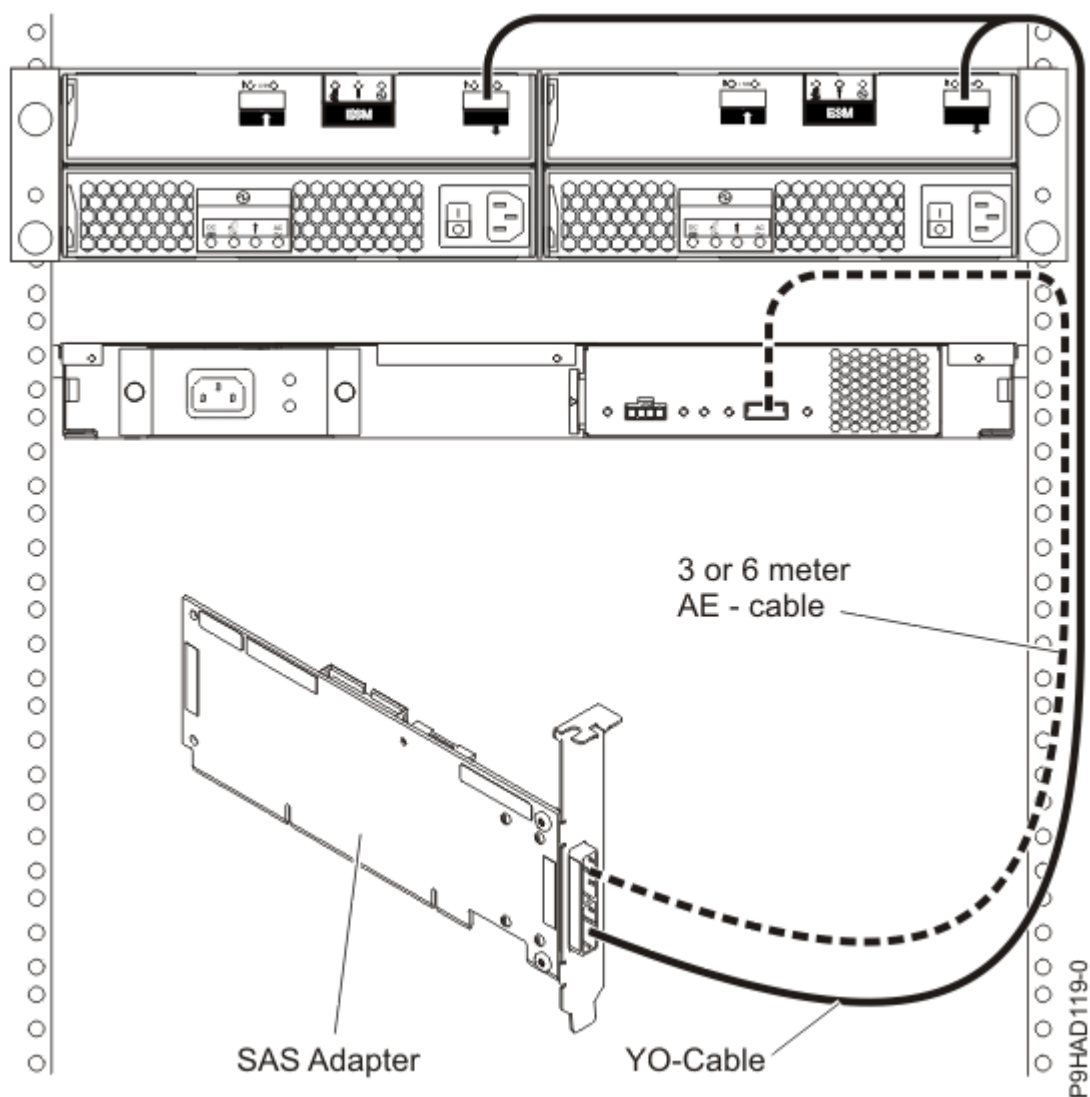


Figure 26: SAS adapter to both a disk expansion drawer and a media expansion drawer

Note: The YO cable must be routed along the right side of the rack frame.

System external SAS port to disk expansion drawer

Figure 27 on page 40 illustrates connecting a system external SAS port to a disk expansion drawer. Disk expansion drawers cannot be cascaded.

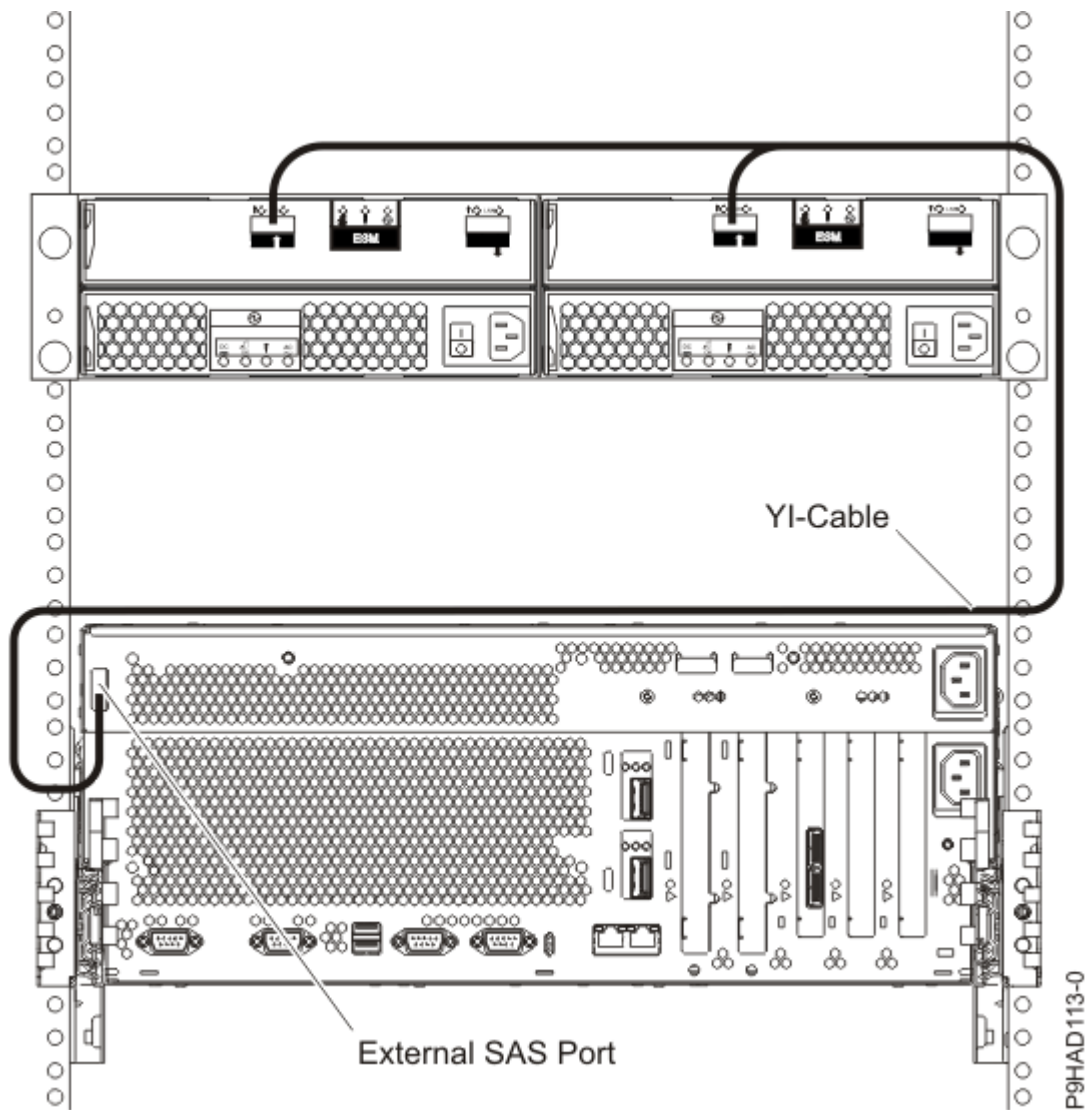
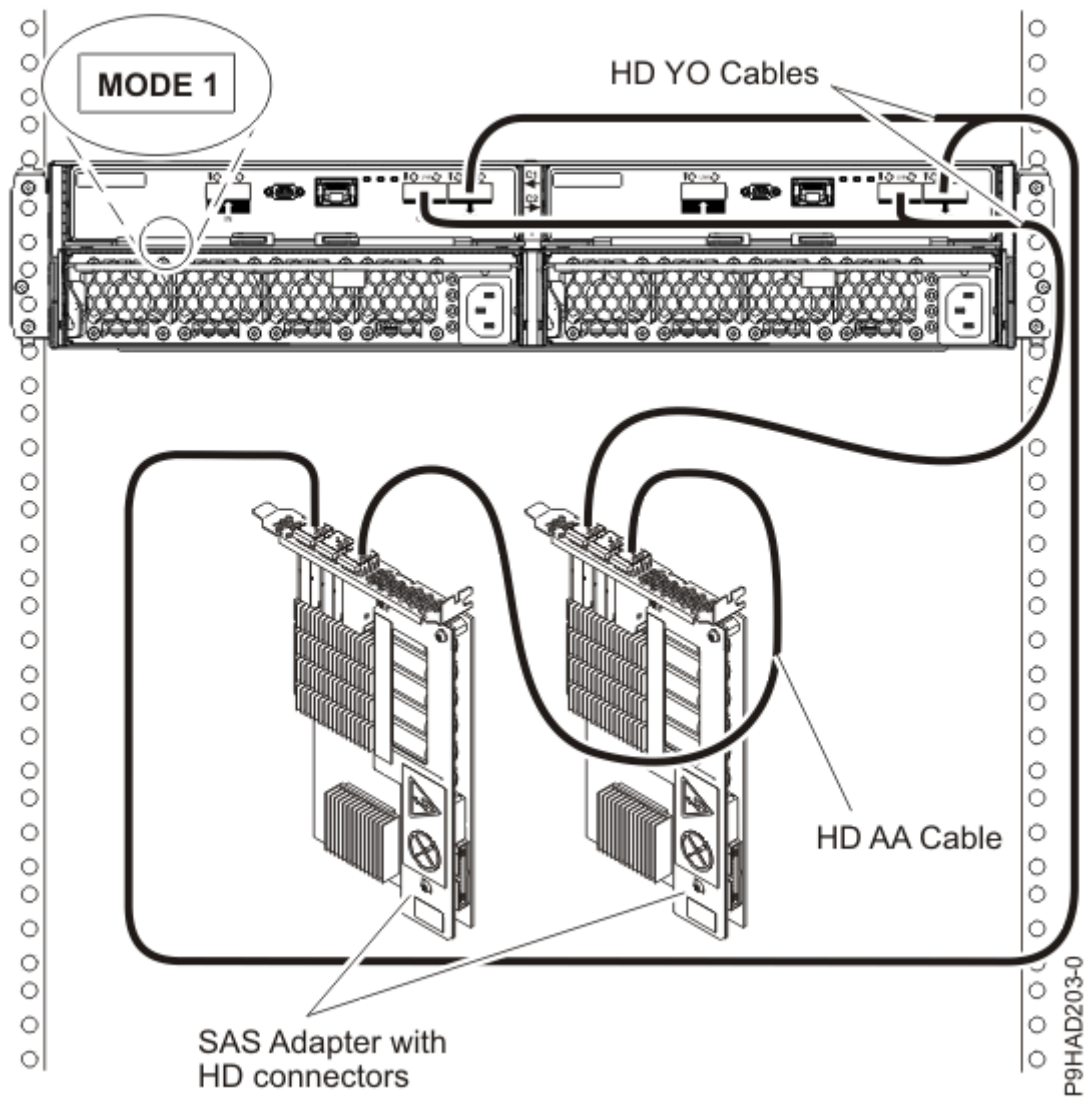


Figure 27: System external SAS adapter port to a disk expansion drawer

Two RAID SAS adapters with HD connectors to disk expansion drawer in a multi-initiator high availability (HA) mode (dual storage adapter configuration)

Figure 28 on page 41, Figure 29 on page 42, and Figure 30 on page 43 illustrate connecting two SAS RAID adapters with HD connectors to one, two, or three disk expansion drawers in a multi-initiator HA mode.

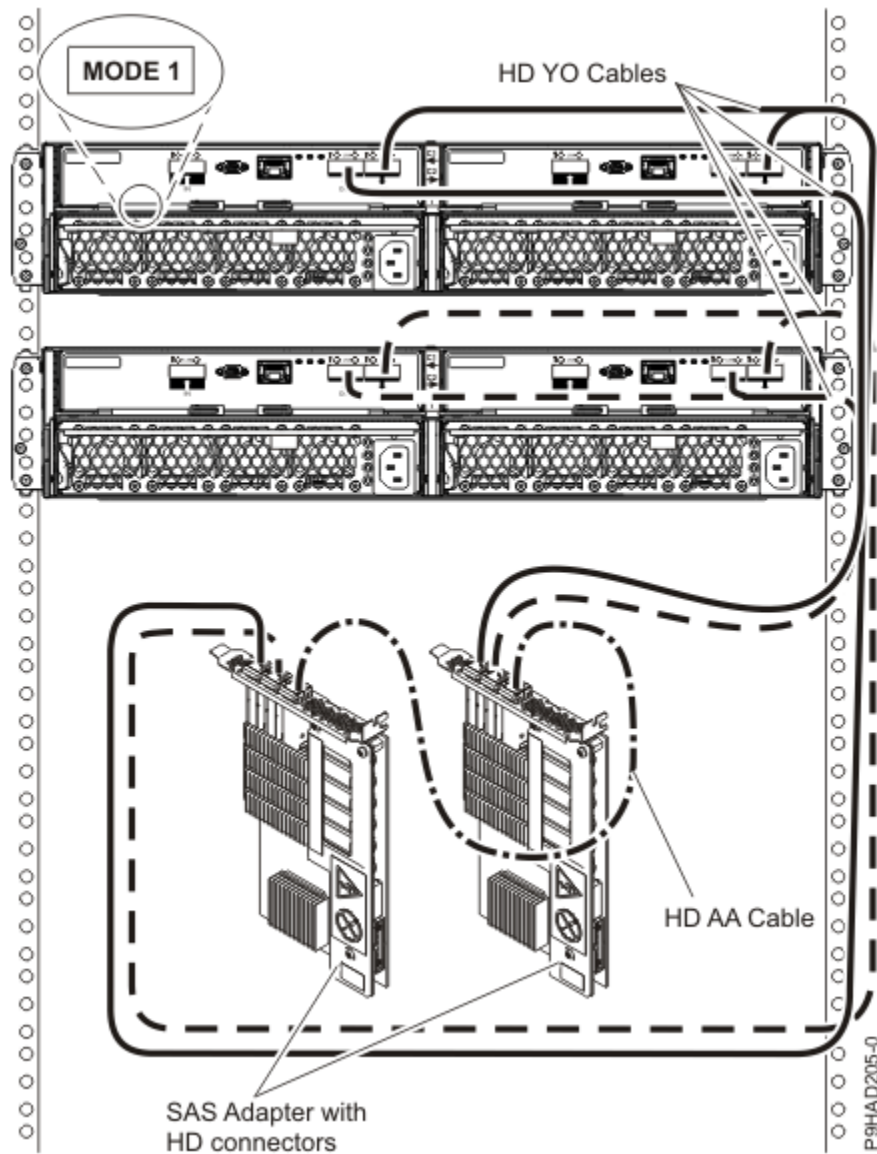
Figure 31 on page 44 illustrates connecting two pair of SAS RAID adapters with HD connectors to one disk expansion drawer in a multi-initiator HA mode.



Notes:

- No cascading allowed for the 5887 storage drawer.
- The 5887 storage drawer is connected to same numbered port on each adapter.
- HD AA cable is required.

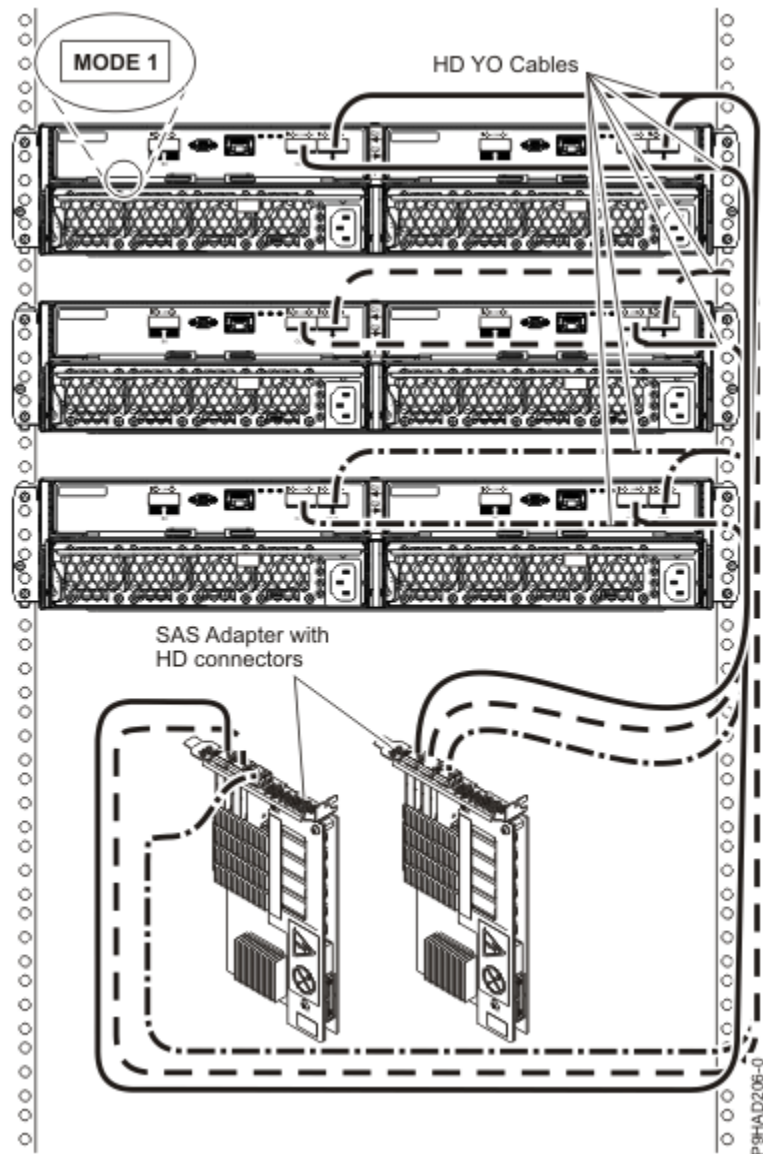
Figure 28: Two RAID SAS adapters with HD connectors to a disk expansion drawer in a multi-initiator HA mode



Notes:

- No cascading allowed for the 5887 storage drawer.
- The 5887 storage drawers are connected to same numbered port on each adapter.
- HD AA cable is required.

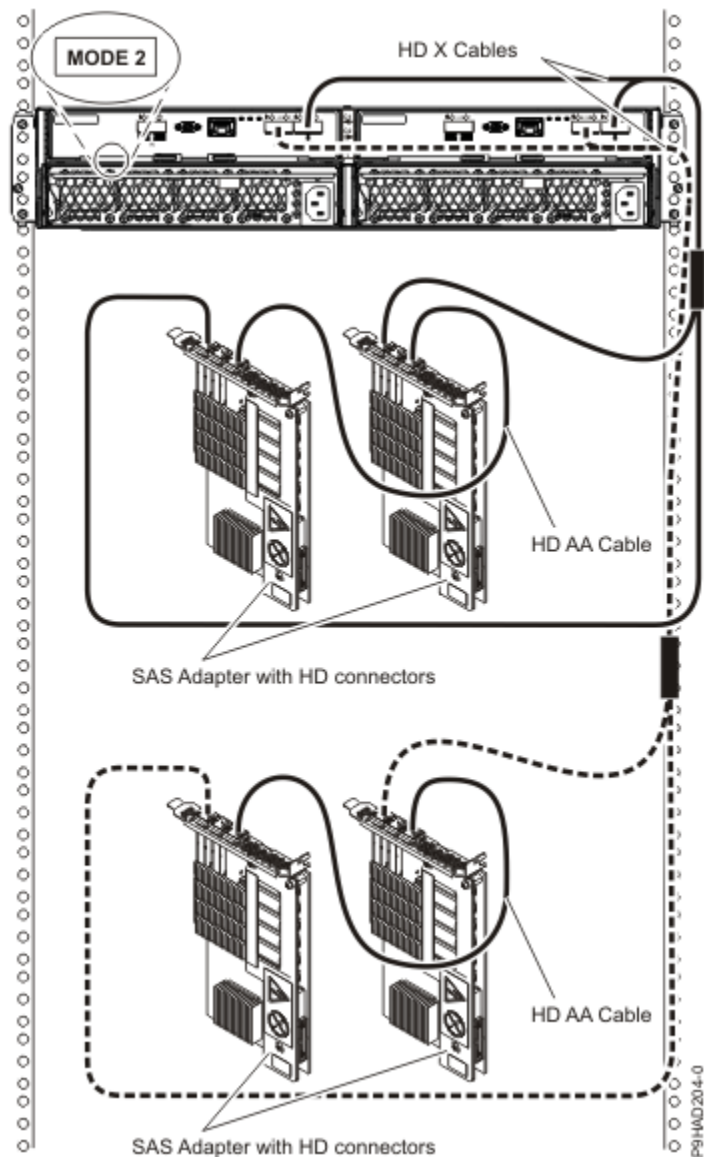
Figure 29: Two RAID SAS adapters with HD connectors to two disk expansion drawer in a multi-initiator HA mode



Note:

- No cascading allowed for the 5887 storage drawer.
- The 5887 storage drawers are connected to same numbered port on each adapter.

Figure 30: Two RAID SAS adapters with HD connectors to three disk expansion drawers in a multi-initiator HA mode



Notes:

- No cascading allowed for the 5887 storage drawer.
- The 5887 storage drawer is connected to same numbered port on each adapter.
- HD AA cable is required.

Figure 31: Two pairs of RAID SAS adapters with HD connectors to a disk expansion drawer – Mode 2 in a multi-initiator HA mode

Internal disk drive sharing

The following information is for use after the FC 5901 SAS Storage adapter is installed. Install the adapter and then return here. For more information about the PCIe adapters topic, see [Installing PCIe adapters in the 9008-22L, 9009-22A, or 9223-22H system](#).

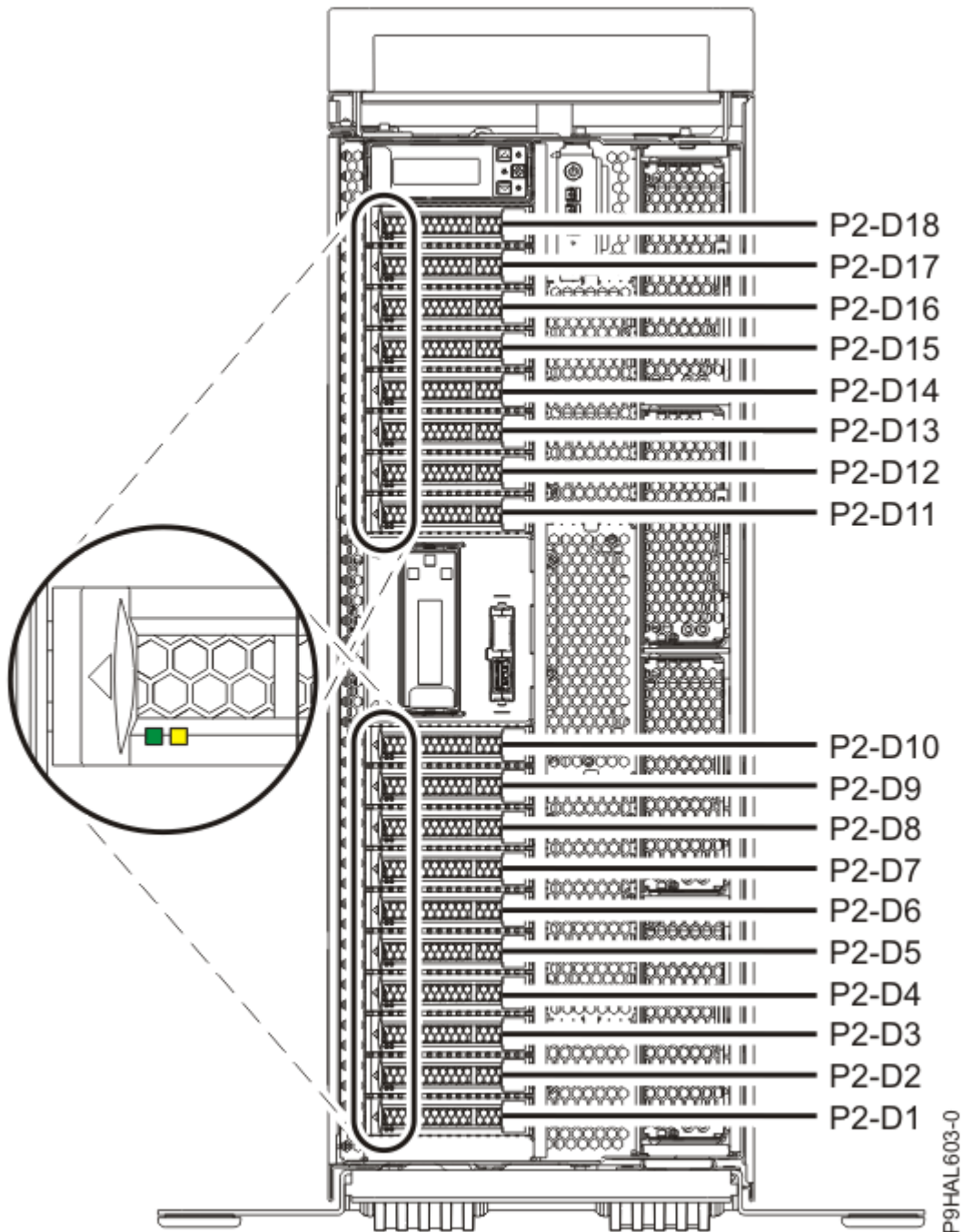
Please review the tasks in the [Before you begin](#) section before you proceed with the following procedure.

This feature allows you to split the internal disks in the system unit enclosure into groups that you can manage separately.

1. Stop and power off the system. For more information, see [Stopping a system or logical partition](#).
2. Cable a single system unit enclosure by completing the following steps:

- a. Attach the cable to the SAS port on the rear bulkhead of the system unit enclosure to the top port in the SAS Storage Controller as shown in the following figure.

Restriction: Internal disk drive sharing is only available when internal cable feature FC 1815 is installed from the DASD backplane to the rear bulkhead of the system unit enclosure. Also FC 5662 175 MB cache RAID - dual IOA enablement card must not be installed. The SAS Storage Controller might be in any of the other slots that support it.



- b. Secure any extra cable.
3. Start the system. For more information, see [Starting the system or logical partition](#).
4. Verify that the feature is installed and is working. For more information, see [Verifying the installed part](#).
- With this function installed, two of the six disks (D3 and D6) in the system enclosure is managed by the SAS storage controller adapter.

Note: The removable media device is always controlled by the separate embedded SAS controller on the system board.

SAS cabling for the 5887 disk drive enclosure

Learn about the different serial-attached SCSI (SAS) cabling configurations that are available for the 5887 disk drive enclosure.

For more information about connecting the 5887 disk drive enclosure to the system, see [Connecting the 5887 disk drive enclosure to your system \(http://www.ibm.com/support/knowledgecenter/POWER9/p9ee3/p9ee3_connect_to_server.htm\)](http://www.ibm.com/support/knowledgecenter/POWER9/p9ee3/p9ee3_connect_to_server.htm).

SAS adapter to the 5887

There are seven supported configurations to connect SAS adapters to the 5887.

Notes:

1. No solid-state drives (SSDs) supported with SAS adapters.
2. No cascading of 5887 enclosures.
3. No support for IBM i.
4. The long end (0.5 m) of the YO cable must be connected to the left side of the enclosure (as viewed from the rear). The short end (0.25 m) of the YO cable must be connected to the right side of the enclosure (as viewed from the rear).

The following list describes the supported configurations for connecting SAS adapters to a 5887:

1. Single SAS adapter to one 5887 enclosure by using a mode 1 connection.
 - 5887 enclosure with one set of 24 hard disk drives (HDDs).
 - Connection using SAS YO cables to connect to the 5887 enclosure.

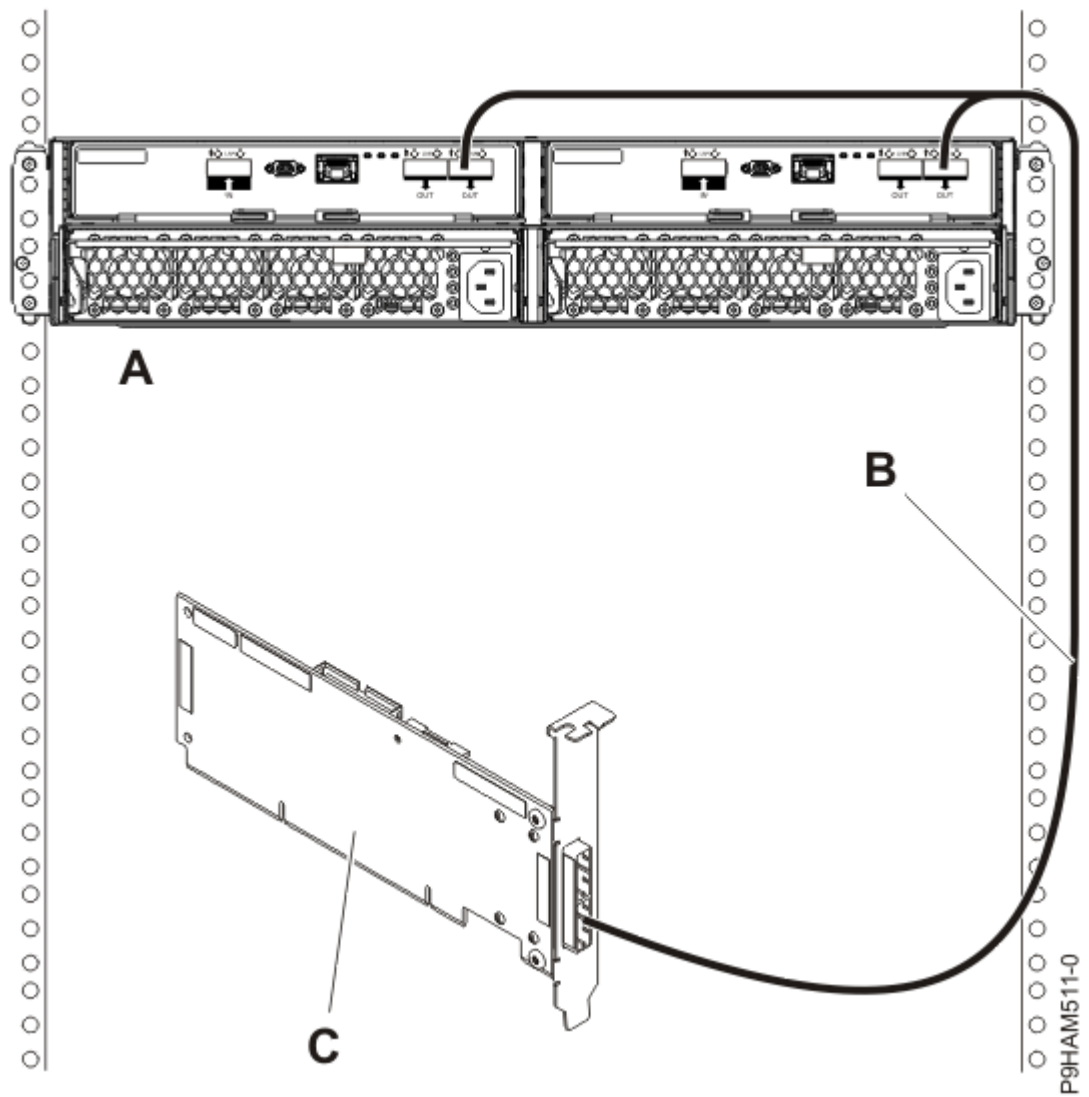


Figure 32: Mode 1 connection of a 5887 enclosure by using a YO cable to a single SAS adapter

2. Single SAS adapter to two 5887 enclosures by using a mode 1 connection.

- 5887 enclosures with two sets of 24 hard disk drives (HDDs).
- Connection using SAS YO cables to connect to the 5887 enclosures.

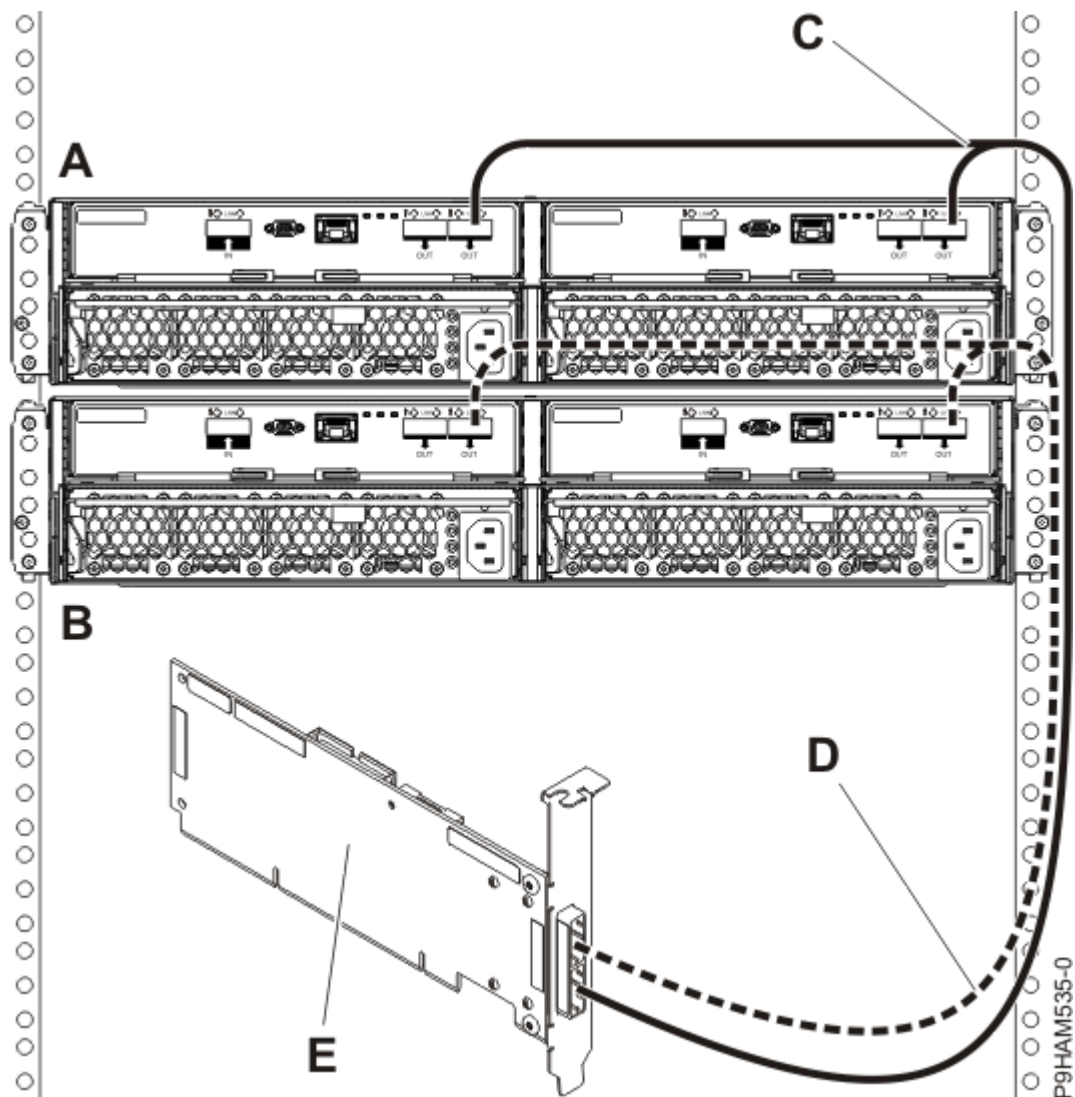


Figure 33: Mode 1 connection of two 5887 enclosures by using YO cables to a single SAS adapter

3. Dual SAS adapters to one 5887 enclosure by using a mode 1 connection.

- 5887 enclosure with one set of 24 hard disk drives (HDDs).
- Connection using dual SAS YO cables to connect to the 5887 enclosure.

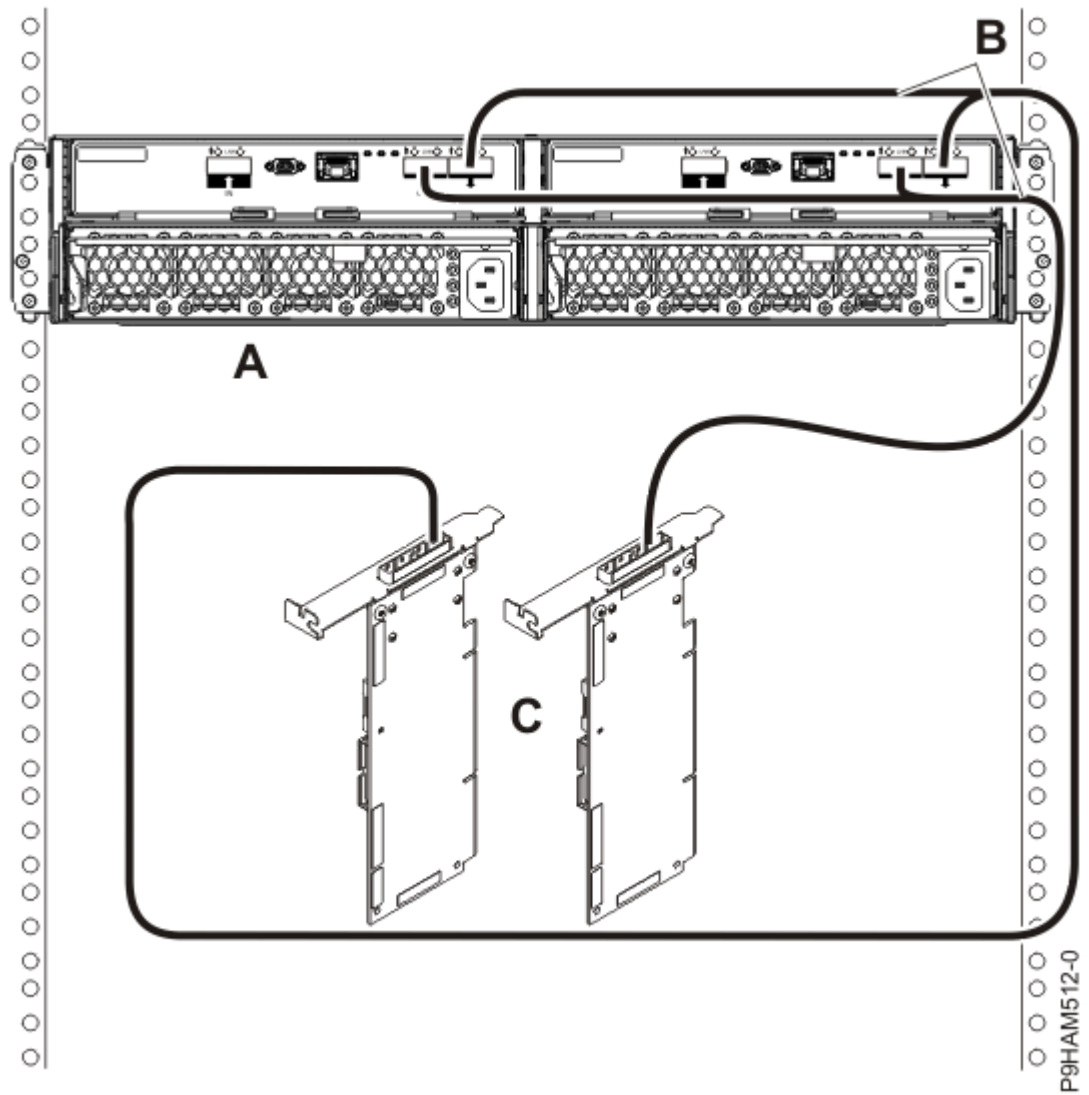


Figure 34: Mode 1 connection of one 5887 enclosure by using YO cables to a SAS adapter pair

4. Dual SAS adapters to two 5887 enclosures by using a mode 1 connection.

- 5887 enclosures with two sets of 24 hard disk drives (HDDs).
- Connection using dual SAS YO cables to connect to the 5887 enclosure.

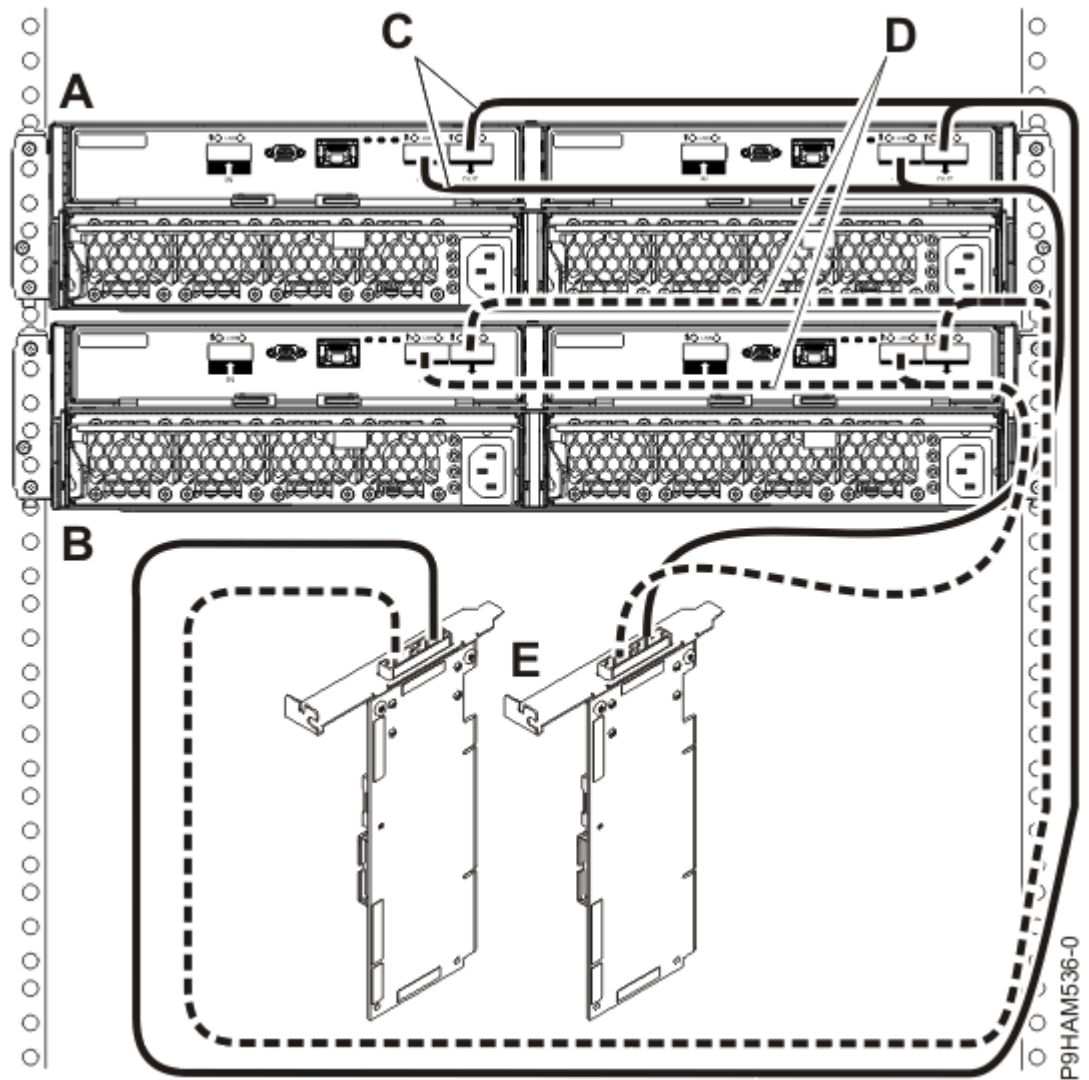


Figure 35: Mode 1 connection of two 5887 enclosures by using YO cables to a SAS adapter pair

5. Two SAS adapters to one 5887 enclosure by using a mode 2 connection.

- 5887 enclosure with two sets of 12 hard disk drives (HDDs).
- Connection using two SAS YO cables to connect to the 5887 enclosure.
- Each pair of SAS adapters controls half of the 5887 enclosure.

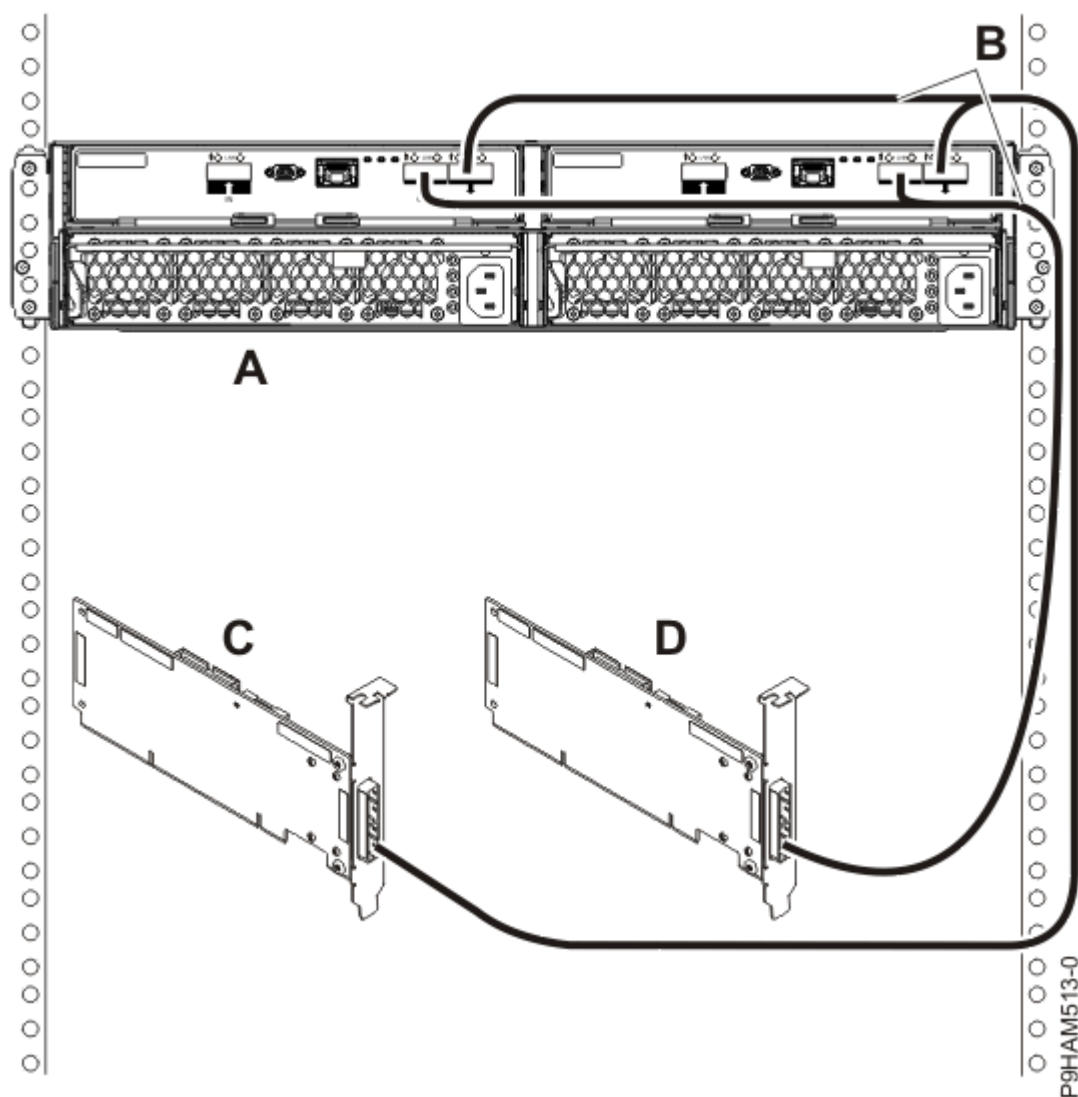


Figure 36: Mode 2 connection of one 5887 enclosure by using YO cables to two independent SAS adapters

6. Two SAS adapter pairs to one 5887 enclosure by using a mode 2 connection.
 - 5887 enclosure with two sets of 12 hard disk drives (HDDs).
 - Connection using dual SAS X cables to connect to the 5887 enclosure.
 - Each pair of SAS adapters controls half of the 5887 enclosure.

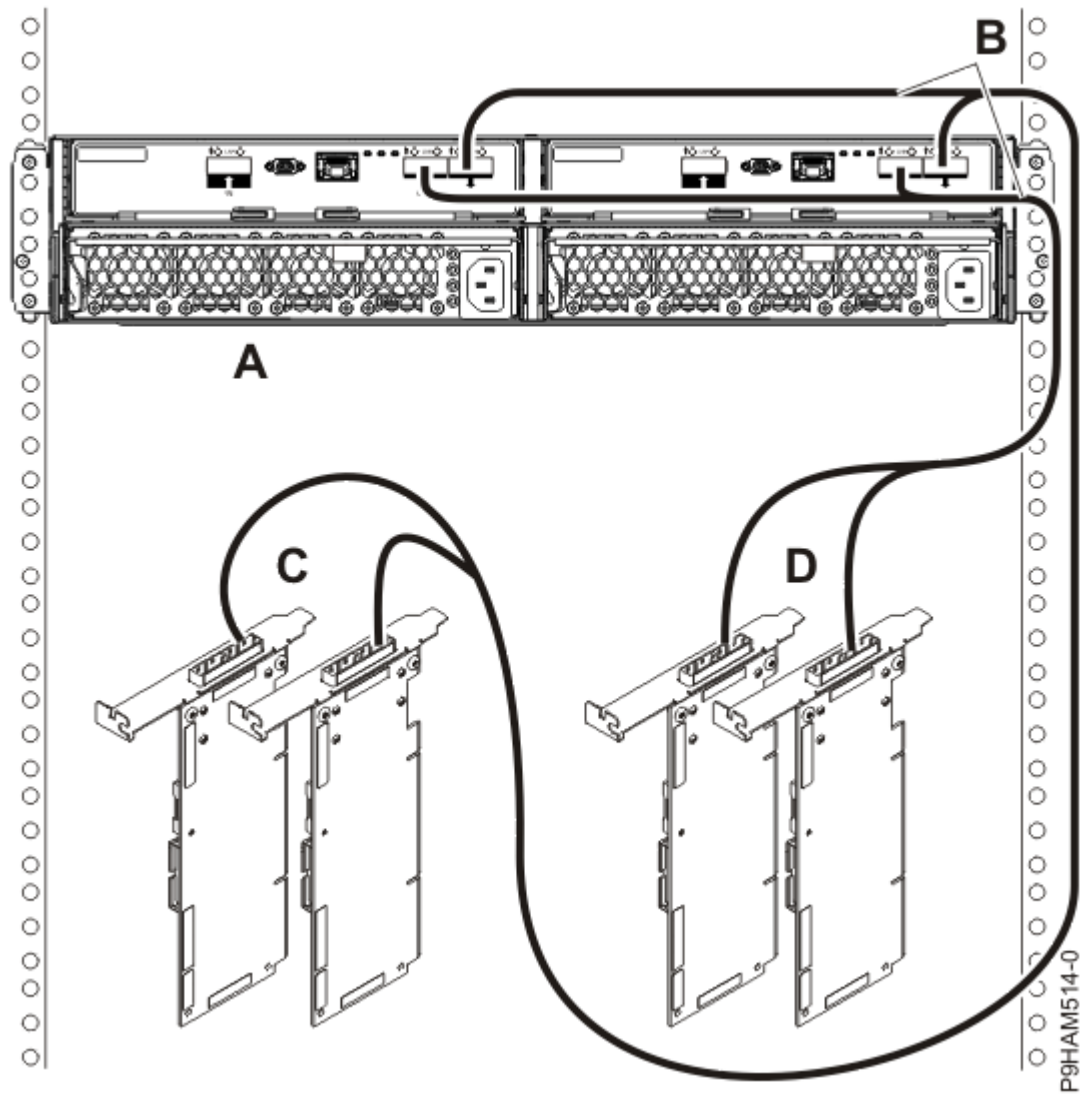


Figure 37: Mode 2 connection of a 5887 enclosure by using X cables to two SAS adapter pairs

7. Four independent SAS adapters to one 5887 enclosure by using a mode 4 connection.

- 5887 enclosure with four sets of six hard disk drives (HDDs).
- Connection using dual SAS X cables to connect to the 5887 enclosure.

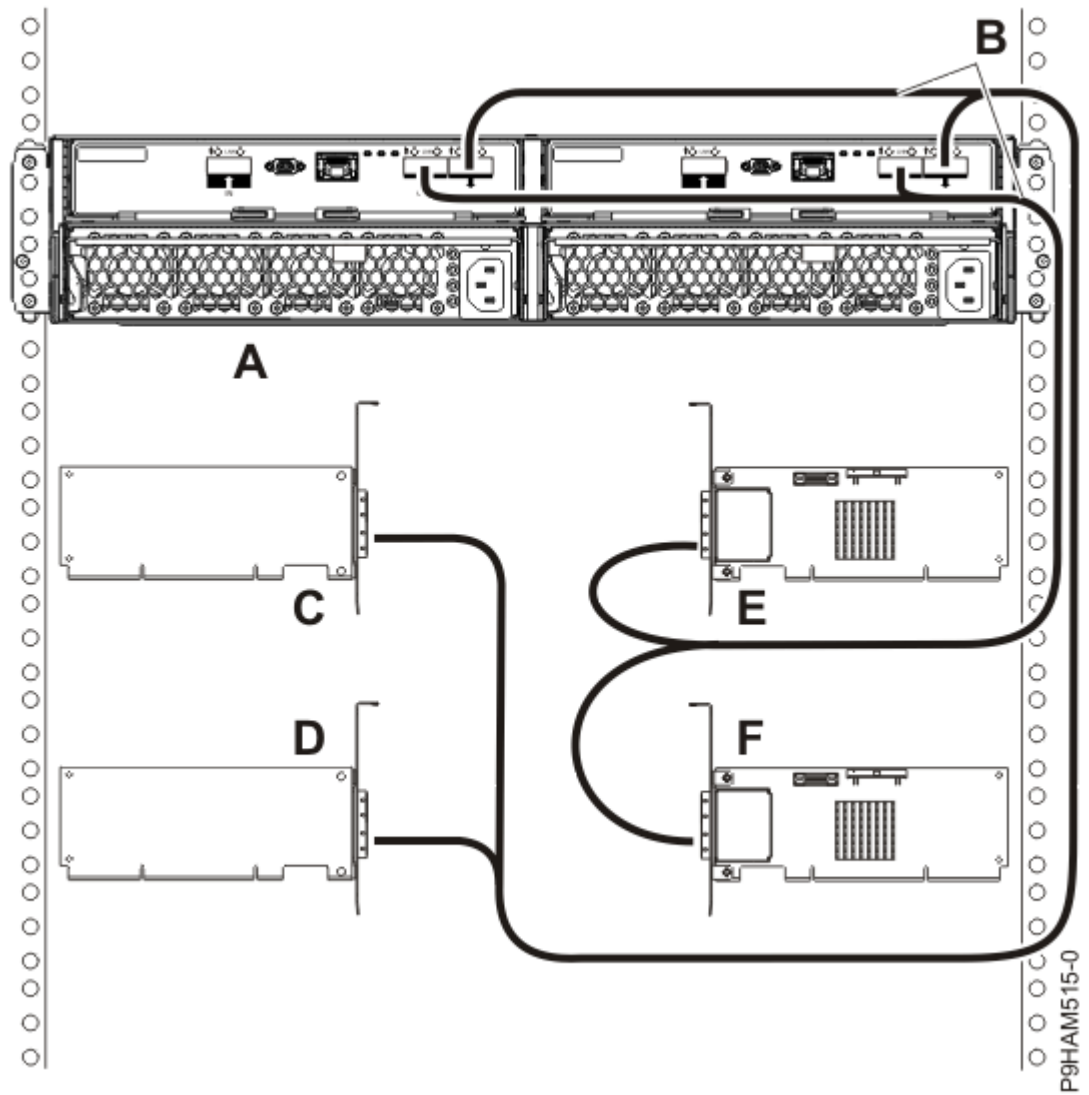


Figure 38: Mode 4 connection of one 5887 enclosure by using X cables to four independent SAS adapters

SAS cabling for the ESLL and ESLS storage enclosures

Learn about the different serial-attached SCSI (SAS) cabling configurations that are available for the ESLL and ESLS storage enclosures.

For more information about connecting ESLL and ESLS storage enclosures to the system, see [Connecting an ESLL or ESLS storage enclosure to your system](http://www.ibm.com/support/knowledgecenter/POWER9/p9eiu/p9eiu_connect_to_server.htm) (http://www.ibm.com/support/knowledgecenter/POWER9/p9eiu/p9eiu_connect_to_server.htm).

SAS adapter to the ESLL and ESLS storage enclosures

The following list describes some of the supported configurations for connecting SAS adapters to the ESLL and ESLS storage enclosures:

1. Single SAS adapter to one ESLL or ESLS storage enclosure by using a mode 1 connection.
 - Connection by using SAS Y012 cables to connect to the ESLL or ESLS storage enclosure.

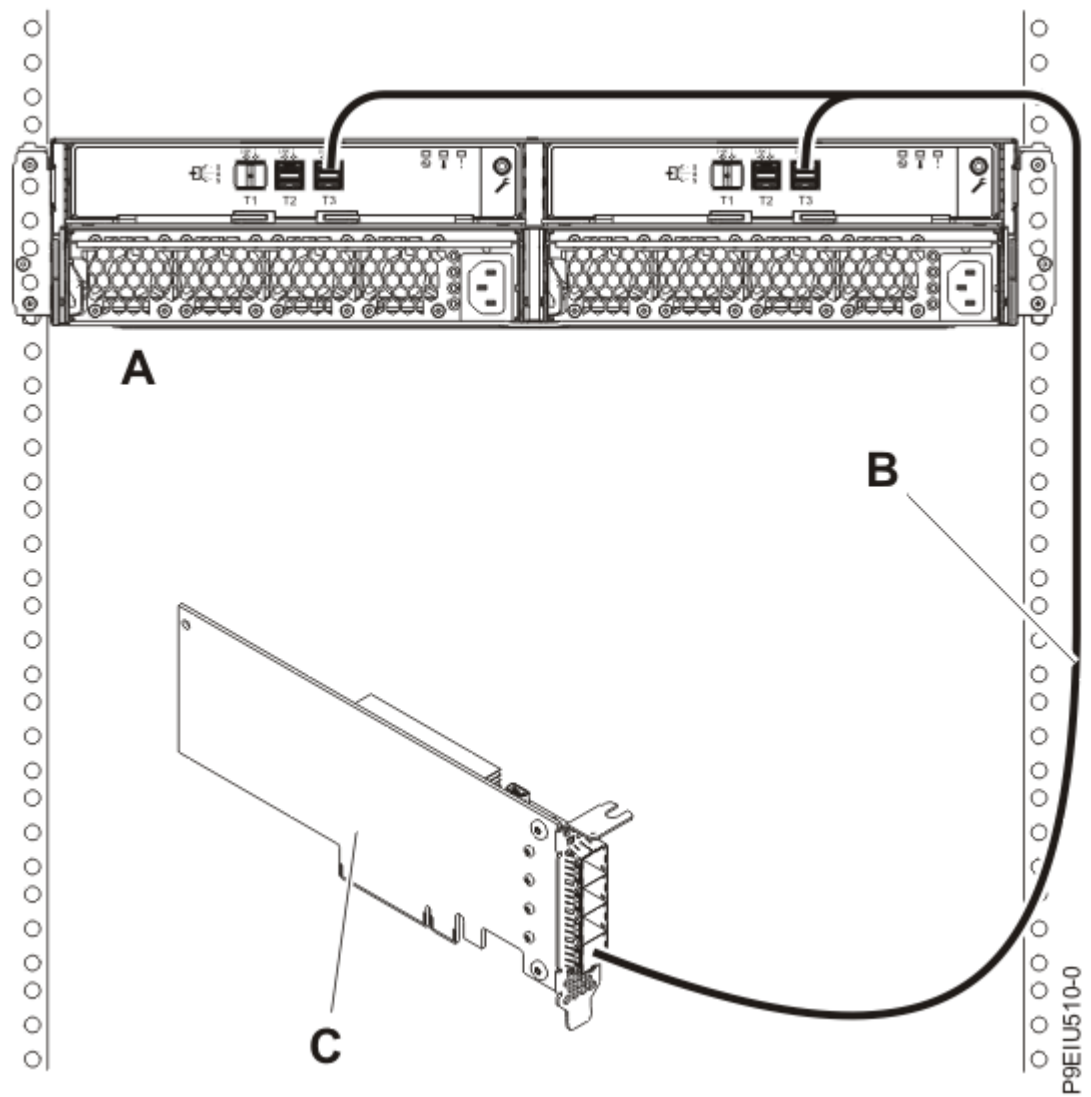


Figure 39: Mode 1 connection of one ESLL or ESLS storage enclosure by using a YO12 cable to a single SAS adapter

2. Single SAS adapter to two ESLL or ESLS storage enclosures by using a mode 1 connection.
 - Connection by using SAS YO12 cables to connect to the ESLL or ESLS storage enclosure.

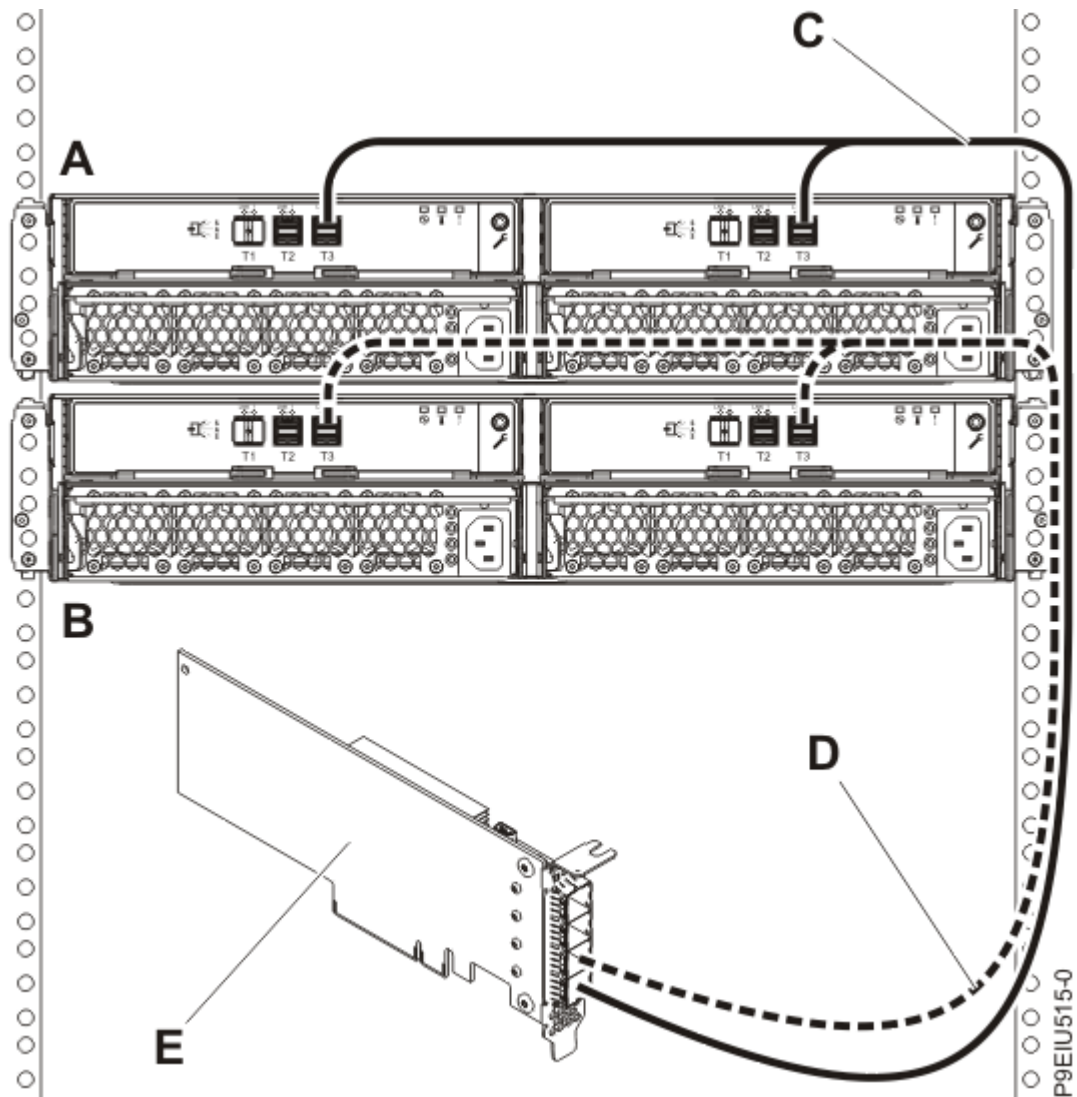


Figure 40: Mode 1 connection of two ESLL or ESLS storage enclosures by using YO12 cables to a single SAS adapter

3. One pair of SAS adapters to one ESLL or ESLS storage enclosure by using a mode 1 connection.
 - For SAS adapter pairs, you must attach the SAS cables to the same port on both adapters.
 - Connection by using SAS YO12 cables to connect to the ESLL or ESLS storage enclosure.

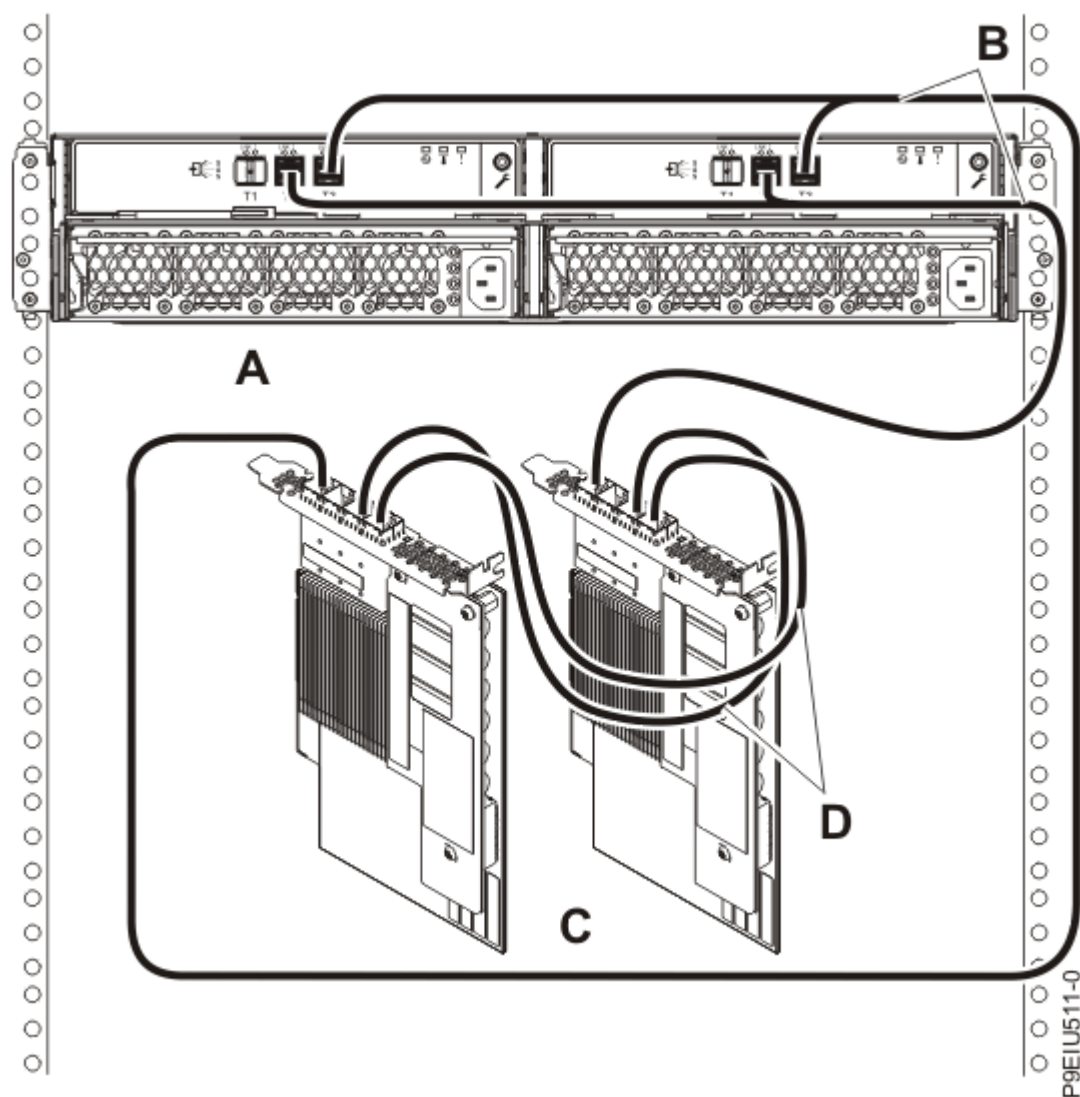


Figure 41: Mode 1 connection of one ESLL or ESLS storage enclosure by using YO12 cables to one pair of SAS adapters

4. One pair of SAS adapters to two ESLL or ESLS storage enclosures by using a mode 1 connection.
 - For SAS adapter pairs, you must attach the cables to the same port on both adapters.
 - Connection by using dual SAS YO12 cables to connect to the 5887 enclosure.

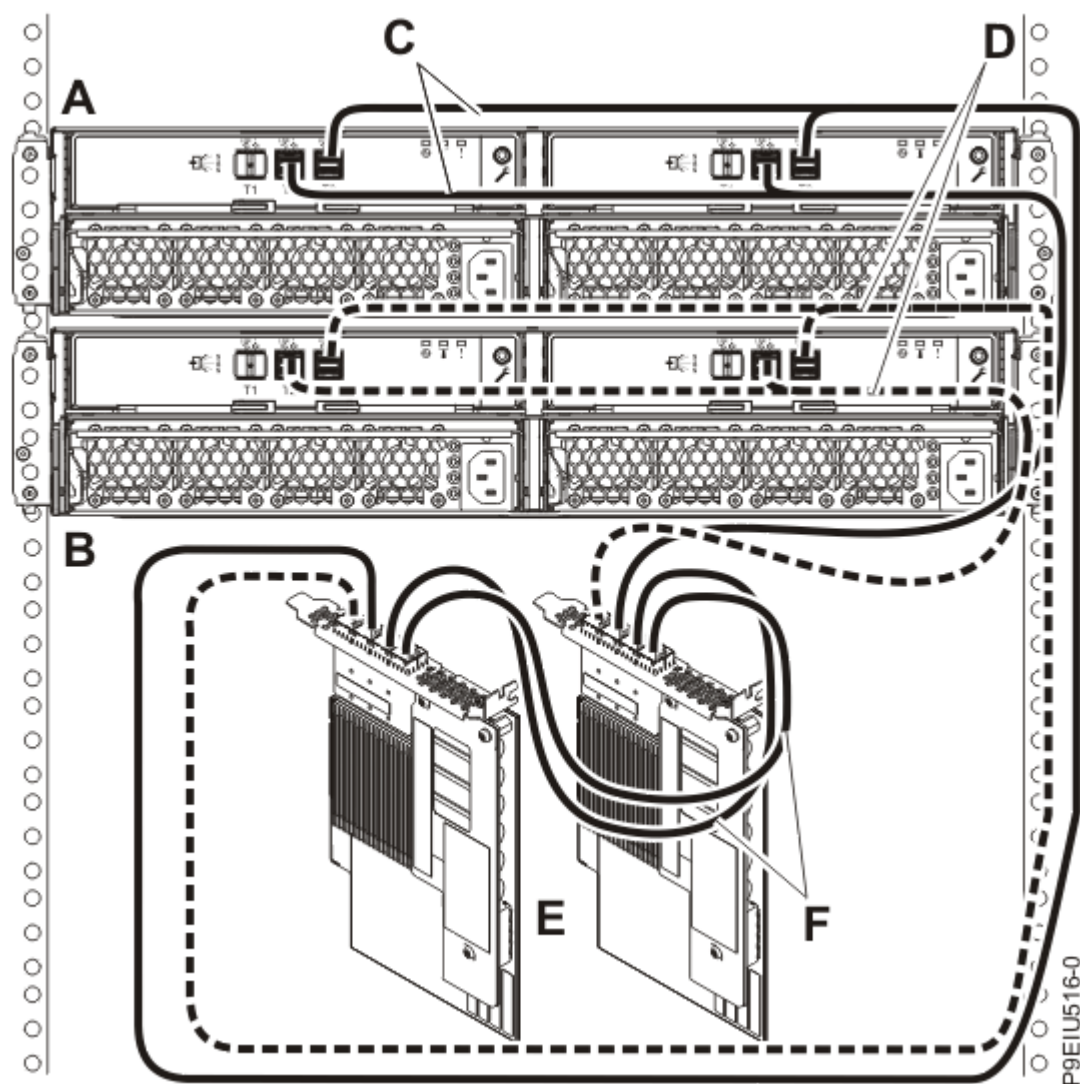


Figure 42: Mode 1 connection of two ESLL or ESLS storage enclosures by using YO12 cables to one pair of SAS adapters

5. Two independent SAS adapters to one ESLL or ESLS storage enclosure by using a mode 2 connection.
 - Connection by using two SAS YO12 cables to connect to the ESLL or ESLS storage enclosure.

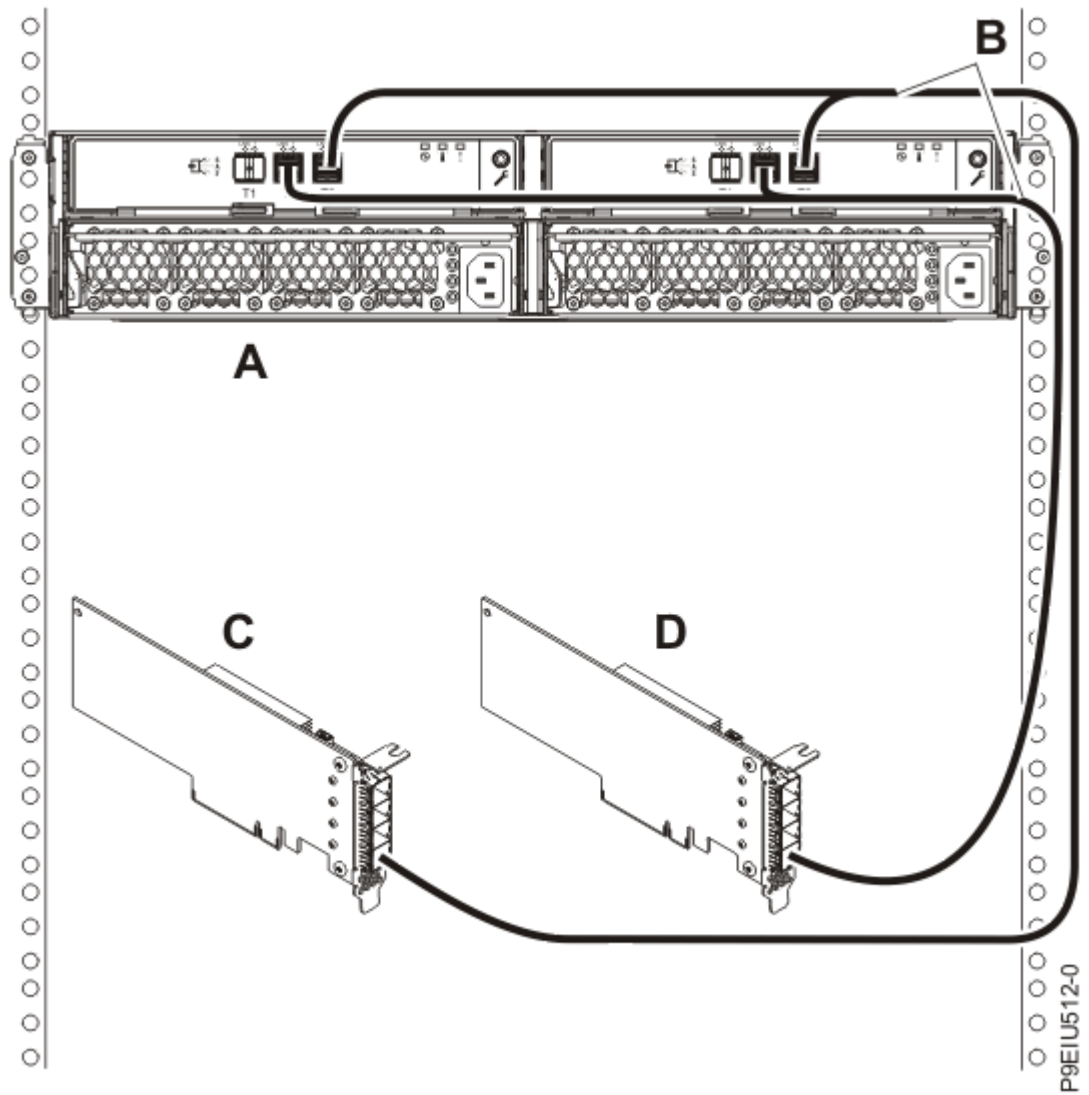


Figure 43: Mode 2 connection of ESLL or ESLS storage enclosure by using YO12 cables to two independent SAS adapters

6. Two pairs of SAS adapters to one ESLL or ESLS storage enclosure by using a mode 2 connection.
 - For SAS adapter pairs, you must attach the cables to the same port on both adapters.
 - Connection by using SAS X12 cables to connect to the ESLL or ESLS storage enclosure.

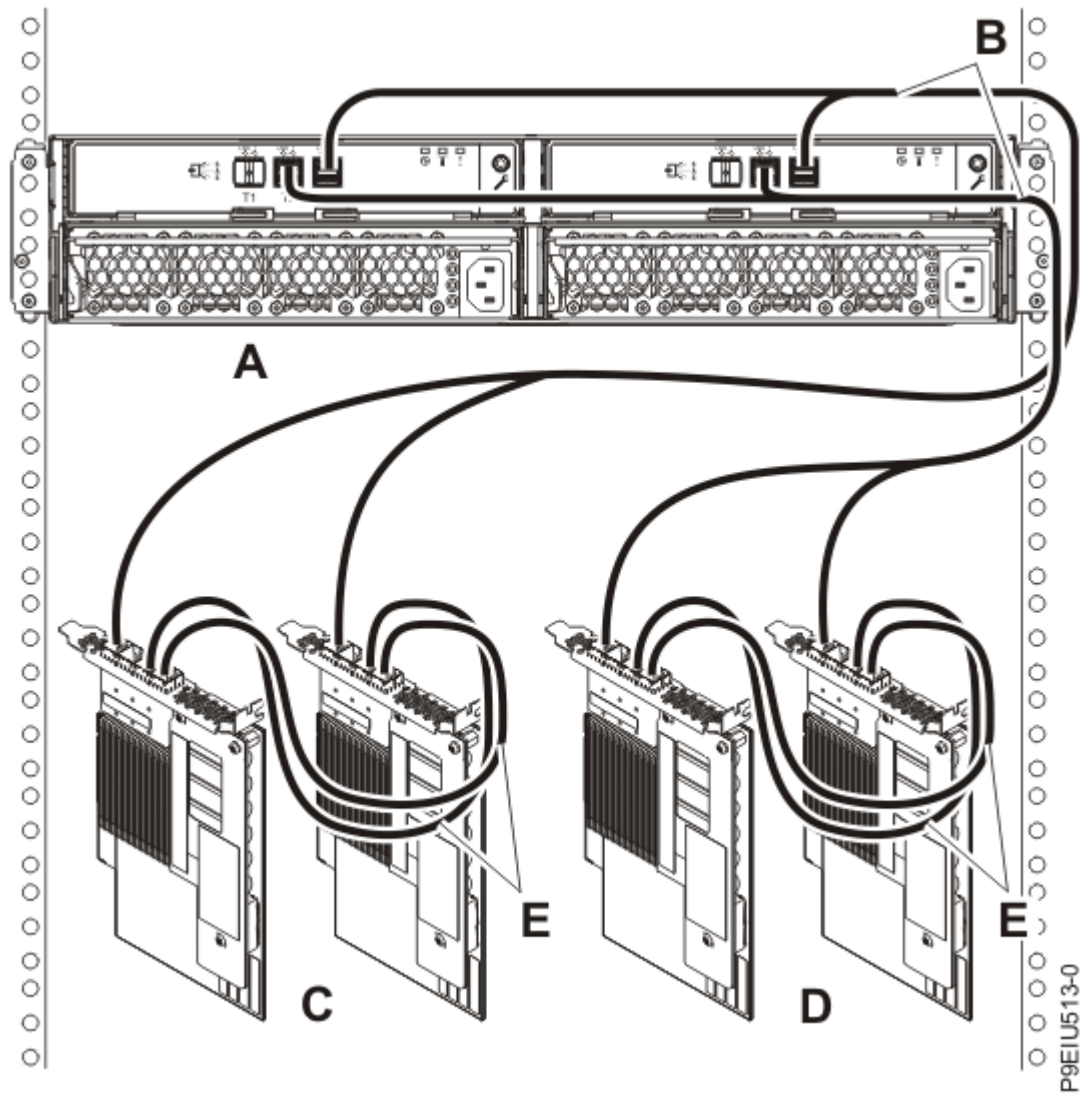


Figure 44: Mode 2 connection of one ESLL or ESLS storage enclosure by using X12 cables to two pairs of SAS adapters

7. Four independent SAS adapters to one ESLL or ESLS storage enclosure by using a mode 4 connection.
 - For SAS adapter pairs, you must attach the cables to the same port on both adapters.
 - Connection by using SAS X12 cables to connect to the ESLL or ESLS storage enclosure.

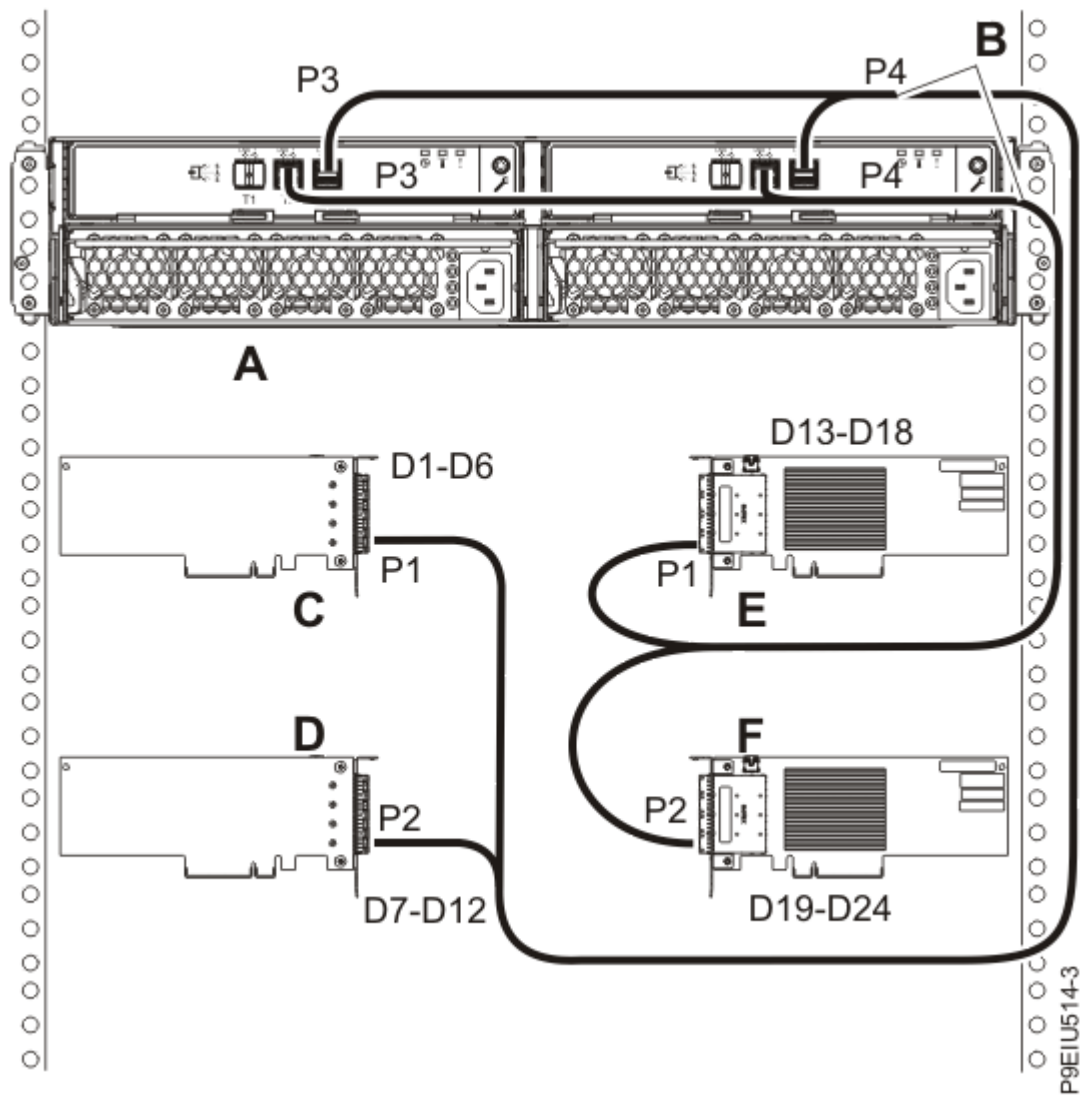


Figure 45: Mode 4 connection of one ESSL or ESLS storage enclosure by using X12 cables to four independent SAS adapters

Starting a system

Learn how to start a system after performing a service action or upgrading a system.

Starting a system that is not managed by an HMC

You can use the power button or the Advanced System Management Interface (ASMI) to start a system that is not managed by a Hardware Management Console (HMC).

Starting a system by using the control panel

You can use the power button on the control panel to start a system that is not managed by a Hardware Management Console (HMC).

Procedure

1. Open the front rack door, if necessary.
2. Before you press the power button on the control panel, ensure that power is connected to the system unit as follows:
 - All system power cables are connected to a power source.

- The power LED (**A**), as shown in the following figure, is flashing.
3. Press the power button (**A**) on the control panel, as shown in [Figure 46 on page 61](#).

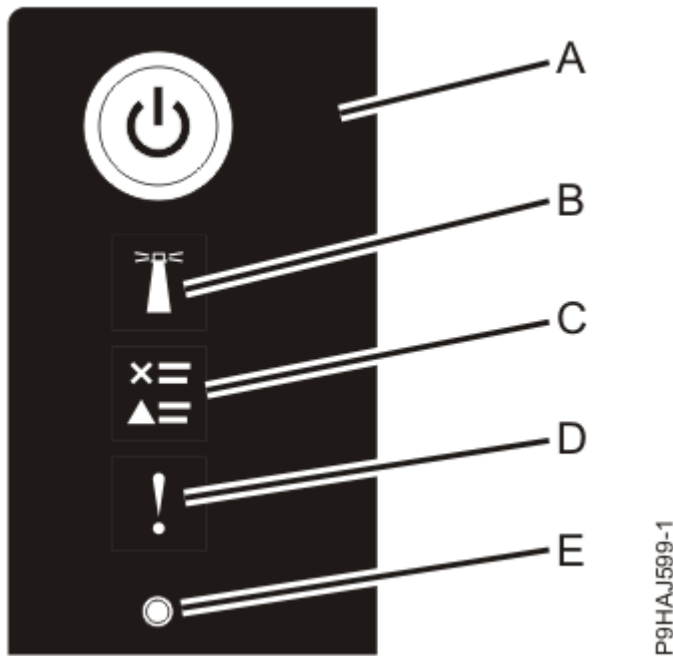


Figure 46: Control panel LEDs

4. Observe the following aspects after pressing the power button:
 - A constant green light indicates full system power to the unit.
 - A flashing green light indicates standby power to the unit.
 - After the power-on button is pressed, the system takes approximately 30-seconds for the power LED to change from flashing to solid. During the transition period, the LED might flash faster.
5. Choose from the following options:
 - If your partitions does start, this ends the procedure.
 - If your partitions does not start, continue with step “6” on page 61.
6. On the ASMI Welcome pane, specify your user ID and password, and click **Log In**.
7. In the navigation area, click **Power/Restart Control > Power On/Off System**.
8. Click **Save settings and continue system server firmware boot**.

Starting a system by using the ASMI

You can use the Advanced System Management Interface (ASMI) to start a system that is not managed by a Hardware Management Console (HMC).

Procedure

1. On the ASMI Welcome pane, specify your user ID and password, and click **Log In**.
2. In the navigation area, click **Power/Restart Control > Power On/Off System**.
The power state of the system is displayed.
3. Specify the settings as required and click **Save setting and power on**.
Choose from the following options:
 - If the Server firmware start policy is set to **Running (Auto-Start Always)**, your partitions start. This ends the procedure.

- If the **Server firmware start policy** is set to **Standby (User-Initiated)** or **Auto-Start (Automatic Restarts Only)**, the system begins to power on, but your partitions do not automatically start. Continue with step “4” on page 62.
4. Wait for the system to power on.
 5. In the navigation area, click **Power/Restart Control > Power On/Off System**.
The system power setting is displayed. The **Current system server firmware state** should now be at **Standby**.
 6. Click **Save settings** and continue with the system server firmware boot operation to start the partitions.

Starting a system or logical partition by using the HMC

You can use the Hardware Management Console (HMC) to start the system or logical partition after the required cables are installed and the power cables are connected to a power source.

Procedure

- To power on the managed system, complete the following steps:



- a) In the navigation area, click the **Resources** icon, and then click **All Systems**.
- b) Select the system that you want to power on.
- c) In the content pane, click **Actions > View All Actions > Power On**.
- d) Click **Finish**.

- To activate a logical partition, complete the following steps:



- a) In the navigation area, click the **Resources** icon, and then click **All Partitions**.
- b) Click the logical partition name that you want to activate.
- c) In the navigation area, click **Partition Actions > Operations > Activate**.
- d) Click **Finish**.

- To activate a logical partition for a specific system, complete the following steps:



- a) In the navigation area, click the **Resources** icon, and then click **All Systems**.
- b) Click the system name in which you want to activate the logical partition.
- c) Select logical partitions that you want to activate.
- d) In the content pane, click **Actions > Activate**.
- e) Click **Finish**.

- To verify that the logical partition start policy is set to **User-Initiated**, complete the following steps:



- a) In the navigation area, click the **Resources** icon, and then click **All Systems**.
- b) Click the system name to view details.
- c) In the navigation area, click **Properties > Other Properties**.
- d) Click the **Power-On Parameters** tab.

Ensure that the **Partition start policy** field is set to **User-Initiated**.

Stopping a system

Learn how to stop a system as a part of a system upgrade or service action.

About this task



Attention: Using either the power-on button on the control panel or entering commands at the Hardware Management Console (HMC) to stop the system can cause unpredictable results in data files. Also, the next time you start the system, it might take longer if all applications are not ended before stopping the system.

Stopping a system that is not managed by an HMC

You might need to stop the system to complete another task. If your system is not managed by the Hardware Management Console (HMC), use these instructions to stop the system by using the power button or the Advanced System Management Interface (ASMI).

Before you begin

Before you stop the system, follow these steps:

1. Ensure that all jobs are completed and end all applications.
2. If a Virtual I/O Server (VIOS) logical partition is running, ensure that all clients are shut down or that the clients have access to their devices by using an alternative method.

Stopping a system by using the control panel

You might need to stop the system to complete another task. If your system is not managed by the Hardware Management Console (HMC), use the instructions in this topic to stop the system by using the power button.

Procedure

1. Log in to the host partition as a user with the authority to run the shutdown or pwrldwnsys (Power Down System) command.
2. On the command line, enter one of the following commands:
 - If your system is running the AIX® operating system, type shutdown.
 - If your system is running the Linux operating system, type shutdown -h now.
 - If your system is running the IBM i operating system, type PWRDWN SYS. If your system is partitioned, use the PWRDWN SYS command to power off each of the secondary partitions. Then, use the PWRDWN SYS command to power off the primary partition.

The command stops the operating system. Choose from the following options:

- If the system power turns off, the power-on light begins to slowly flash, and the system goes into a standby state, continue with step [“5” on page 64](#).
 - If your system does not power off when the last partition powers off, continue with step [“3” on page 63](#).
3. Open the front rack door, if necessary.
 4. Hold the power button **(A)** on the control panel, as shown in the following figure. The control panel shows a countdown from 4 to 0. After the countdown is complete, release the power button.

The system power turns off, the power-on light begins to slowly flash, and the system goes into a standby state.

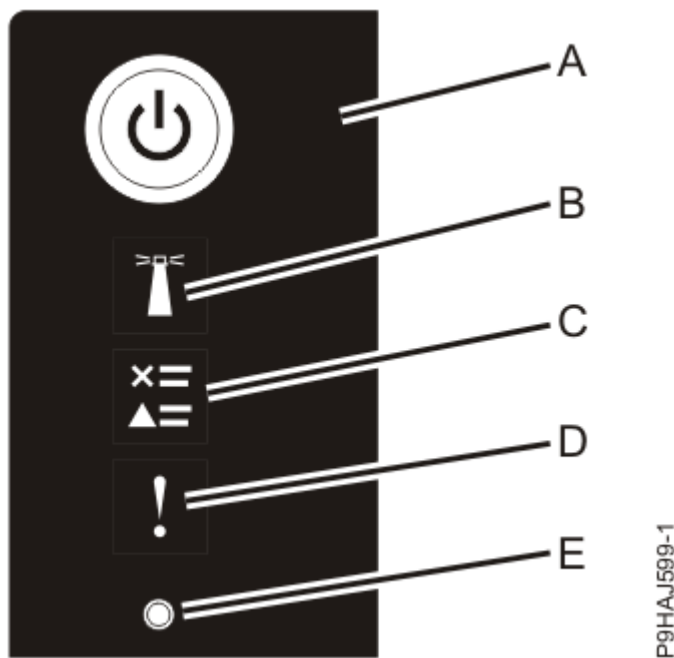


Figure 47: Control panel LEDs

5. Record the IPL type and the IPL mode from the control panel display to help you return the system to this state when the installation or replacement procedure is completed.
6. Set the power switches of any devices that are connected to the system to off.

Stopping a system by using the ASMI

You might need to stop the system to complete another task. If your system is not managed by the Hardware Management Console (HMC), use these instructions to stop the system by using the Advanced System Management Interface (ASMI).

Procedure

1. Log in to the host partition as a user with the authority to run the shutdown or `pwdwnsys` (Power Down System) command.
2. On the command line, enter one of the following commands:
 - If your system is running the AIX operating system, type `shutdown`.
 - If your system is running the Linux operating system, type `shutdown -h now`.
 - If your system is running the IBM i operating system, type `PWRDWN SYS`. If your system is partitioned, use the `PWRDWN SYS` command to power off each of the secondary partitions. Then, use the `PWRDWN SYS` command to power off the primary partition.

The command stops the operating system. Choose from the following options:

- If the system power turns off, the power-on light begins to slowly flash, and the system goes into a standby state, continue with step “5” on page 64.
 - If your system does not power off when the last partition powers off, continue with step “3” on page 64.
3. On the ASMI Welcome pane, specify your user ID and password, and click **Log In**.
 4. In the navigation area, click **Power/Restart Control > Power On/Off System**.
The system power setting is displayed.
 5. Specify the settings as required and click **Save settings and power off**.
The system power turns off, the power-on light begins to slowly flash, and the system goes into a standby state.

6. Set the power switches of any devices that are connected to the system to off.

Stopping a system by using the HMC

You can use the Hardware Management Console (HMC) to stop the system or logical partition.

About this task

By default, the managed system is set to power off automatically when you shut down the last running logical partition on the managed system. If you set the managed system properties on the HMC such that the managed system does not power off automatically, you must use this procedure to power off your managed system.



Attention: Ensure that you shut down the running logical partitions on the managed system before you power off the managed system. Powering off the managed system without shutting down the logical partitions first causes the logical partitions to shut down abnormally and can cause data loss. If you use a Virtual I/O Server (VIOS) logical partition, ensure that all clients are shut down or that the clients have access to their devices by using an alternative method.

To power off a managed system, you must be a member of one of the following roles:

- Super administrator
- Service representative
- Operator
- Product engineer

Note: If you are a product engineer, verify that the customer has shut down all active partitions and has powered off the managed system. Continue with the procedure only after the status of the server changes to **Power Off**.

Procedure

1. You must shut down all the active logical partitions before powering off the system. To shut down logical partitions for a specific system, complete the following steps:



- a) In the navigation area, click the **Resources** icon, and then click **All Systems**.
- b) Click the system name for which you want to shut down partitions.
- c) Select the logical partitions that you want to shut down.
- d) In the content pane, click **Actions > Shutdown**.
- e) Click **Finish**.

2. To power off the system, complete the following steps:



- a) In the navigation area, click the **Resources** icon, and then click **All Systems**.
- b) Select the system that you want to power off.
- c) In the content pane, click **Actions > View All Actions > Power Off**.
- d) Click **Finish**.

Connector locations

Learn about connector locations for enclosures and expansion units and servers.

Connector locations for the EMX0 PCIe3 expansion drawer

Learn about connector locations for the EMX0 PCIe3 expansion drawer.

The EMX0 PCIe3 expansion drawer is connected to the host system from the PCIe3 cable adapter on the server to the PCIe3 6-slot fanout module on the EMX0 PCIe3 expansion drawer.

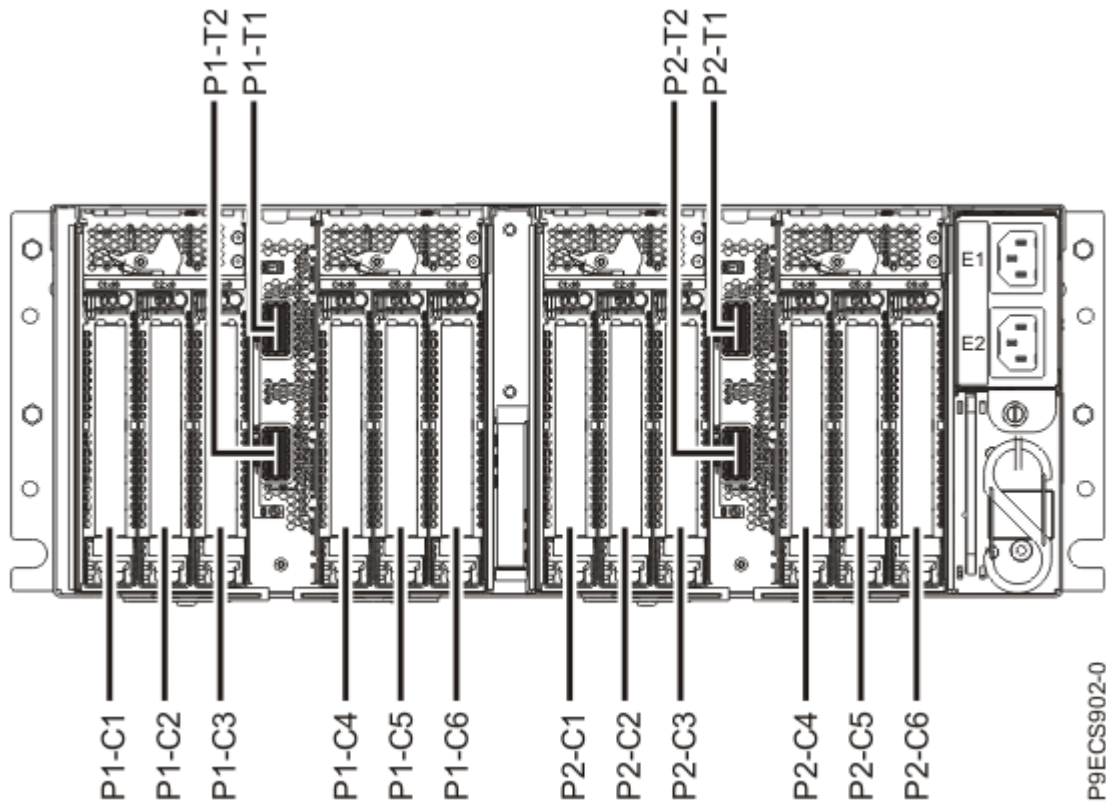


Figure 48: EMX0 PCIe3 expansion drawer showing the left and right PCIe3 6-slot fanout module and top (T1) and bottom (T2) expansion drawer cable connectors

For more information about the EMX0 PCIe3 expansion drawer locations, see [EMX0 PCIe3 expansion drawer locations](http://www.ibm.com/support/knowledgecenter/POWER9/p9ecs/p9ecs_emx0_loccodes.htm) (http://www.ibm.com/support/knowledgecenter/POWER9/p9ecs/p9ecs_emx0_loccodes.htm).

For more information about the server locations, see [Part locations and location codes](http://www.ibm.com/support/knowledgecenter/POWER9/p9ecs/p9ecs_locations.htm) (http://www.ibm.com/support/knowledgecenter/POWER9/p9ecs/p9ecs_locations.htm).

Connector locations for POWER9 servers

Learn about connector locations for POWER9 servers.

Connector locations for the 9008-22L, 9009-22A, and 9223-22H systems

Learn about connector locations for the 9008-22L, 9009-22A, and 9223-22H systems.

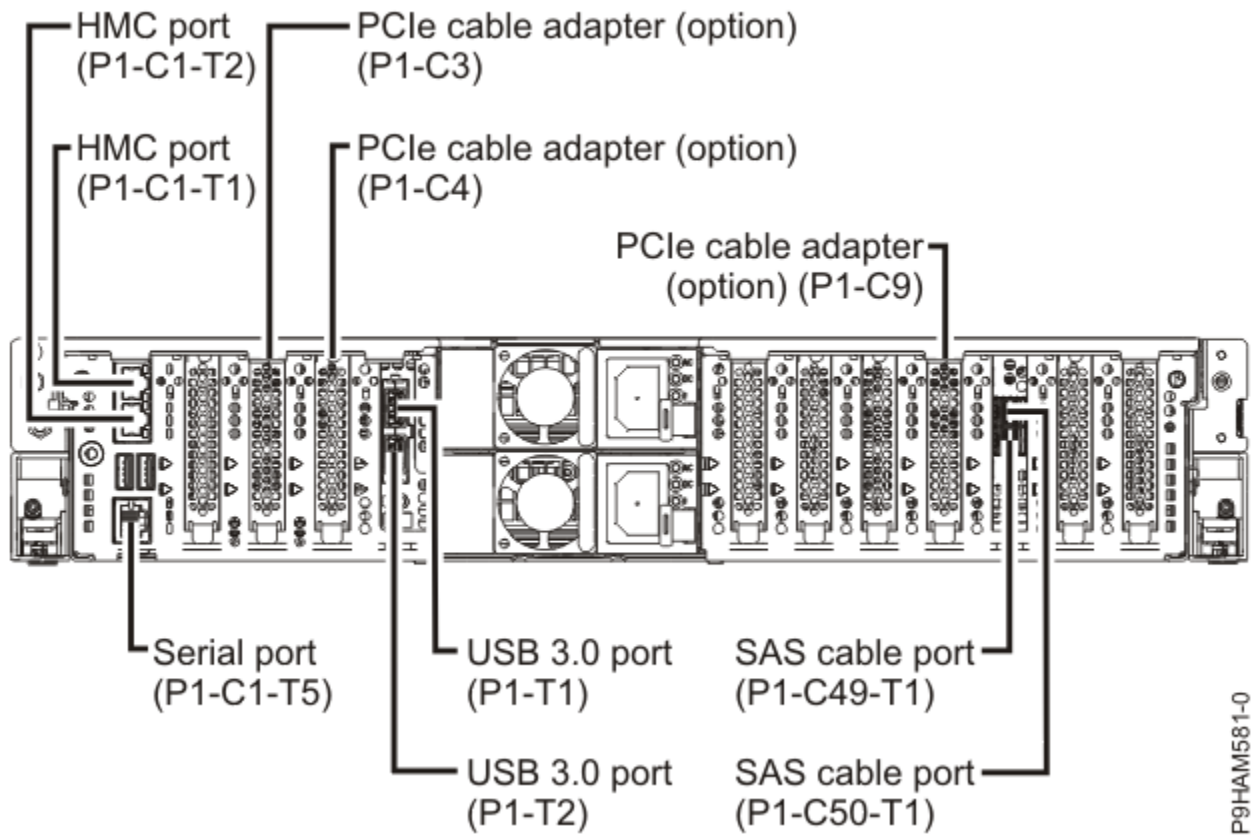


Figure 49: Connector locations for the 9008-22L, 9009-22A, and 9223-22H systems

Connector locations for the 9009-41A, 9009-42A, and 9223-42H systems

Learn about connector locations for the 9009-41A, 9009-42A, and 9223-42H systems.

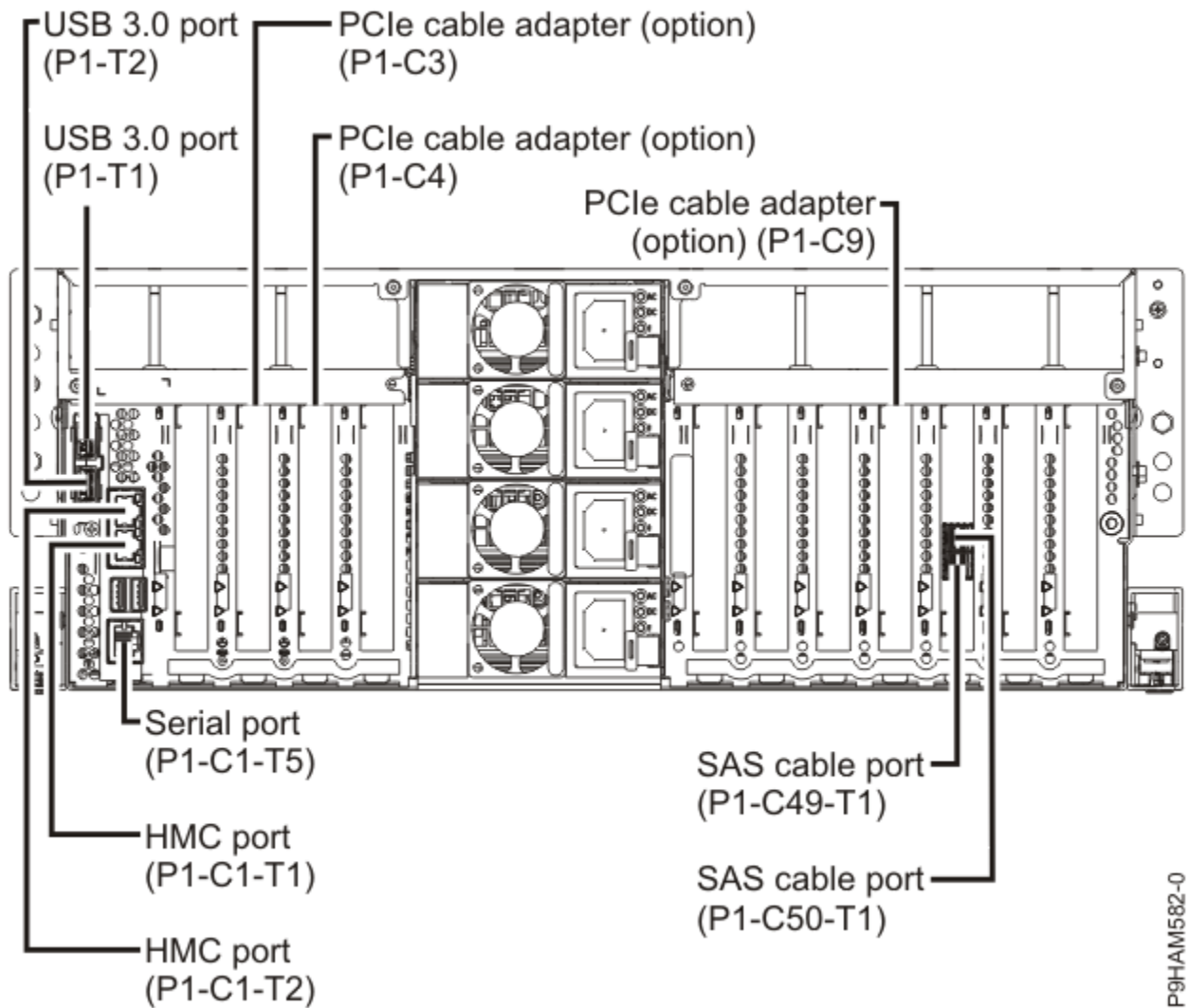


Figure 50: Connector locations for 9009-41A, 9009-42A, and 9223-42H systems

Connector locations for the 9040-MR9 systems

Learn about connector locations for the 9040-MR9 systems.

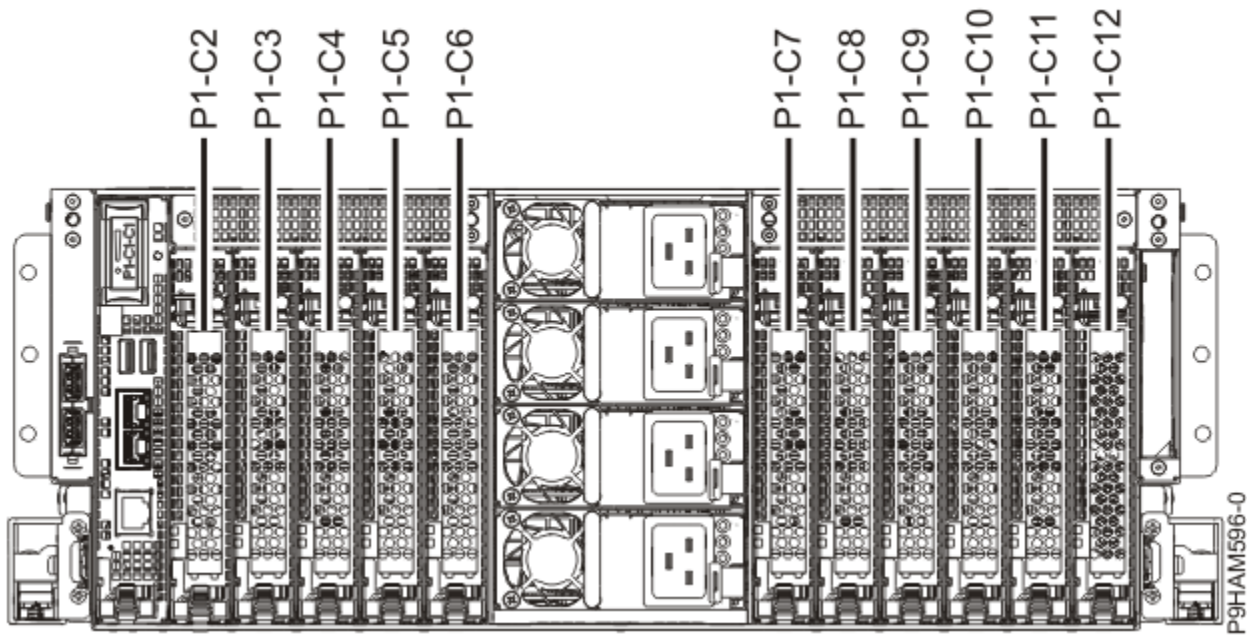


Figure 51: Rear view of the 9040-MR9 system

Table 5 on page 69 shows the slots that must be used to install a SAS RAID controller in the 9040-MR9 system for controlling the internal SAS disk drive bays.

Table 5: SAS RAID controller slots for the 9040-MR9 system.	
SAS RAID controller	Slot
PCIe3 SAS RAID quad-port 6 Gb x8, low-profile capable adapter (FC EJ0K; CCIN 57B4)	P1-C12
PCIe3 SAS RAID quad-port 6 Gb x8, low-profile capable adapter (two FC EJ0K; two CCIN 57B4)	P1-C9 and P1-C12
Note: The C9 and C12 slots are used for controlling the internal SAS disk drive bays and have limited availability for attaching a 5887 disk drive enclosure or an ESLL or ESLS storage enclosure.	

For more information about FC EJ0K, see PCIe3 RAID SAS quad-port 6 Gb adapter (FC EJ0K; CCIN 57B4) (<http://www.ibm.com/support/knowledgecenter/POWER9/p9hcd/fcej0k.htm>).

Table 6 on page 69 shows the slot priorities for the FC EJ0K adapter in the 9040-MR9 system.

Table 6: Slot priorities for the FC EJ0K.					
Feature code	Description	Slot priorities for two processors	Slot priorities for three processors	Slot priorities for four processors	Maximum number of adapters supported
EJ0K	PCIe3 SAS RAID quad-port 6 Gb x8, low-profile capable adapter (FC EJ0K; CCIN 57B4)	12, 9, 11, 8, 10, 7	12, 9, 11, 8, 5, 10, 7, 4	12, 9, 11, 8, 5, 3, 10, 7, 4, 2	6/8/10

Table 6: Slot priorities for the FC EJ0K. (continued)

Feature code	Description	Slot priorities for two processors	Slot priorities for three processors	Slot priorities for four processors	Maximum number of adapters supported
Note: The C9 and C12 slots are used for controlling the internal disk drive bays and have limited availability for attaching a 5887 disk drive enclosure or an ESLL or ESLS storage enclosure.					

Table 7 on page 70 shows the PCIe3 cable adapter slots and priorities for the 9040-MR9 system. The PCIe3 cable adapter is used to connect your system to the PCIe3 6-slot fanout module in your EMX0 PCIe Gen3 I/O expansion drawer.

Table 7: PCIe3 cable adapter slots and priorities

Feature code	Description	Slot priorities for two processors	Slot priorities for three processors	Slot priorities for four processors	Maximum number of adapters supported
EJ08	PCIe to optical CXP converter adapter (FC EJ08; CCIN 2CE2); Adapter part number: 041T9901	11, 8 10, 7	11, 8, 5, 10, 7, 4	11, 8, 5, 3, 10, 7, 4, 2	4/6/8

Connector locations for the 9080-M9S systems

Learn about connector locations for the 9080-M9S systems.

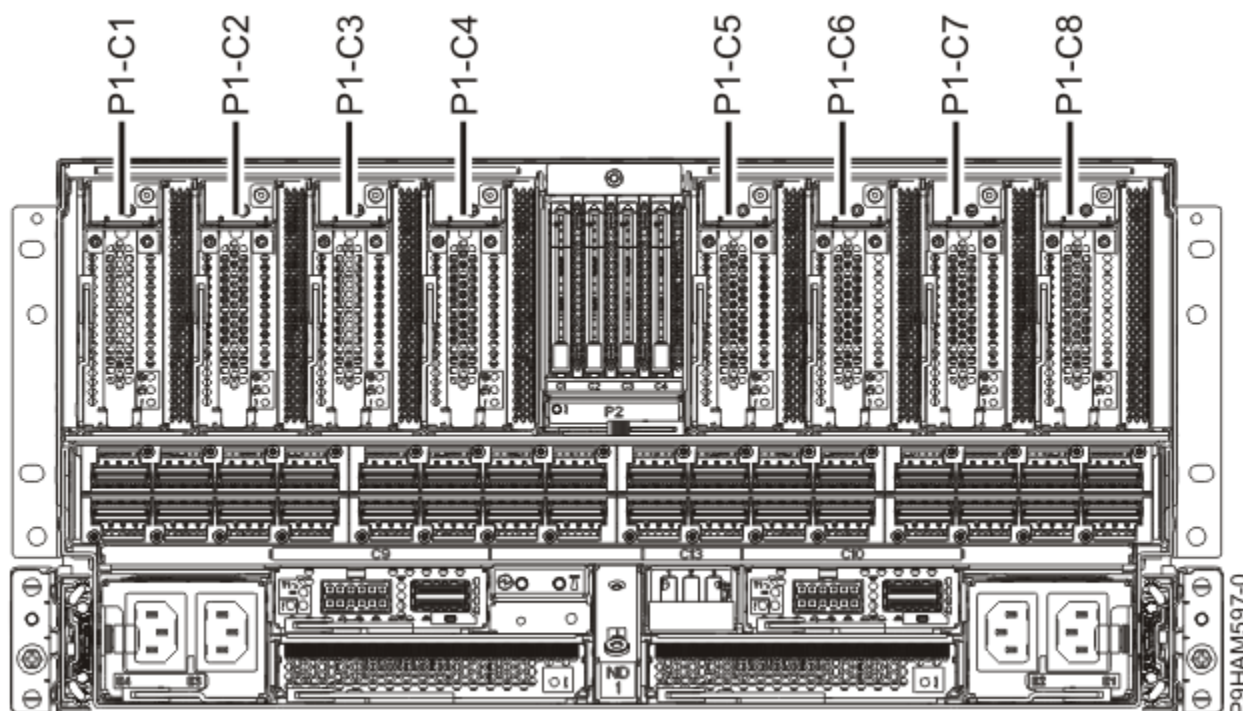


Figure 52: Rear view of the 9080-M9S system

Table 8 on page 71 shows the slot priorities for the FC EJ0K adapter in the 9080-M9S system.

<i>Table 8: Slot priorities for the FC EJ0M and EJ14</i>			
Feature code	Description	Slot priorities	Node max
EJ0M	PCIe3 SAS RAID quad-port 6 Gb LP adapter (FC EJ0M and FC EL3B; CCIN 57B4); Adapter part number: 000MH910	2, 4, 6, 3, 5, 7, 1, 8	8
EJ14	PCIe3 12 GB Cache RAID PLUS SAS adapter quad-port 6 Gb x8 (FC EJ14; CCIN 57B1); Adapter part number 01DH742	1, 3, 5, 7, 2, 4, 6, 8	8

Table 9 on page 71 shows the PCIe cable adapter slots and priorities for the 9080-M9S system.

<i>Table 9: PCIe3 cable adapter slots and priorities</i>			
Feature code	Description	Slot priorities	Node max
EJ07	PCIe3 cable adapter for the PCIe3 expansion drawer (FC EJ07; CCIN 6B52); Adapter part number: 00TK704	1, 7, 3, 5, 2, 8, 4, 6	8

Connector locations for POWER8 servers

Learn about connector locations for POWER8 servers.

Connector locations for the 8247-21L, 8247-22L, 8284-21A, and 8284-22A systems

Learn about connector locations for the 8247-21L, 8247-22L, 8284-21A, and 8284-22A systems.

The expanded function 8247-21L, 8247-22L, 8284-21A, and 8284-22A servers provide cable connector locations via a SAS port for disk drive enclosures.

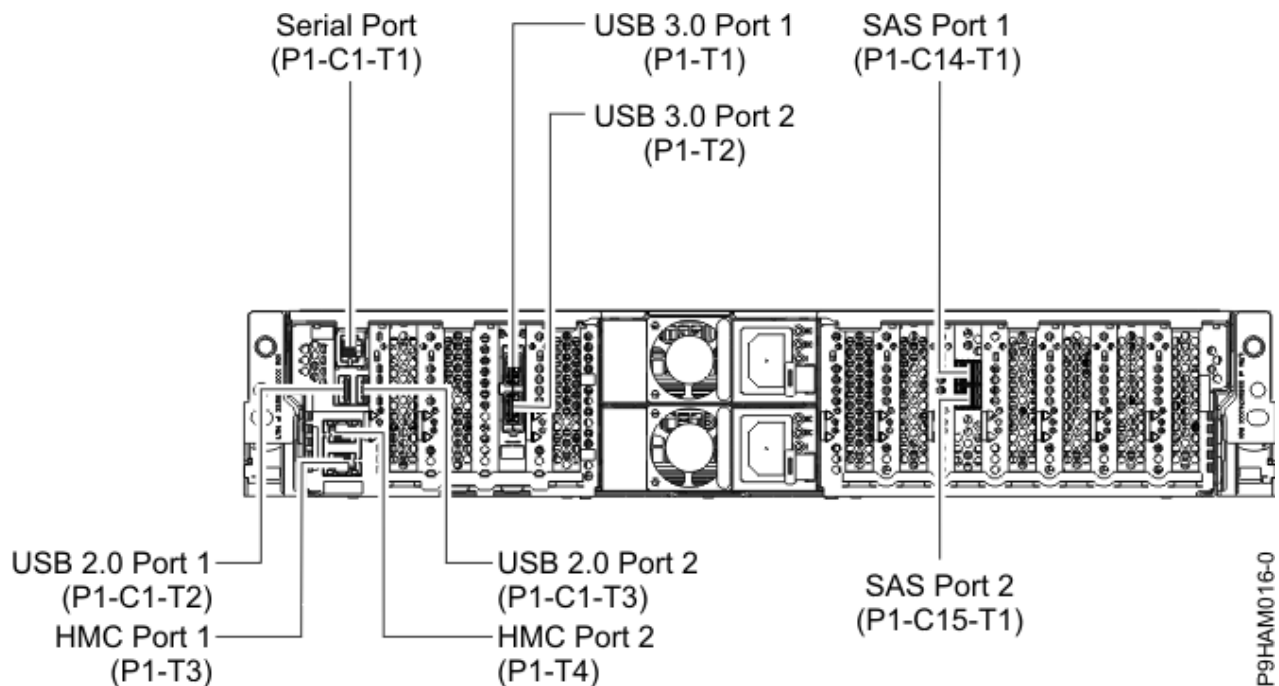


Figure 53: Connector locations for the expanded function 8247-21L, 8247-22L, 8284-21A, and 8284-22A systems

Connector locations for the 8286-41A system

Learn about connector locations for the 8286-41A rack-mounted and stand-alone models.

The 8286-41A server provides cable connector locations via a SAS port for disk drive enclosures.

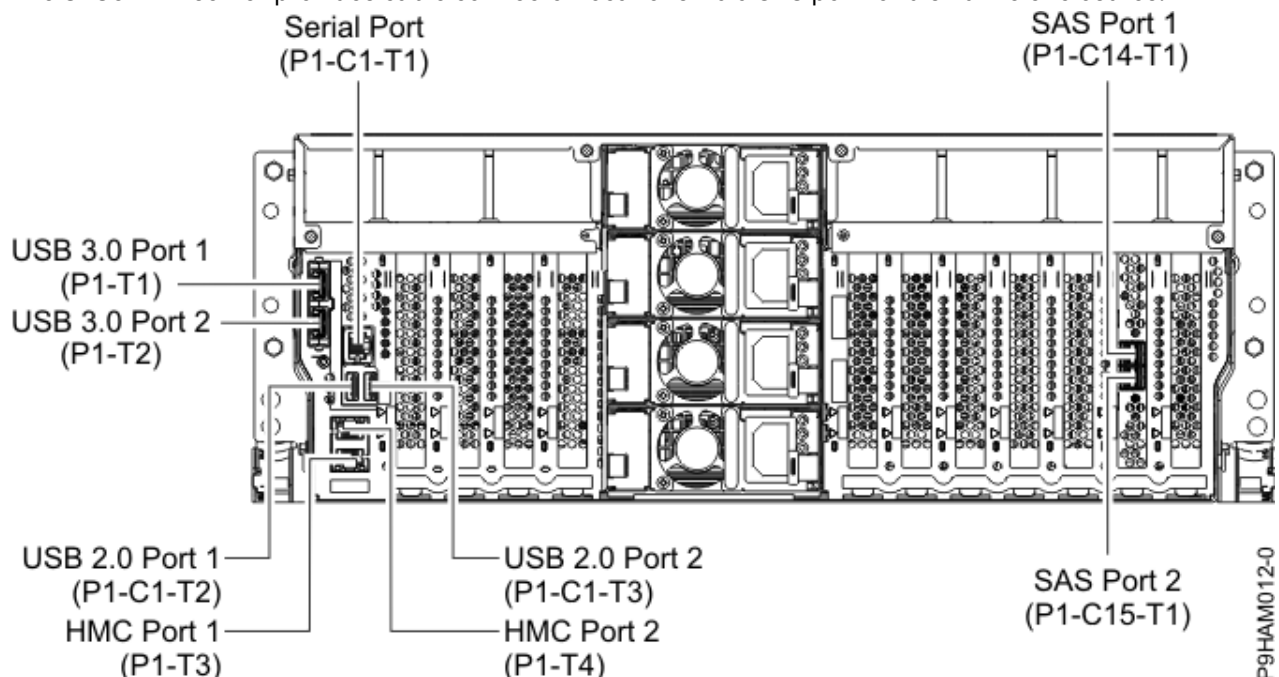


Figure 54: Connector locations for the rack-mounted 8286-41A (expanded function) system

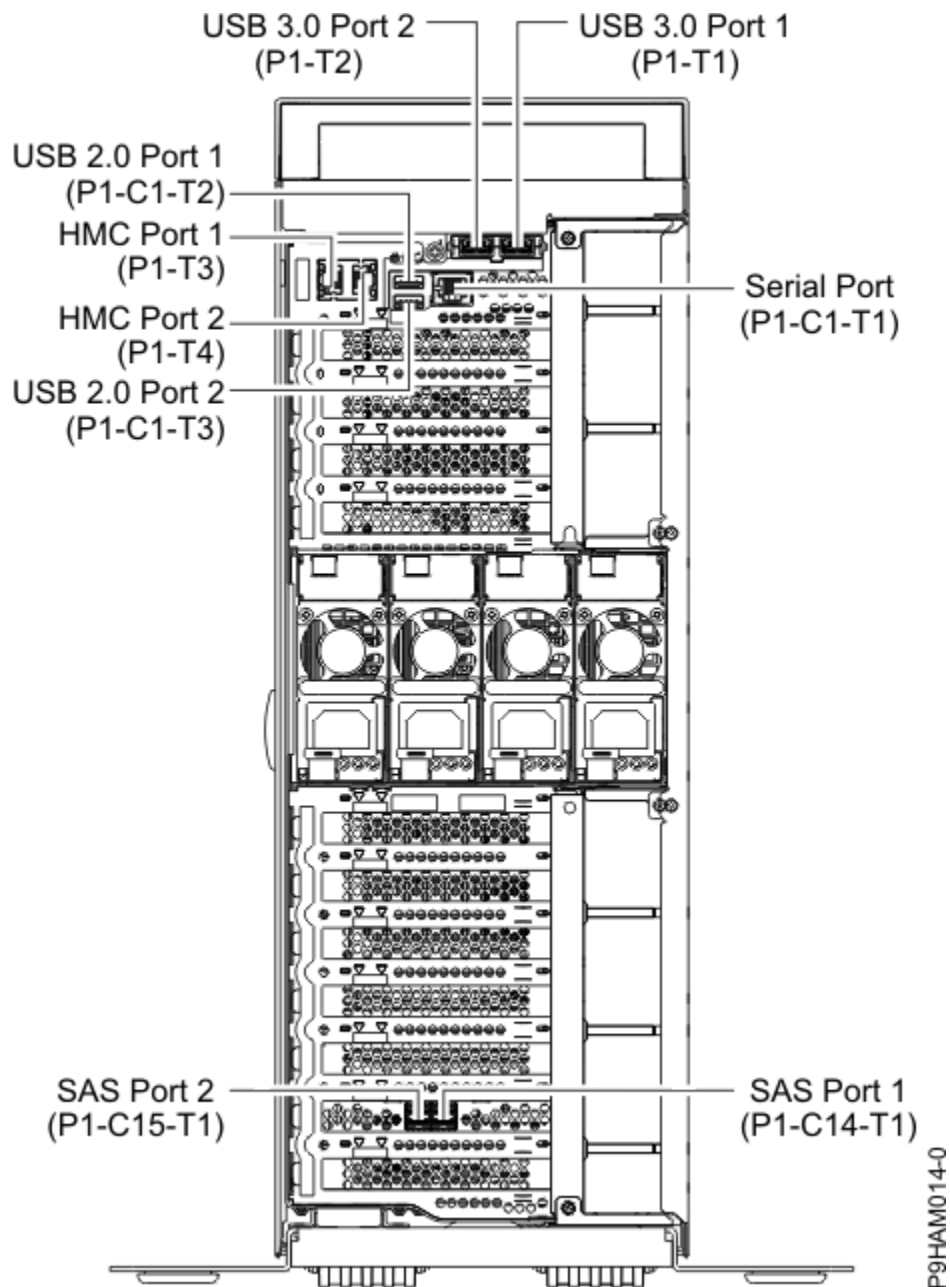


Figure 55: Connector locations for the stand-alone 8286-41A (expanded function) system

Connector locations for the 8247-42L and 8286-42A systems

Learn about connector locations for the 8247-42L and 8286-42A rack-mounted models.

The 8247-42L and 8286-42A (expanded function) servers provide cable connector locations via a SAS port for disk drive enclosures.

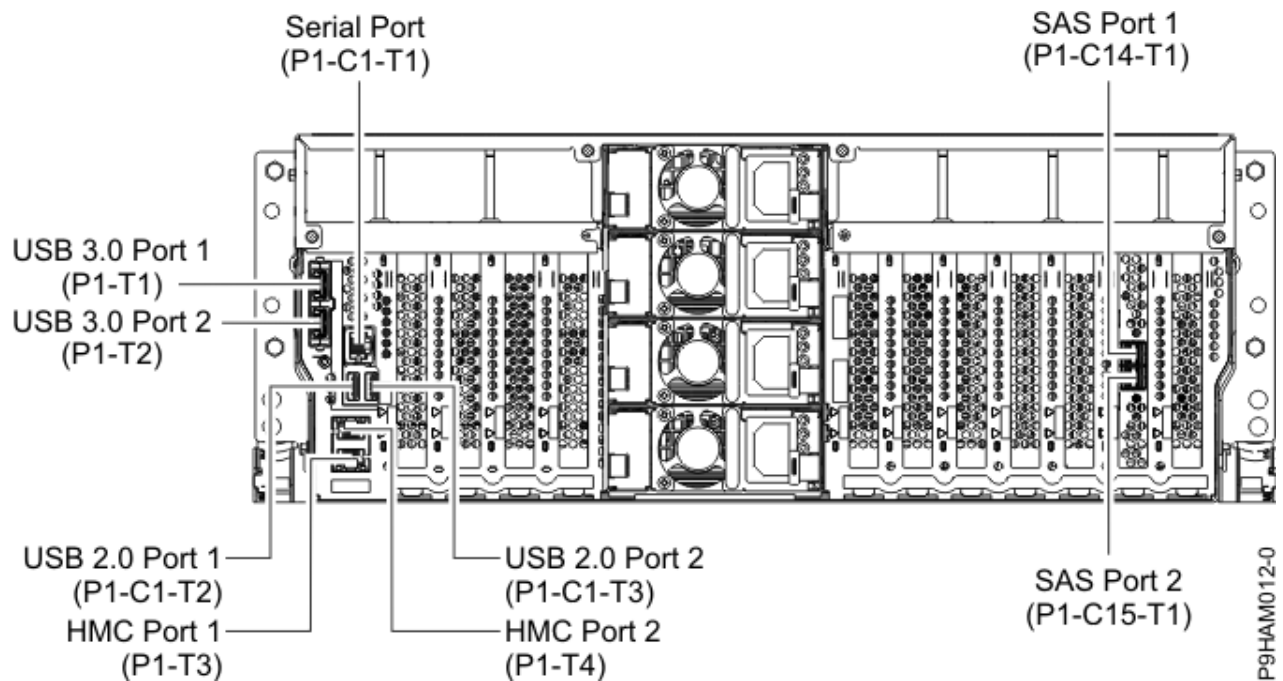


Figure 56: Connector locations for the 8247-42L and 8286-42A (expanded function) systems

Connector locations for the 8408-44E and 8408-E8E systems

Learn about connector locations for the 8408-44E and 8408-E8E systems.

The 8408-44E and 8408-E8E systems provide cable connector locations via a SAS port (P1-C5-T3) for disk drive enclosures and cable ports (P1-C5-T1 and P1-C5-T2) for the EMX0 PCIe3 expansion drawer

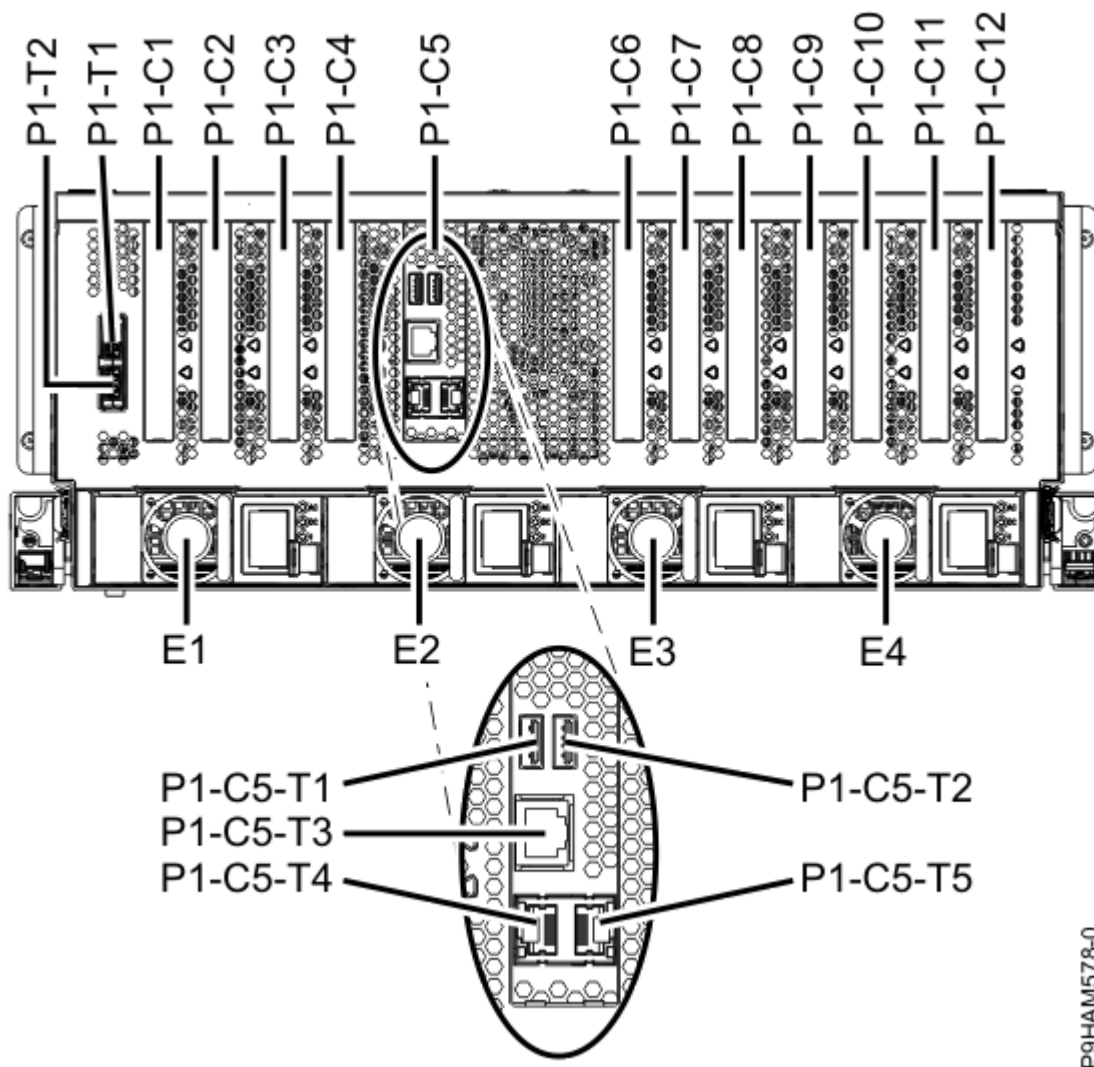


Figure 57: Connector locations for the 8408-44E and 8408-E8E systems

Connector locations for the 9080-MHE, 9080-MME, 9119-MHE, and 9119-MME systems

Learn about connector locations for the 9080-MHE, 9080-MME, 9119-MHE, and 9119-MME systems.

The 9080-MHE, 9080-MME, 9119-MHE, and 9119-MME servers provide cable connector locations via a SAS port for disk drive enclosures and cable ports for the EMX0 PCIe3 expansion drawer.

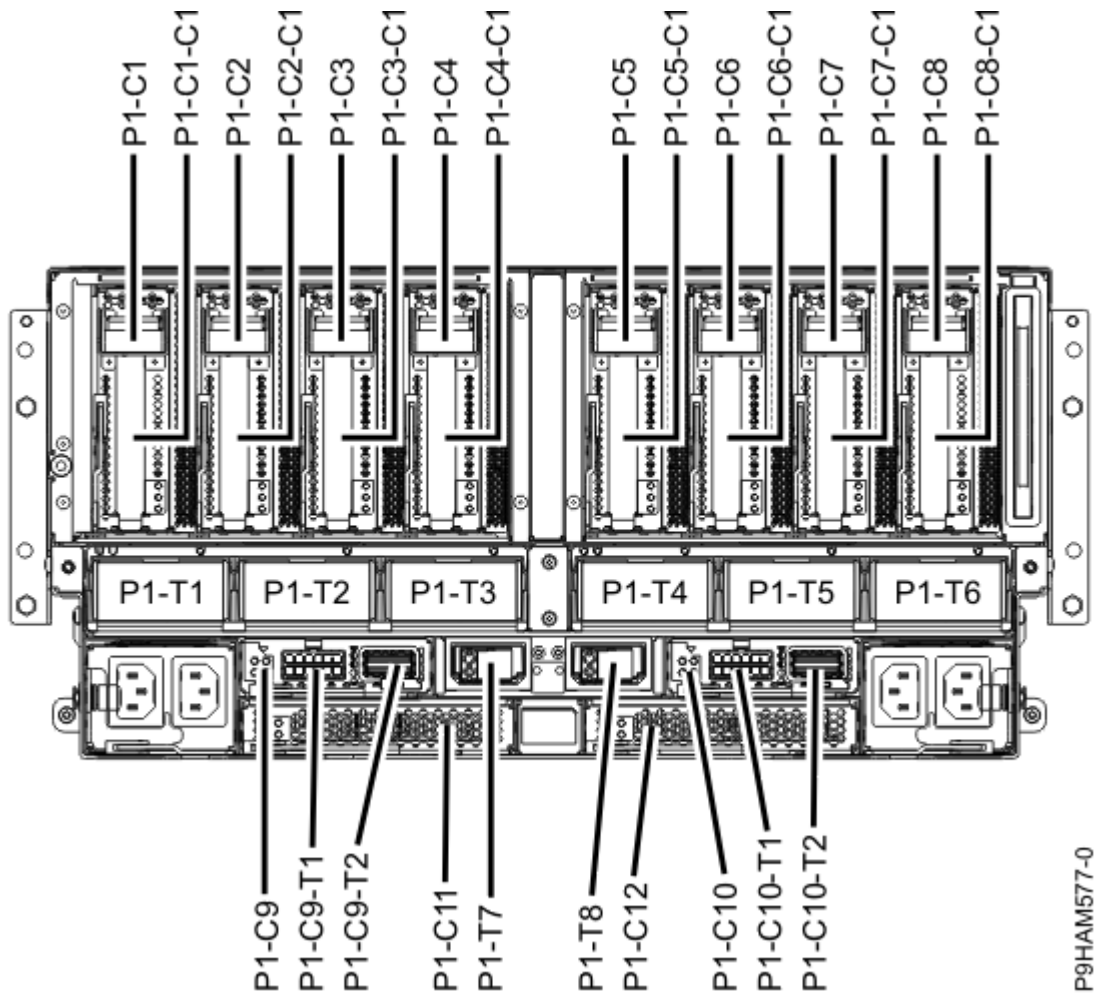


Figure 58: Connector locations for the 9080-MHE, 9080-MME, 9119-MHE, and 9119-MME systems

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Accessibility features for IBM Power Systems servers

Accessibility features assist users who have a disability, such as restricted mobility or limited vision, to use information technology content successfully.

Overview

The IBM Power Systems servers include the following major accessibility features:

- Keyboard-only operation
- Operations that use a screen reader

The IBM Power Systems servers use the latest W3C Standard, WAI-ARIA 1.0 (www.w3.org/TR/wai-aria/), to ensure compliance with US Section 508 (www.access-board.gov/guidelines-and-standards/communications-and-it/about-the-section-508-standards/section-508-standards) and Web Content Accessibility Guidelines (WCAG) 2.0 (www.w3.org/TR/WCAG20/). To take advantage of accessibility features, use the latest release of your screen reader and the latest web browser that is supported by the IBM Power Systems servers.

The IBM Power Systems servers online product documentation in IBM Knowledge Center is enabled for accessibility. The accessibility features of IBM Knowledge Center are described in the [Accessibility](http://www.ibm.com/support/knowledgecenter/doc/kc_help.html#accessibility) section of the IBM Knowledge Center help (www.ibm.com/support/knowledgecenter/doc/kc_help.html#accessibility).

Keyboard navigation

This product uses standard navigation keys.

Interface information

The IBM Power Systems servers user interfaces do not have content that flashes 2 - 55 times per second.

The IBM Power Systems servers web user interface relies on cascading style sheets to render content properly and to provide a usable experience. The application provides an equivalent way for low-vision users to use system display settings, including high-contrast mode. You can control font size by using the device or web browser settings.

The IBM Power Systems servers web user interface includes WAI-ARIA navigational landmarks that you can use to quickly navigate to functional areas in the application.

Vendor software

The IBM Power Systems servers include certain vendor software that is not covered under the IBM license agreement. IBM makes no representation about the accessibility features of these products. Contact the vendor for accessibility information about its products.

Related accessibility information

In addition to standard IBM help desk and support websites, IBM has a TTY telephone service for use by deaf or hard of hearing customers to access sales and support services:

TTY service
800-IBM-3383 (800-426-3383)
(within North America)

For more information about the commitment that IBM has to accessibility, see [IBM Accessibility \(www.ibm.com/able\)](http://www.ibm.com/able).

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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 IBM servers that contain the POWER9 processor and its features unless designated as electromagnetic compatibility (EMC) Class B in the feature information.

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

CAN ICES-3 (A)/NMB-3(A)

European Community Compliance Statement

This product is in conformity with the protection requirements of EU Council Directive 2014/30/EU 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.

European Community contact:
IBM Deutschland GmbH
Technical Regulations, Abteilung M456
IBM-Allee 1, 71139 Ehningen, Germany
Tel: +49 800 225 5426
email: halloibm@de.ibm.com

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

VCCI Statement - Japan

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VCCI-A

The following is a summary of the VCCI Japanese statement in the box above:

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

Japan Electronics and Information Technology Industries Association Statement

This statement explains the Japan JIS C 61000-3-2 product wattage compliance.

(一社) 電子情報技術産業協会 高調波電流抑制対策実施
要領に基づく定格入力電力値 : Knowledge Centerの各製品の
仕様ページ参照

This statement explains the Japan Electronics and Information Technology Industries Association (JEITA) statement for products less than or equal to 20 A per phase.

高調波電流規格 JIS C 61000-3-2 適合品

This statement explains the JEITA statement for products greater than 20 A, single phase.

高調波電流規格 JIS C 61000-3-2 準用品

本装置は、「高圧又は特別高圧で受電する需要家の高調波抑制対策ガイドライン」対象機器（高調波発生機器）です。

- 回路分類 : 6 (単相、P F C回路付)
- 換算係数 : 0

This statement explains the JEITA statement for products greater than 20 A per phase, three-phase.

高調波電流規格 JIS C 61000-3-2 準用品

本装置は、「高圧又は特別高圧で受電する需要家の高調波抑制対策ガイドライン」対象機器（高調波発生機器）です。

- 回路分類 : 5 (3相、P F C回路付)
- 換算係数 : 0

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.

Electromagnetic Interference (EMI) Statement - Taiwan

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.

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

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Dieses Produkt entspricht den Schutzanforderungen der EU-Richtlinie 2014/30/EU zur Angleichung der Rechtsvorschriften über die elektromagnetische Verträglichkeit in den EU-Mitgliedsstaaten und hält die Grenzwerte der EN 55022 / EN 55032 Klasse A ein.

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"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 2014/30/EU in der Bundesrepublik Deutschland.

Zulassungsbescheinigung laut dem Deutschen Gesetz über die elektromagnetische Verträglichkeit von Geräten (EMVG) (bzw. der EMC Richtlinie 2014/30/EU) für Geräte der Klasse A

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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 Relations Europe, Abteilung M456
IBM-Allee 1, 71139 Ehningen, Germany
Tel: +49 (0) 800 225 5426
email: HalloIBM@de.ibm.com

Generelle Informationen:

Das Gerät erfüllt die Schutzanforderungen nach EN 55024 und EN 55022 / EN 55032 Klasse A.

Electromagnetic Interference (EMI) Statement - Russia

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радиопомехи, для снижения которых необходимы
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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

CAN ICES-3 (B)/NMB-3(B)

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VCCI-B

Japan Electronics and Information Technology Industries Association Statement

This statement explains the Japan JIS C 61000-3-2 product wattage compliance.

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仕様ページ参照

This statement explains the Japan Electronics and Information Technology Industries Association (JEITA) statement for products less than or equal to 20 A per phase.

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This statement explains the JEITA statement for products greater than 20 A, single phase.

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- 回路分類：6（単相、PFC回路付）
- 換算係数：0

This statement explains the JEITA statement for products greater than 20 A per phase, three-phase.

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- 回路分類：5（3相、PFC回路付）
- 換算係数：0

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台灣國際商業機器股份有限公司
台北市松仁路7號3樓
電話：0800-016-888

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IBM-Allee 1, 71139 Ehningen, Germany
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email: HalloIBM@de.ibm.com

Generelle Informationen:

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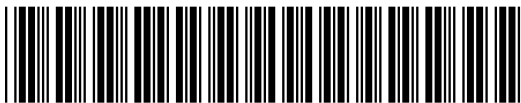
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