Power Systems

Internally-Secured SAS Cables for the 9040-MR9

Note

Before using this information and the product it supports, read the information in “Safety notices” on page v, “Notices” on page 95, 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.

Contents

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 if provided, 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).

- Stability hazard:
  - The rack may tip over causing serious personal injury.
  - Before extending the rack to the installation position, read the installation instructions.
  - Do not put any load on the slide-rail mounted equipment mounted in the installation position.
  - Do not leave the slide-rail mounted equipment in the installation position.
- 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 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 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 2083 mm (30 x 82 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)

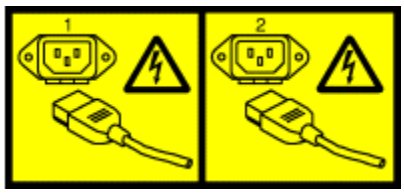
(L002)

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). Stability hazard:

- The rack may tip over causing serious personal injury.
- Before extending the rack to the installation position, read the installation instructions.
- Do not put any load on the slide-rail mounted equipment mounted in the installation position.
- Do not leave the slide-rail mounted equipment in the installation position.

(L002)

(L003)



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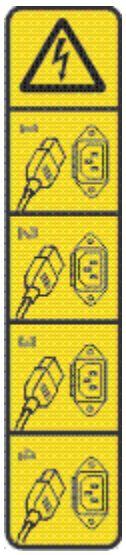

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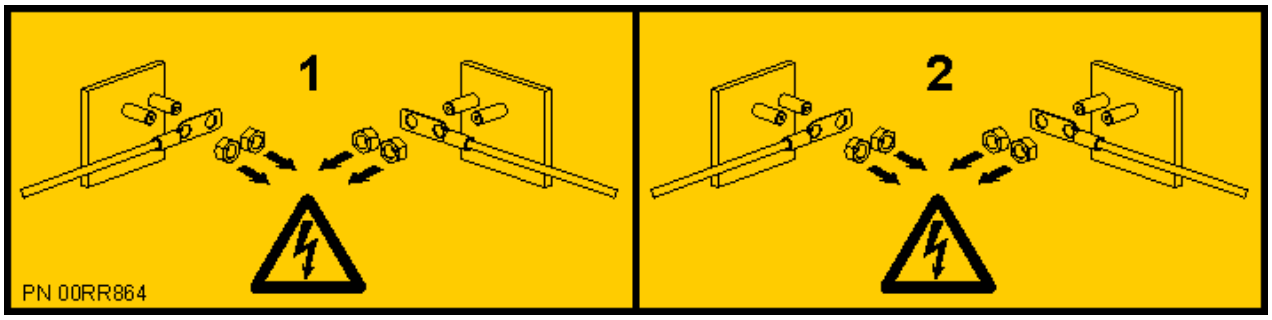


DANGER: Multiple power cords. The product might be equipped with multiple AC power cords or multiple DC power cables. To remove all hazardous voltages, disconnect all power cords and power cables. (L003)

(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.

Removing the internally-secured SAS cables and replacing them with externally-secured SAS cables in the 9040-MR9

To replace the original internally-secured SAS cables in the server with updated externally-secured SAS cables, complete the steps in this procedure.

Before you begin

Before beginning this procedure, ensure that you have these items on hand:

- Tweezers
- SAS cable kit

Procedure

1. If the system has externally-secured SAS cables as shown in the following figure, **do not** follow the steps in this topic. You must follow the steps in Removing and replacing the SAS cables (https://www.ibm.com/support/knowledgecenter/POWER9/p9eg7/p9eg7_950_rr_kickoff.htm).

   The externally-secured SAS cables have a screw at **(A)** and a housing at **(B)**.

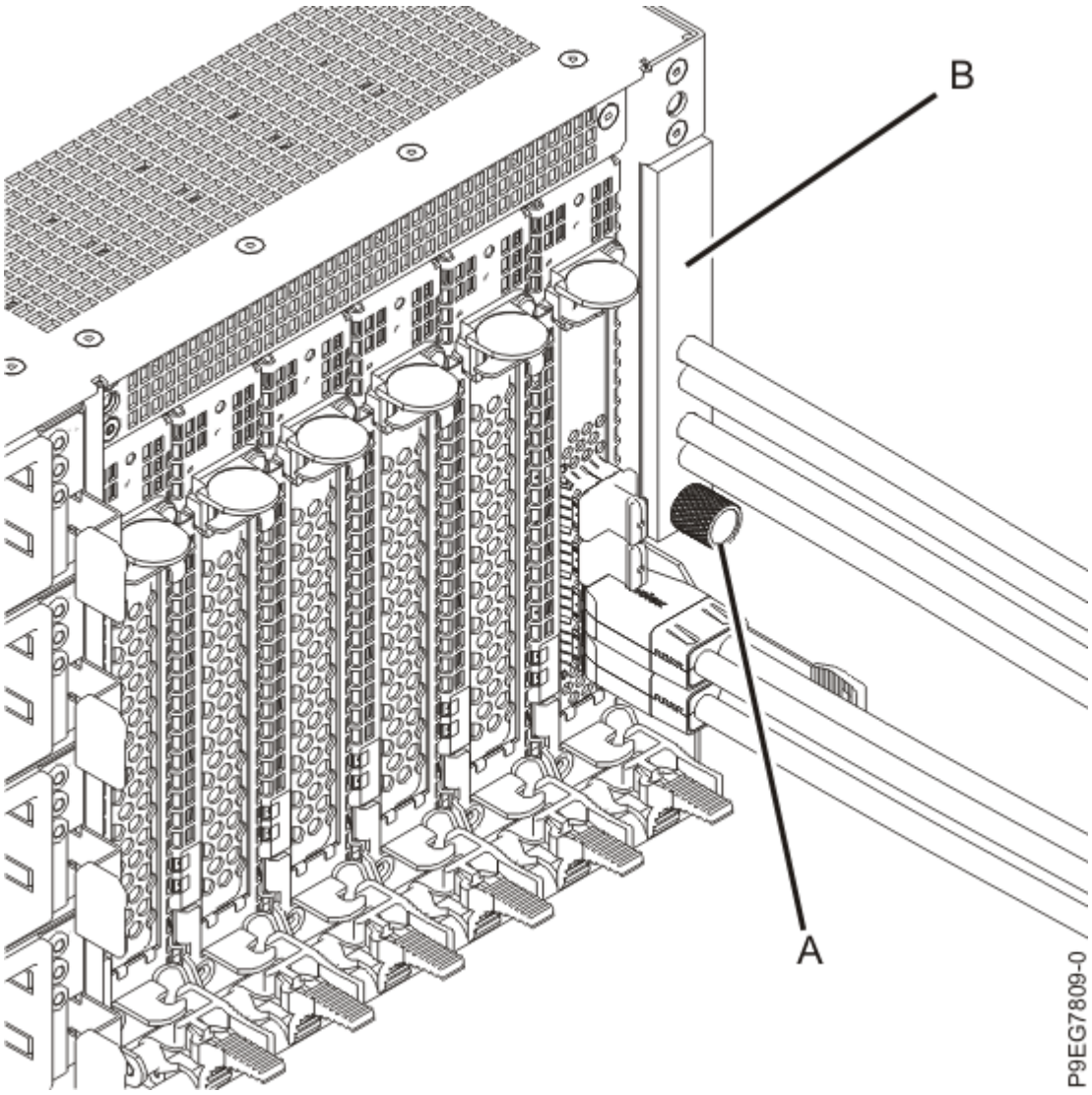


Figure 1. Identifying the externally-secured SAS cables

2. **If the system has internally-secured SAS cables as shown in the following figure, complete the steps in this procedure; continue with the next step.**

   The internally-secured SAS cables **do not** have a screw at **(A)**. The area at **(B)** is an **open slot** containing the SAS cables.

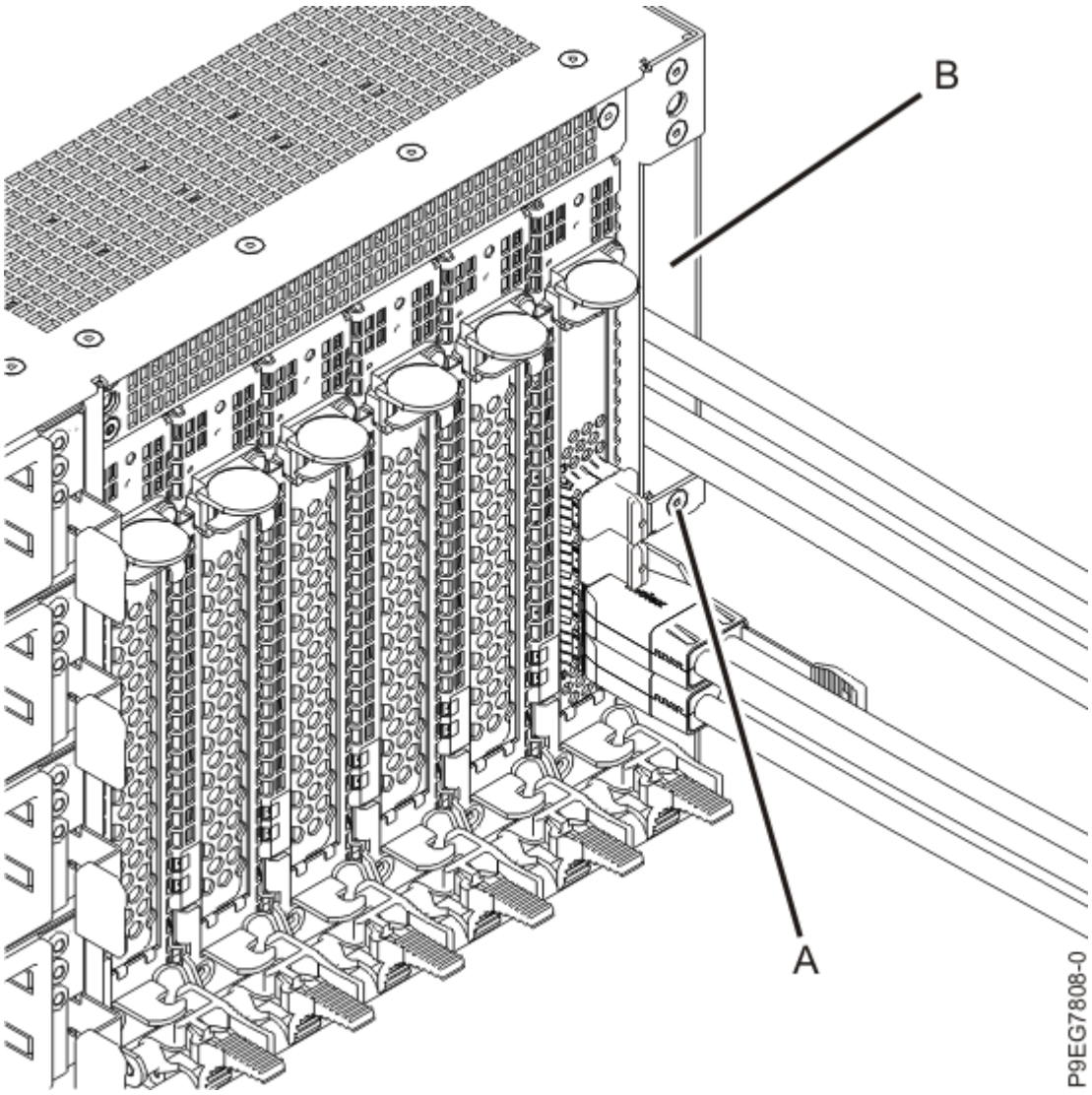


Figure 2. Identifying the internally-secured SAS cables

3. 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.

4. Label and disconnect the power source from the system by unplugging the power cords from the system.

   Notes:

- This system might be equipped with two or more power supplies. If the removing and replacing procedures require the system power to be turned off, ensure that all power sources to the system are disconnected.
- The power cord **(B)** is fastened to the system with a hook-and-loop fastener **(A)**. If you are placing the system in a service position after you disconnect the power cords, ensure that you unstrap the fastener.

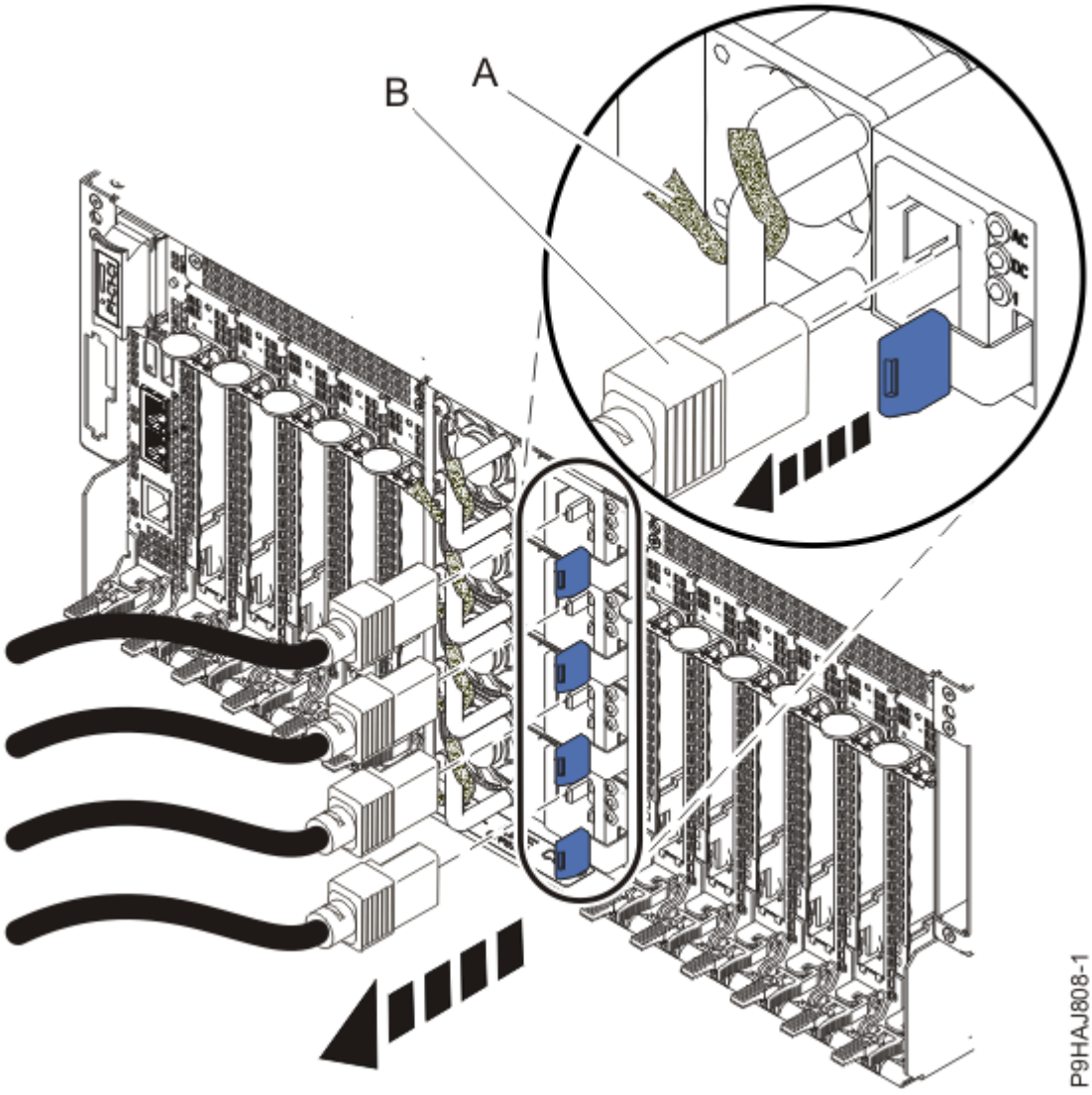
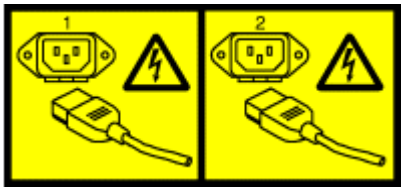


Figure 3. Removing the power cords

(L003)



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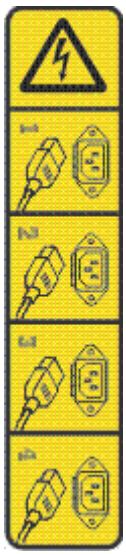

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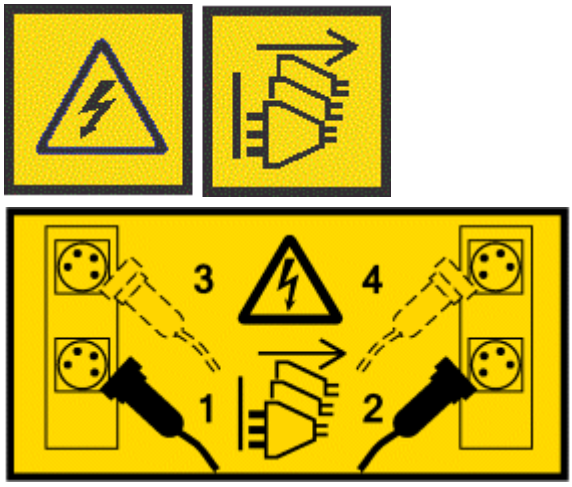

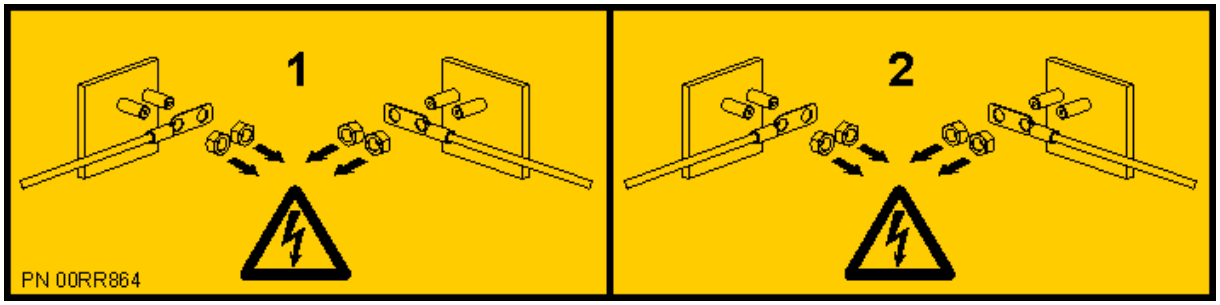

DANGER: Multiple power cords. The product might be equipped with multiple AC power cords or multiple DC power cables. To remove all hazardous voltages, disconnect all power cords and power cables. (L003)

5. Note the positions and label the rear SAS cables. See the following figures. Complete the following steps to remove the SAS cables.
   a) Slightly push in the SAS cable.
   b) While pushing the SAS cable, gently pull the blue tab **(A)** straight back from the system to release the latches that secure the SAS cable to the PCIe adapter.

      Do not pull the blue tab to the side, you might break the tab and prevent the cable from being removed. Pull the blue tab straight back.
   c) While gently pulling the blue tab, grasp and pull on the black SAS cable itself to unplug and remove the SAS cable from the PCIe adapter.

      To prevent breakage, do not pull with excessive force on the blue tab.
   d) Repeat steps “5.a” on page 6 - “5.c” on page 6 for each SAS cable.

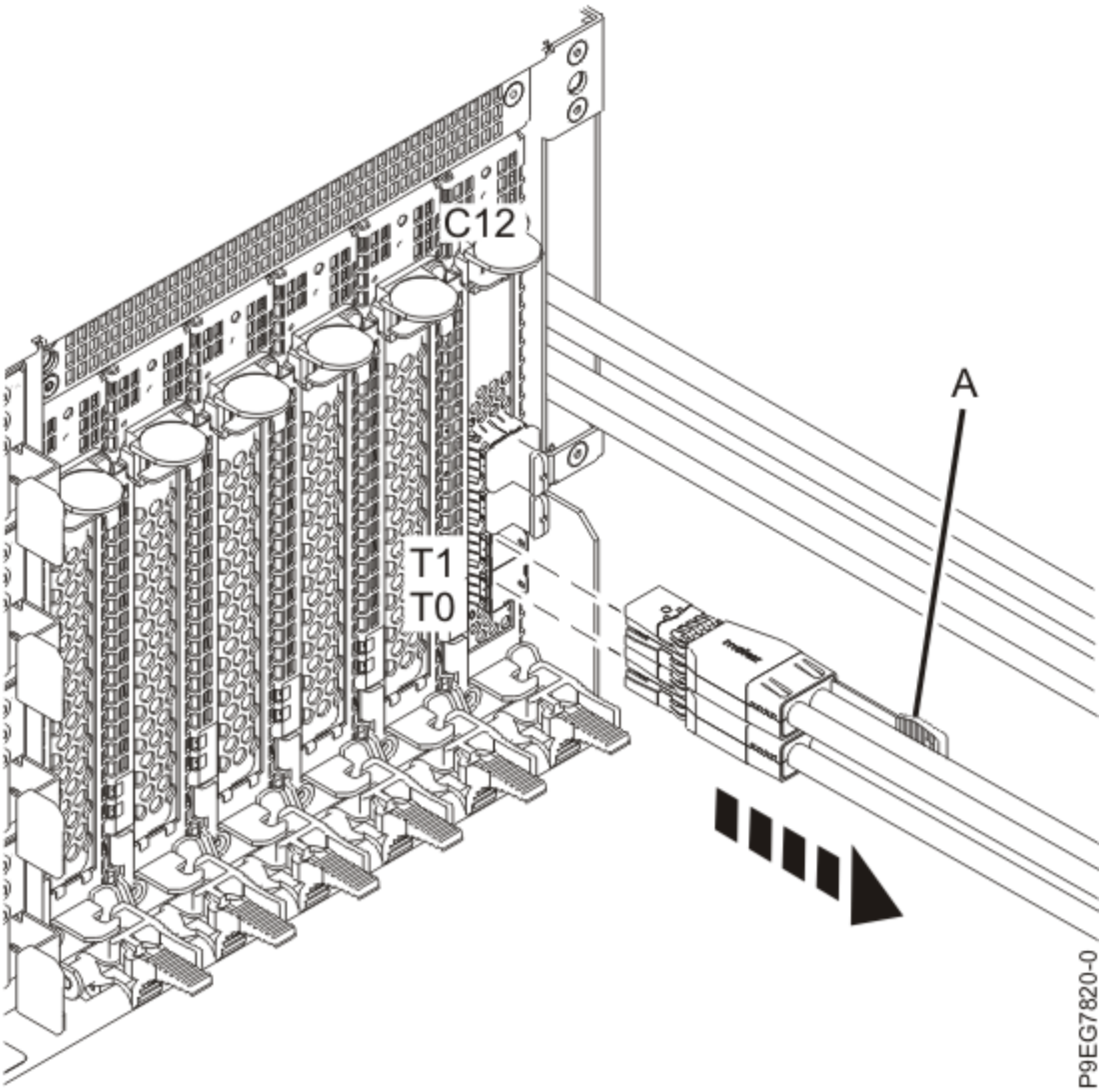

Figure 4. Disconnecting the SAS cables for the base configuration

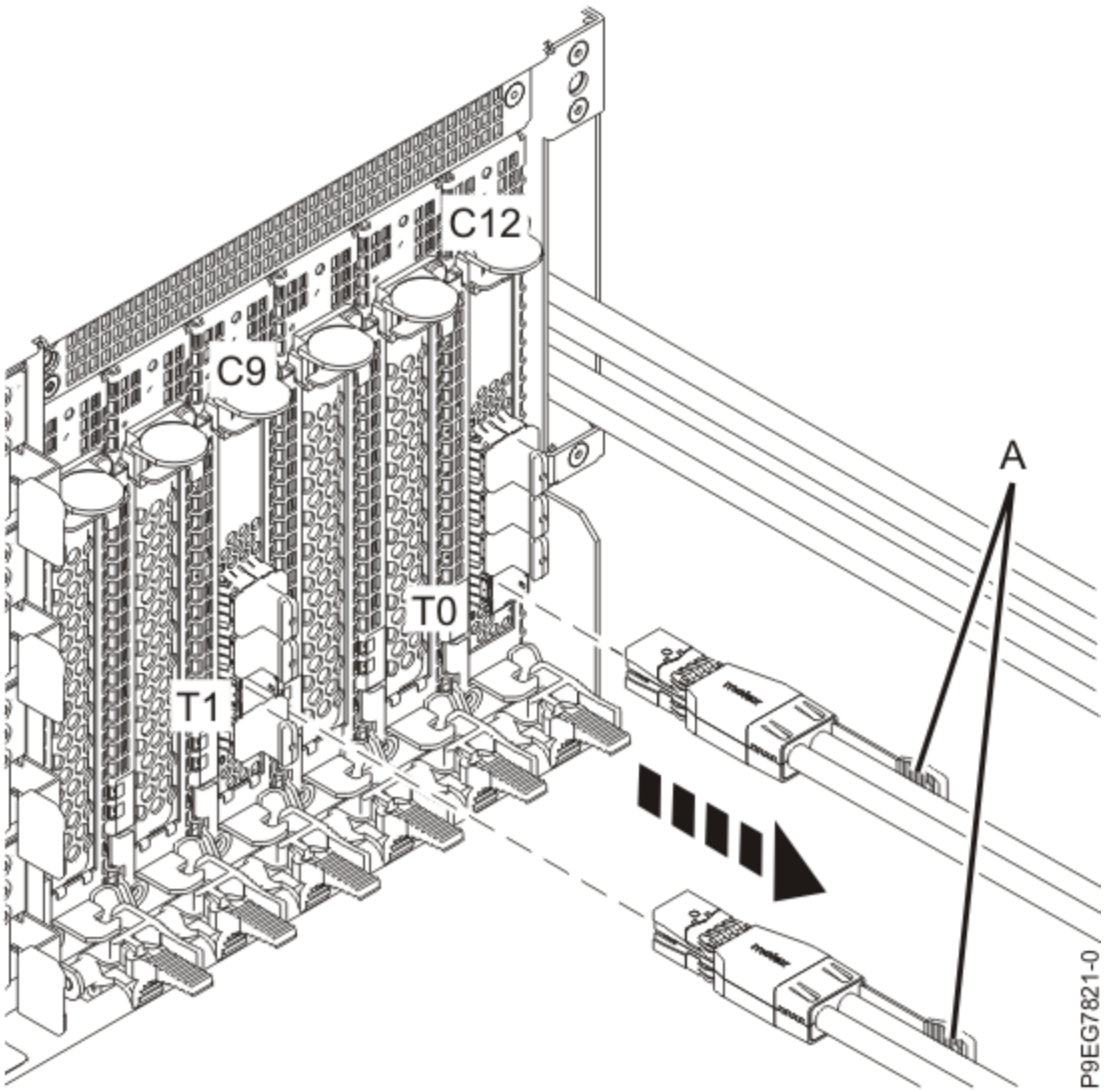

Figure 5. Disconnecting the SAS cables for the split configuration

6. Label and disconnect any remaining external cables.
7. Remove the power supplies enough to prevent them from interfering with the removal of the system backplane and SAS cables.
   a) To unseat the power supply from its position in the system, push in the locking-tab **(A)**.
   b) Using the handle **(B)**, pull the power supply **(C)** approximately 2.5 cm (1 in) away from the system.
   c) Repeat steps “7.a” on page 8 through “7.b” on page 8 to remove the remaining power supplies.

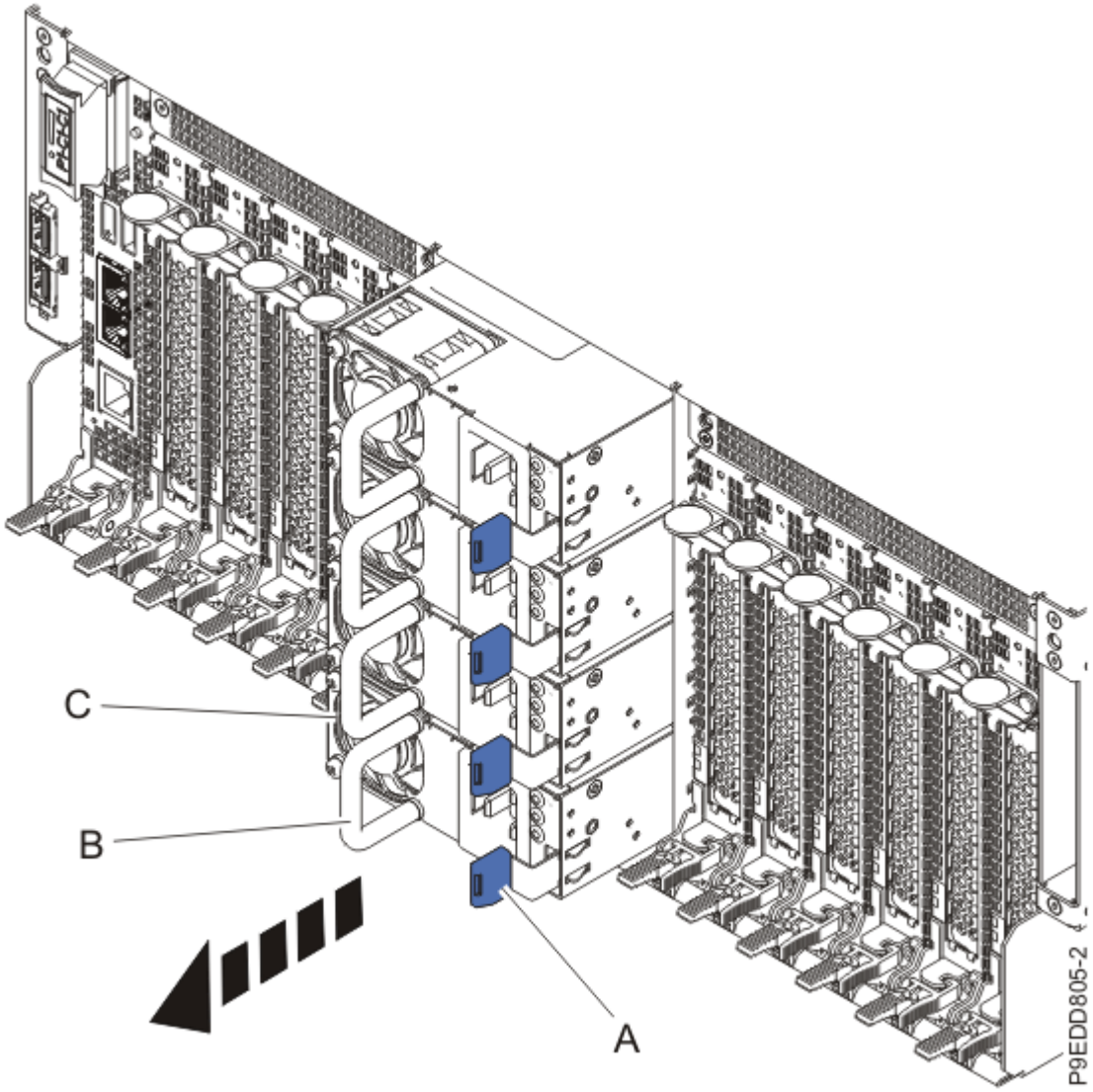

Figure 6. Partially removing the power supplies

8. Remove the PCIe adapter cassettes enough to prevent them from interfering with the removal of the system backplane and SAS cables.
   a) Squeeze the latch lever **(A)** and press down on the latch **(B)** in the direction shown.
      This action pivots the cassette forward and releases the cassette from the slot.

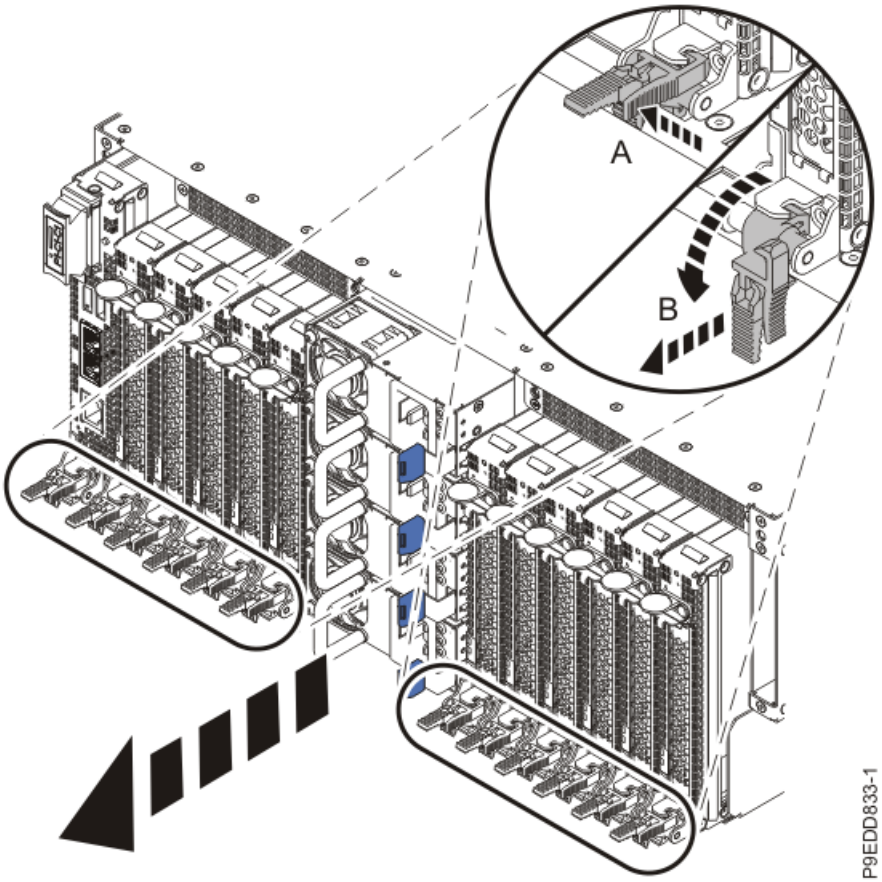

Figure 7. Partially removing the PCIe adapter cassettes

b) After the PCIe adapter cassette unlatches, unplug but do not remove the cassette from its slot. Pull the cassette out far enough approximately 2.5 cm (1 in) to prevent it from interfering with the removal of the system backplane.

c) Repeat steps “8.a” on page 9 through “8.b” on page 10 to pull out the remaining PCIe adapter cassettes.

9. Place your fingers on the indentations and pull the latches **(B)** located on both sides of the cover as shown in the following figure.

   Pull the cover **(A)** away from the system.

   CAUTION: The fans can pull in hair, jewelry, loose clothing, and so forth, and cause injury or damage. Operate the system with the bezel installed. For service operations, if the front cover must be removed with the system operating, ensure that all such loose material is secured away from the fan area, to prevent any loose material from being pulled into the fan.

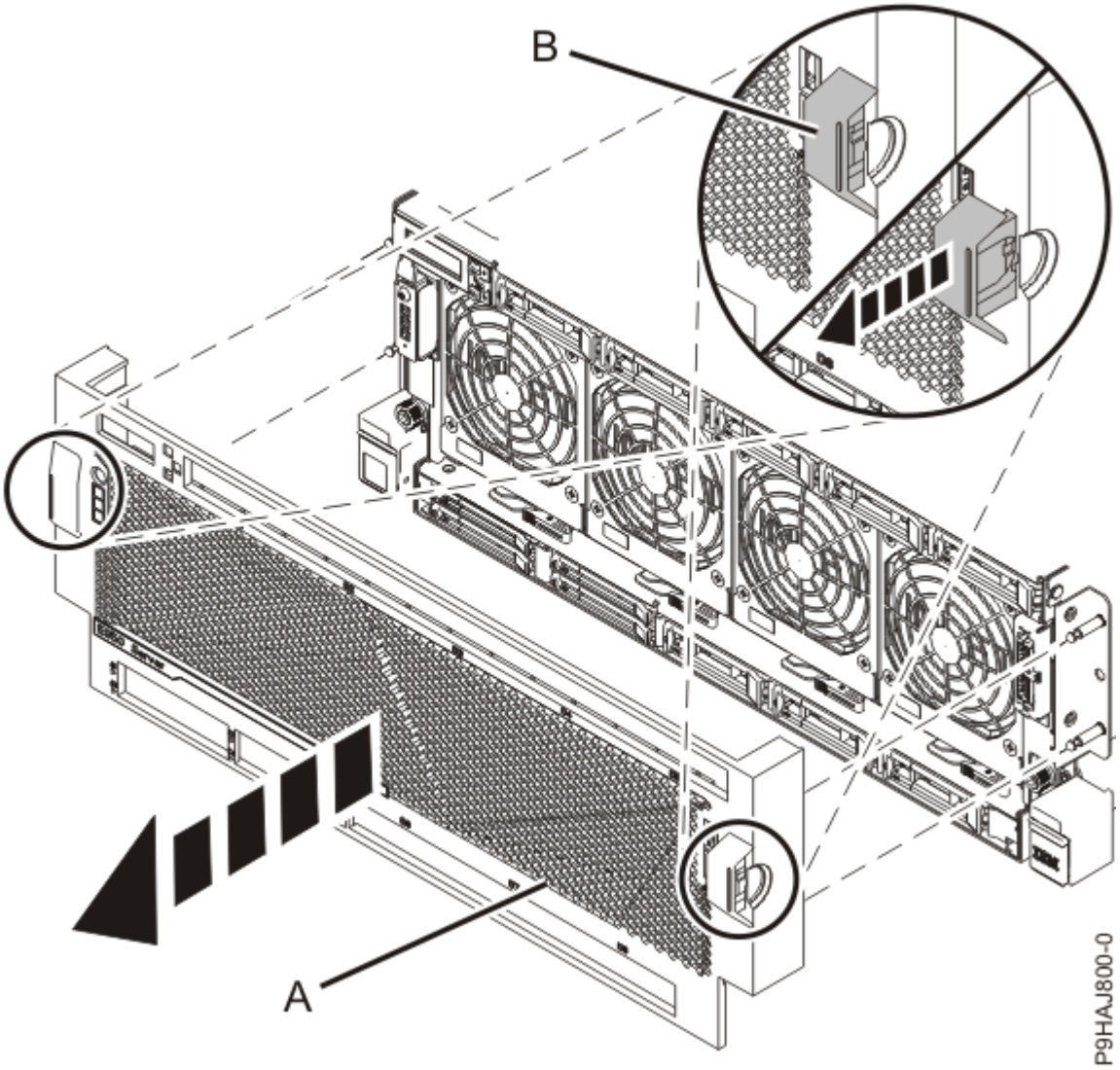

Figure 8. Removing the front cover

10. Complete the following steps to place the system in the service position.

    Do not pull out or install any drawer or feature if the rack stabilizer brackets are not attached to the rack. Do not pull out more than one drawer at a time. The rack might become unstable if you pull out more than one drawer at a time.

    a. If not already removed, remove the shipping screws **(A)** as shown in the following figure by using a Phillips screwdriver.
    b. Release the side latches **(B)** by pressing them downward as shown in the following figure.

c. Pull out the system **(C)** as shown in the following figure. Ensure that any cables do not catch or bind as you pull out the system.

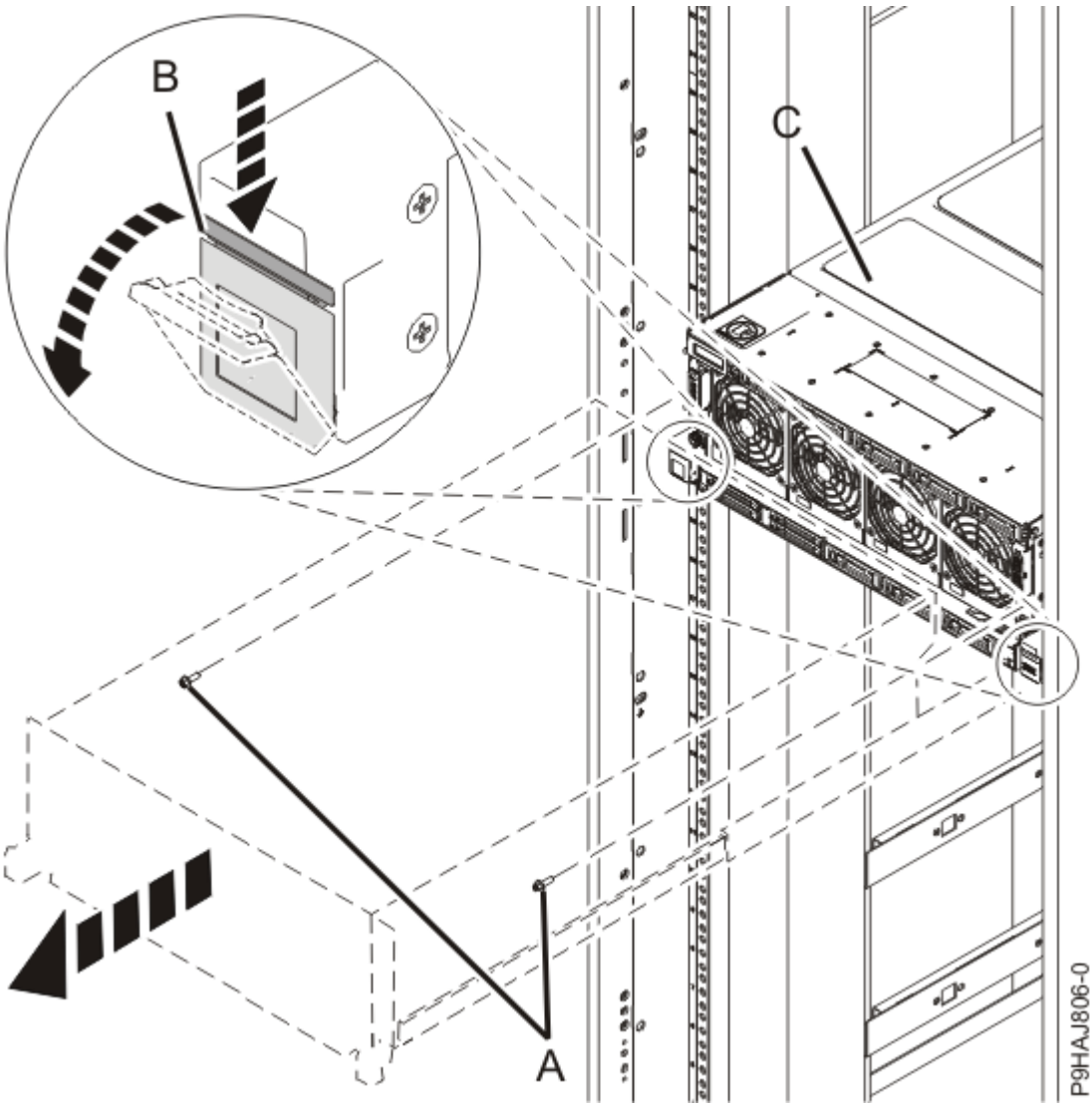

Figure 9. Placing the system in service position

11. Remove the service access cover.

Attention: Operating the system without the service access cover on for more than 10 minutes when the system power is turned on might damage the system components.

a. Push the release latches **(A)** in the direction shown in the following figure.

b. Slide the cover **(B)** off the system unit as shown in the following figure. When the front of the service access cover has cleared the upper frame ledge, lift the cover up and off the system unit.

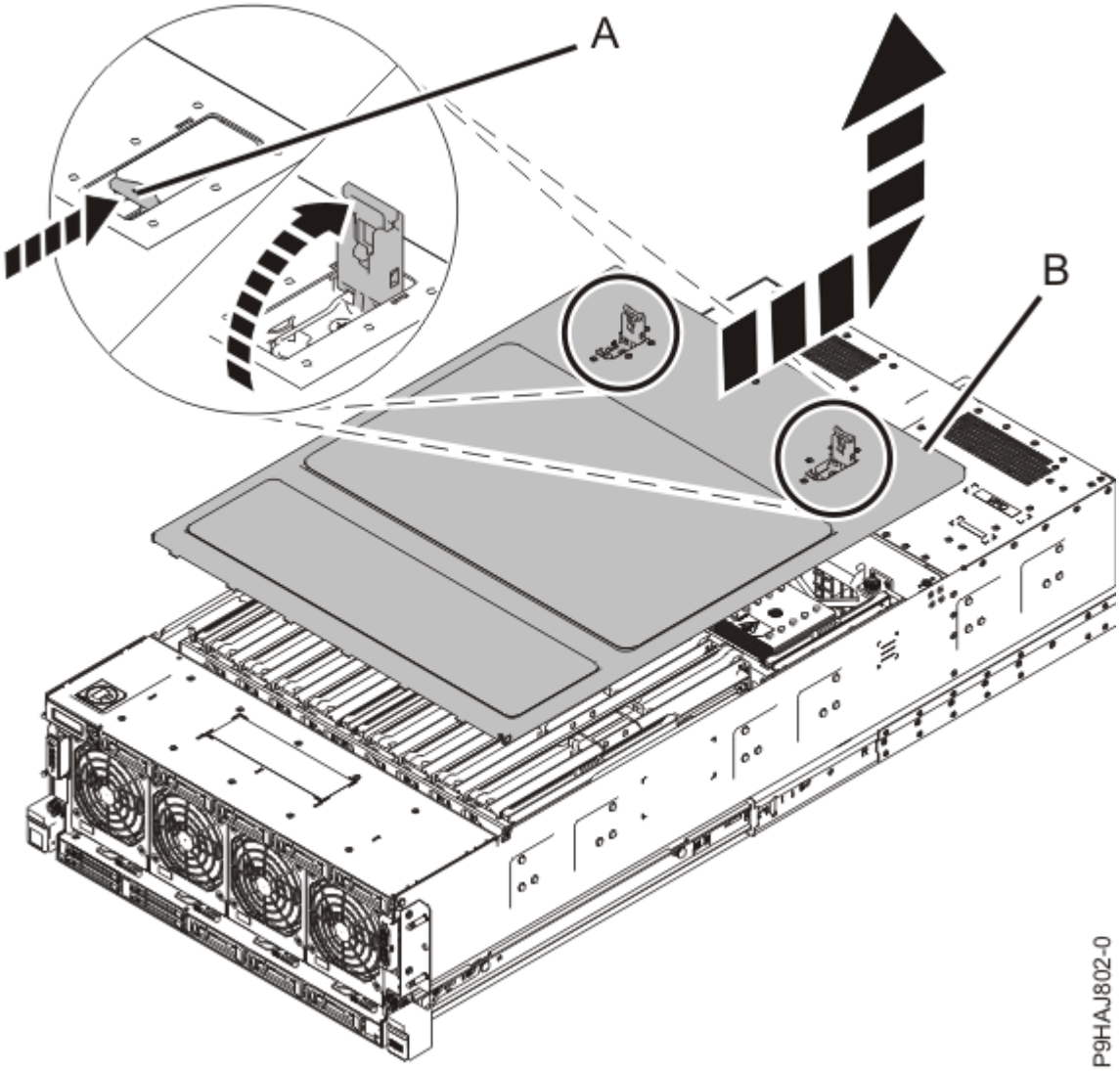

Figure 10. Removing the service access cover

12. Complete the following steps to place the system in the operating position.
    a. Unlock the blue rail safety latches **(A)** by pushing them towards the front as shown in the following figure.
    b. Push the system unit back into the rack as shown in the following figure until both release latches of the system unit lock into position. Ensure that any cables do not catch or bind as you push in the system.

    Note: Slide the system unit slowly into the rack to ensure that your fingers do not get caught in the side rails.

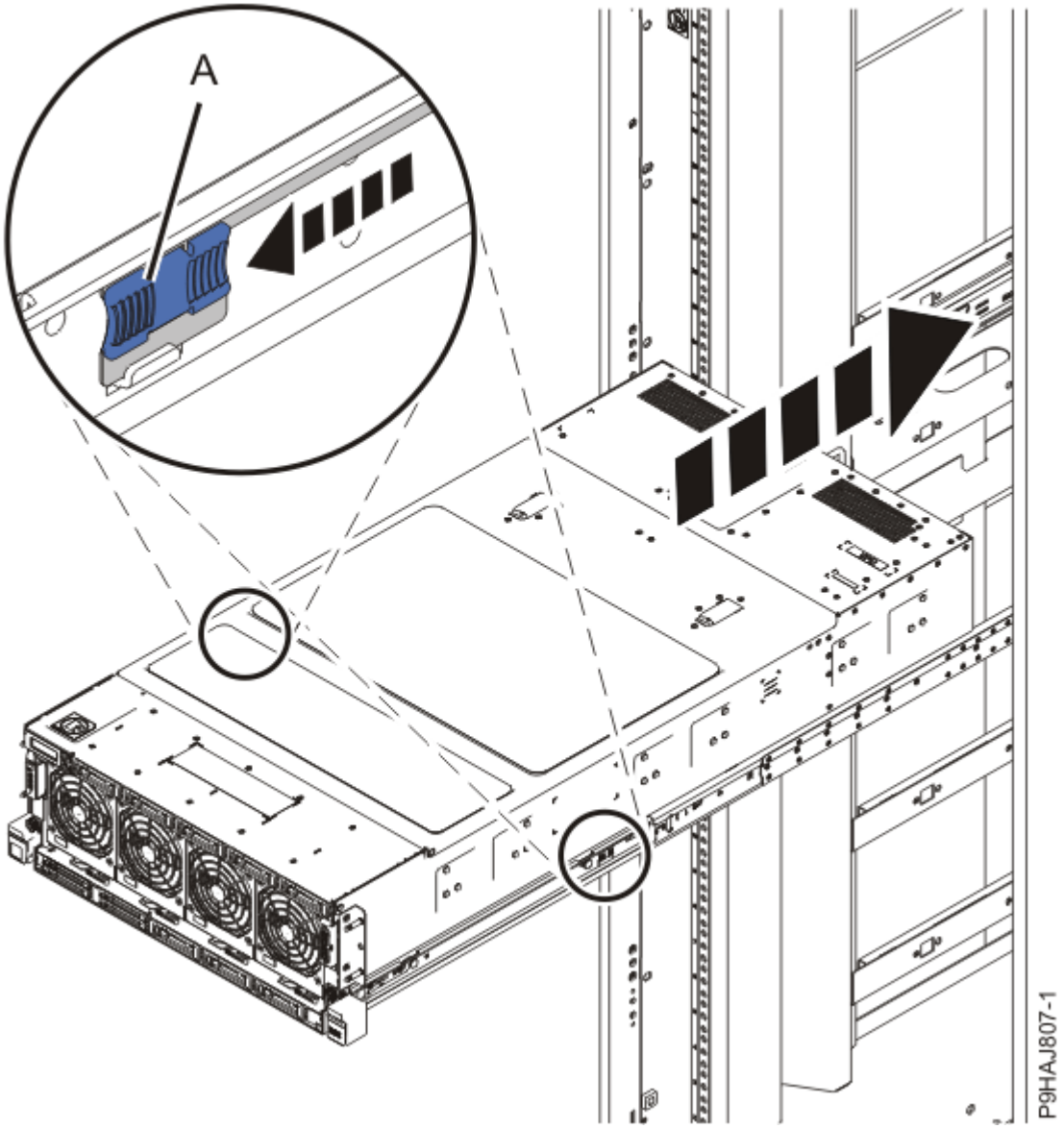

Figure 11. Placing the system into the operating position

13. 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.

14. Remove all the fans from the disk drive backplane as shown in the following figure.

a) Put your thumb against the latch **(A)** in the following figure, and put your index finger against the latch **(B)**.

b) Push against the latch with your thumb and then pull out the latch with your index finger. This action releases the latch.

c) Rotate the fan handle in the direction that is shown in the following figure to unlock the fan from its slot.

d) Hold onto the fan handle and by using your hand to support the bottom of the fan, pull out the fan from its slot as shown in the following figure.

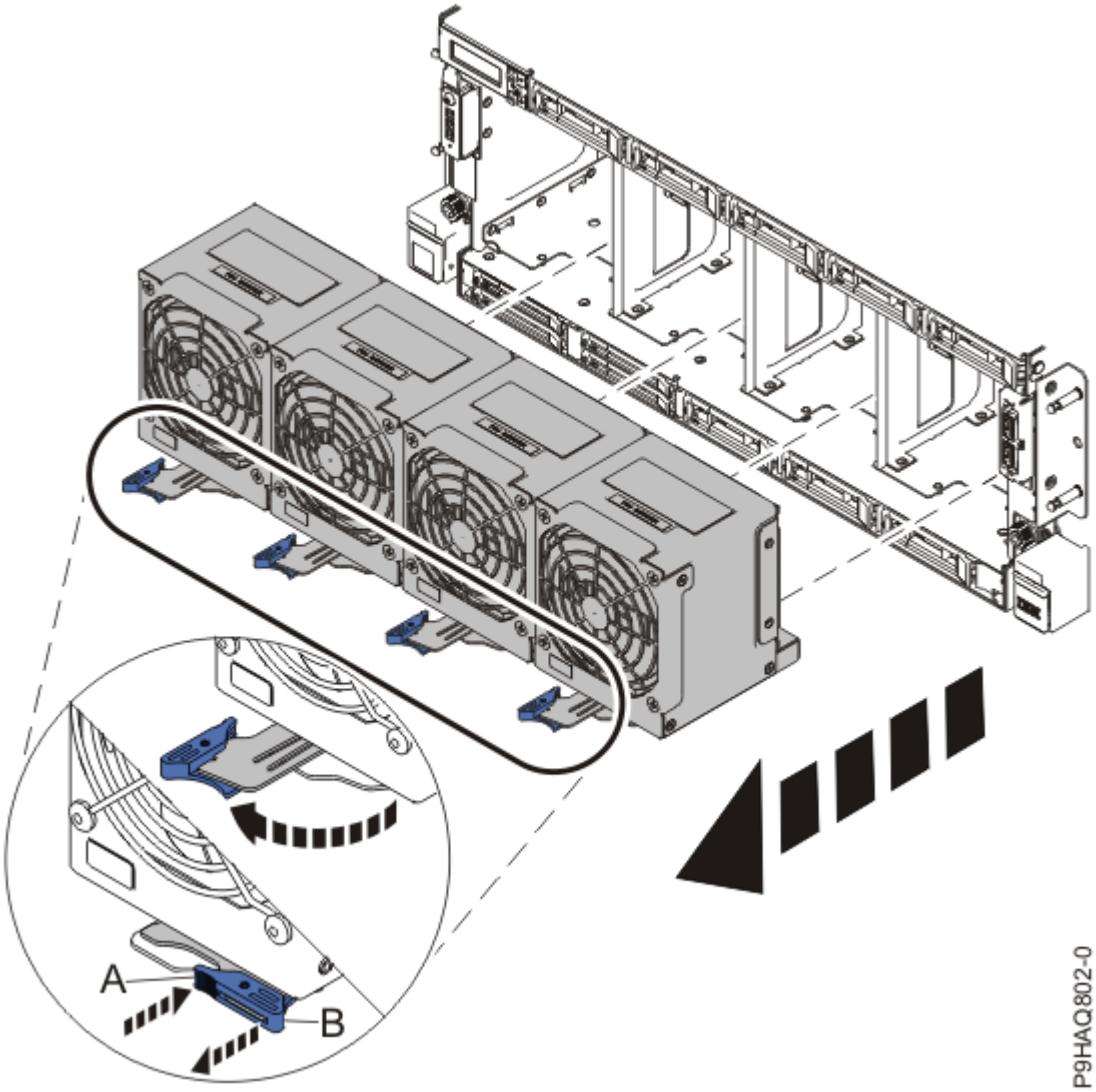

Figure 12. Removing the fans

15. To remove the disk drive backplane from the front of the system, complete the following steps:

CAUTION: To prevent damage to the SAS cables, you must unplug the SAS cables from the rear of the disk drive backplane before fully removing the disk drive backplane.

a) Loosen the two screws **(A)** as shown in the following figure.

b) Loosen the two recessed screws **(B)** as shown in the following figure. Use a 4 mm ball-end hex driver (130 mm long, IBM part number 02EA546) to loosen the screws.

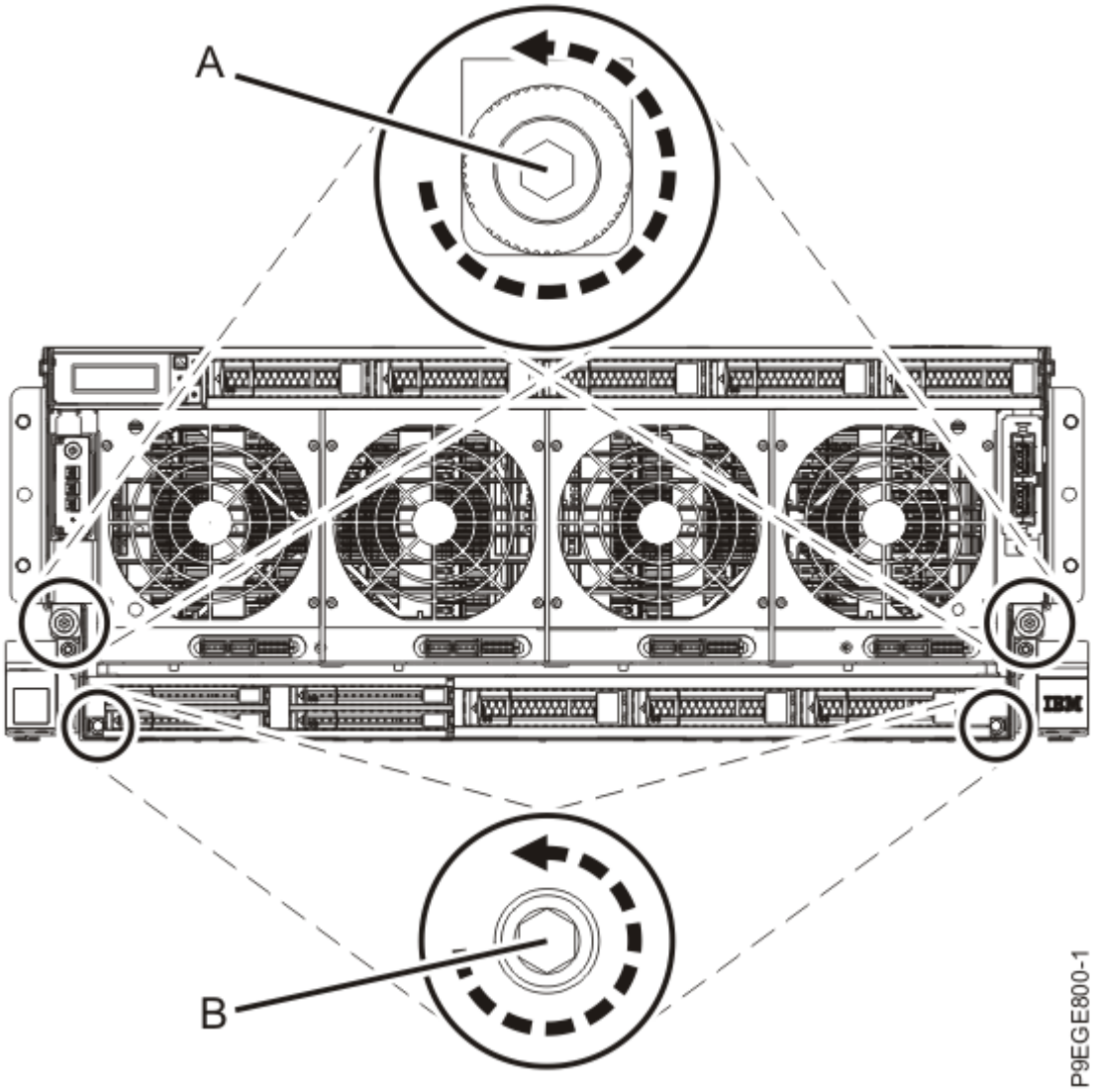

Figure 13. Loosening the disk drive backplane screws

c) Grasp the disk drive backplane with two hands as indicated by the blue squares in the following figure. Pull the disk drive backplane approximately 2.5 cm (1 in) straight out from the front of the system.

   If you pull the disk drive backplane with one hand, it might twist sideways.

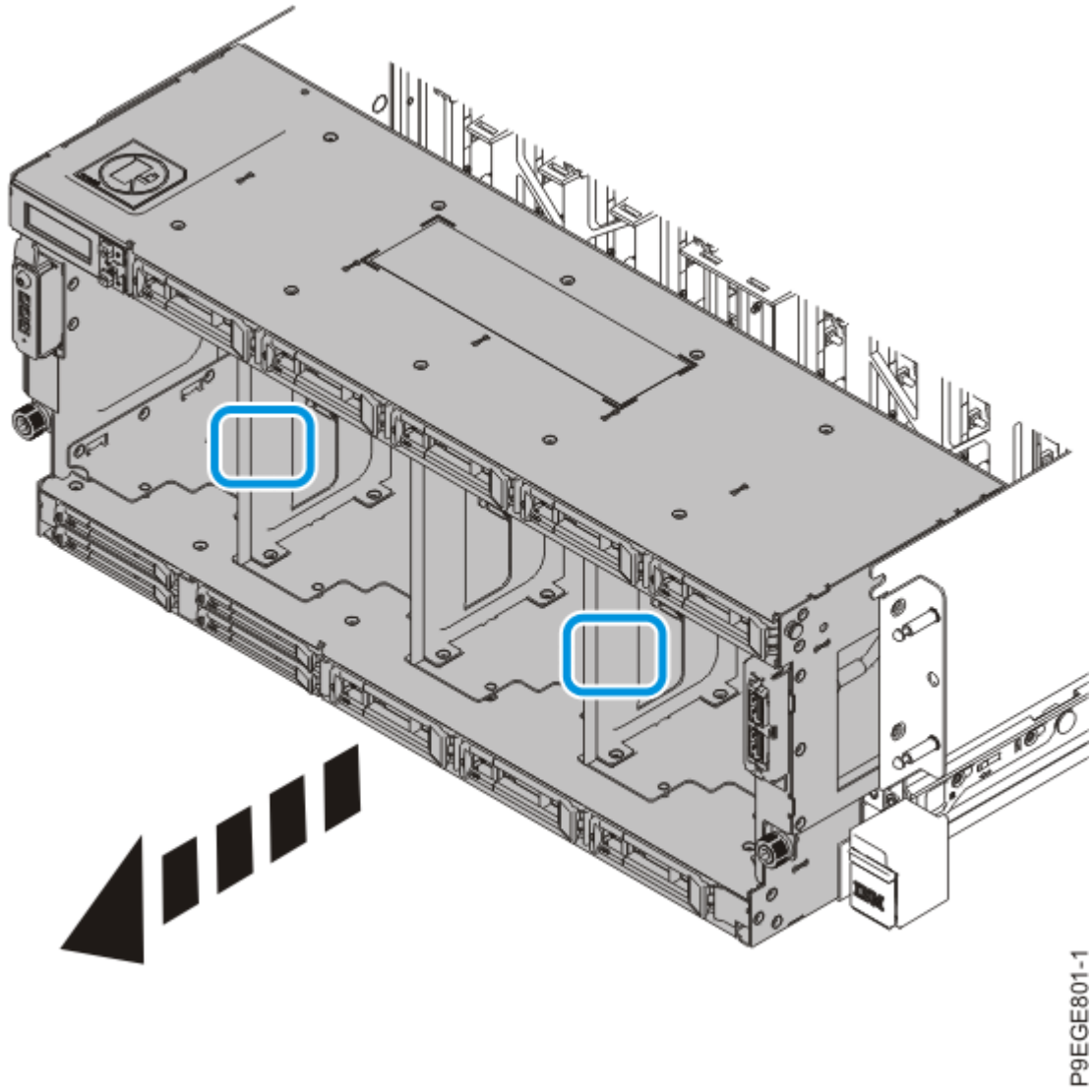

Figure 14. Partially removing the disk drive backplane

d) Pull the entire system unit out of the rack at most 20.3 cm (8 in), enough to access and disconnect the SAS cables and to remove the disk drive backplane.

Do not pull out or install any drawer or feature if the rack stabilizer brackets are not attached to the rack. Do not pull out more than one drawer at a time. The rack might become unstable if you pull out more than one drawer at a time.

1) If not already removed, remove the shipping screws **(A)** as shown in the following figure by using a Phillips screwdriver.

2) Release the side latches **(B)** by pressing them downward as shown in the following figure.
3) Pull out the entire system unit **(C)** at most 20.3 cm (8 in) from the rack as shown in the following figure. Ensure that any cables do not catch or bind as you pull out the system.

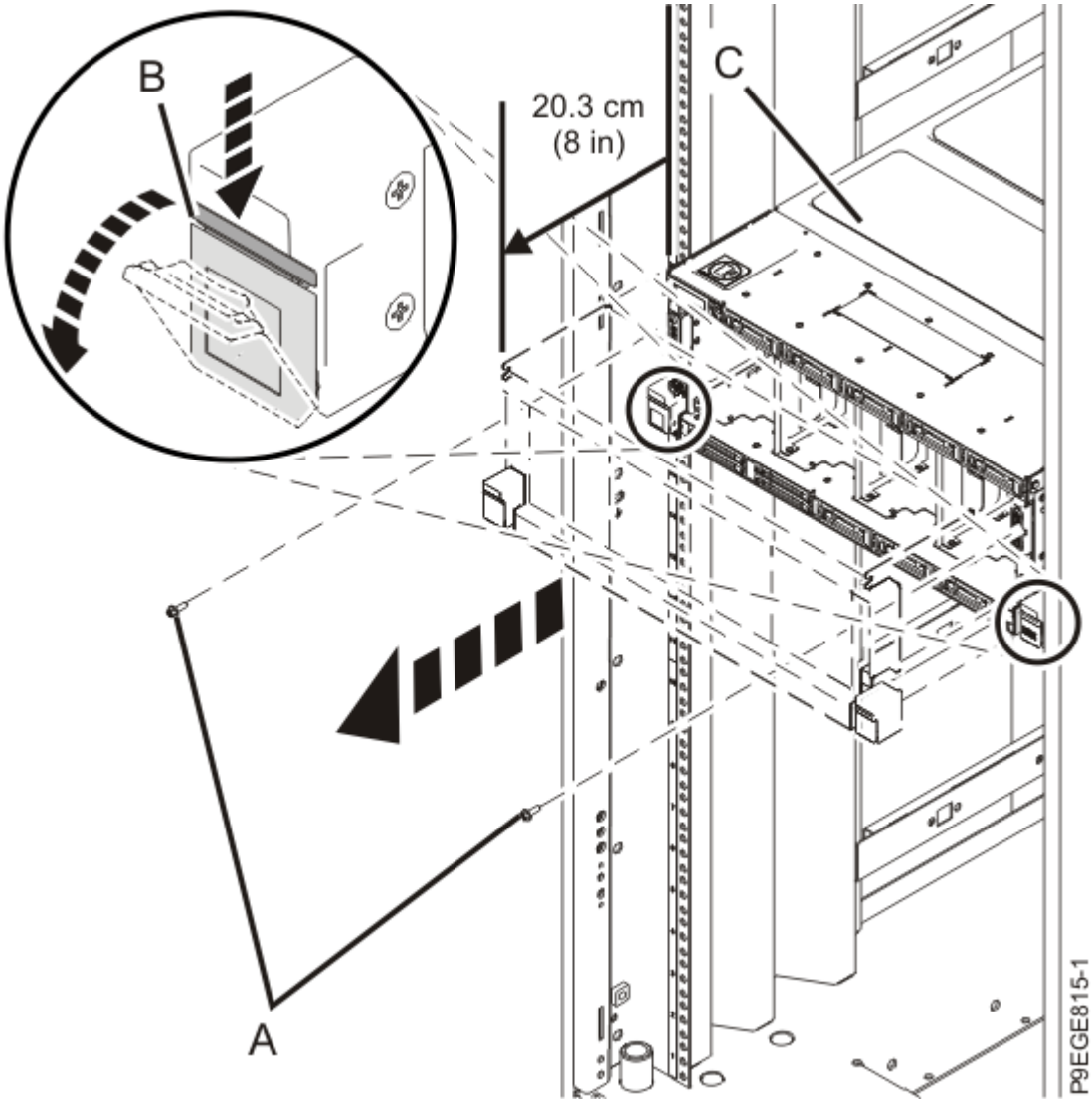

Figure 15. Partially sliding the system from the rack

e) Label and unplug the SAS cables from the rear of the disk drive backplane as shown in the following figure.

Press in on the clip to release the cable. Hold the disk drive backplane while you remove the SAS cables to prevent the disk drive backplane from tipping forward and out of the system.

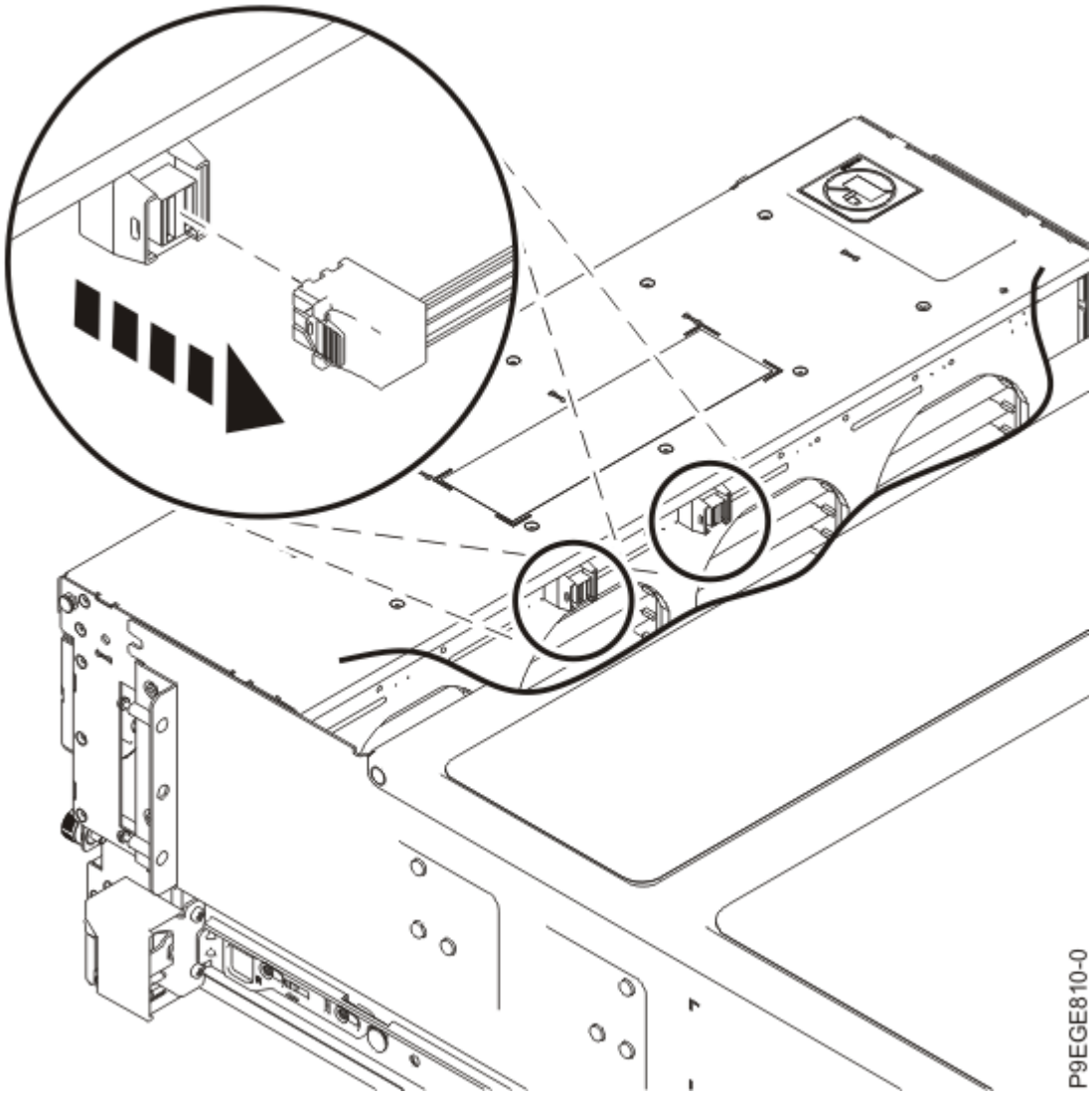

Figure 16. Unplugging the SAS cables from the base function disk drive backplane

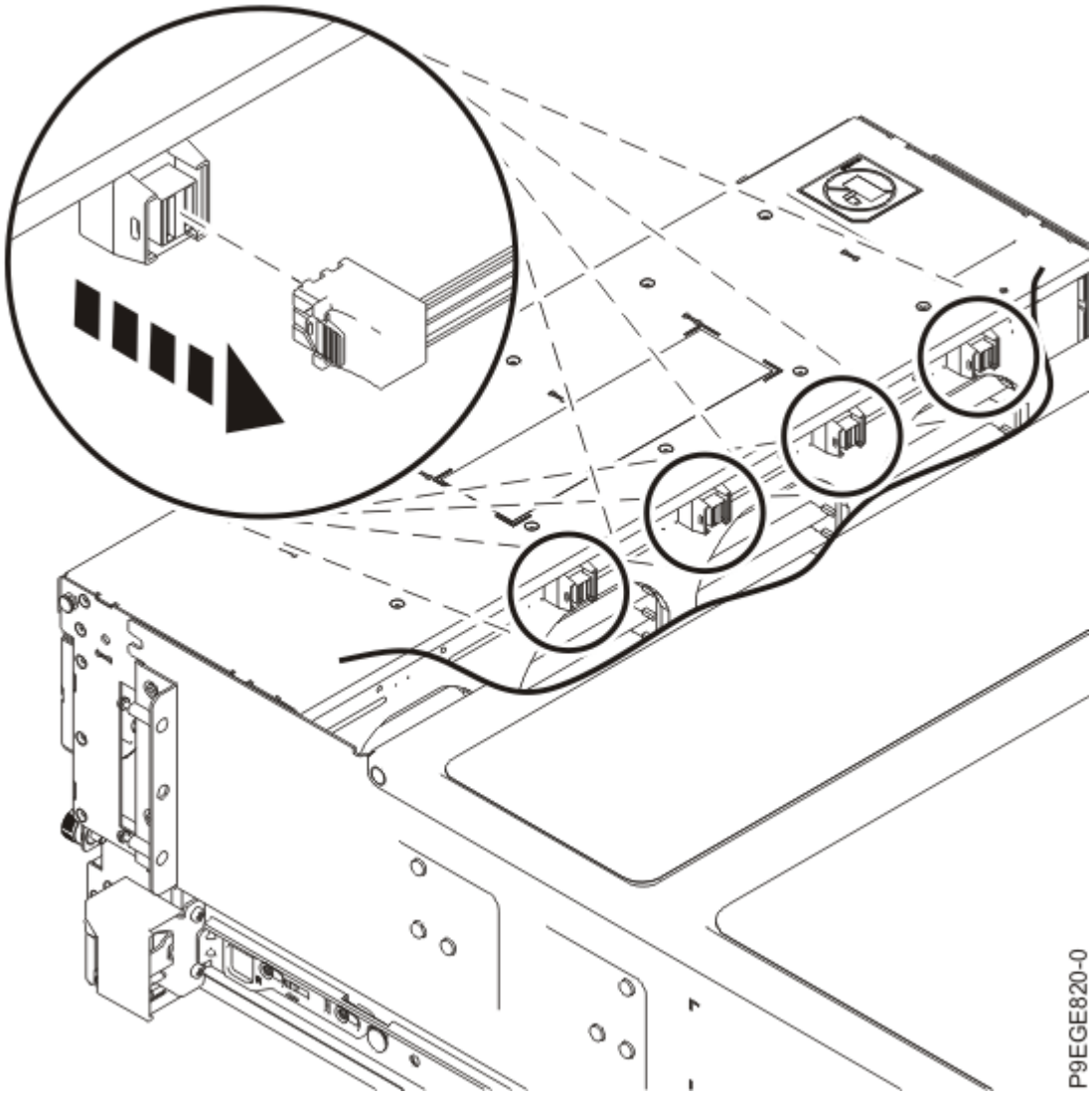

Figure 17. Unplugging the SAS cables from the expanded function disk drive backplane

f) Using two hands, fully remove the disk drive backplane from the system.

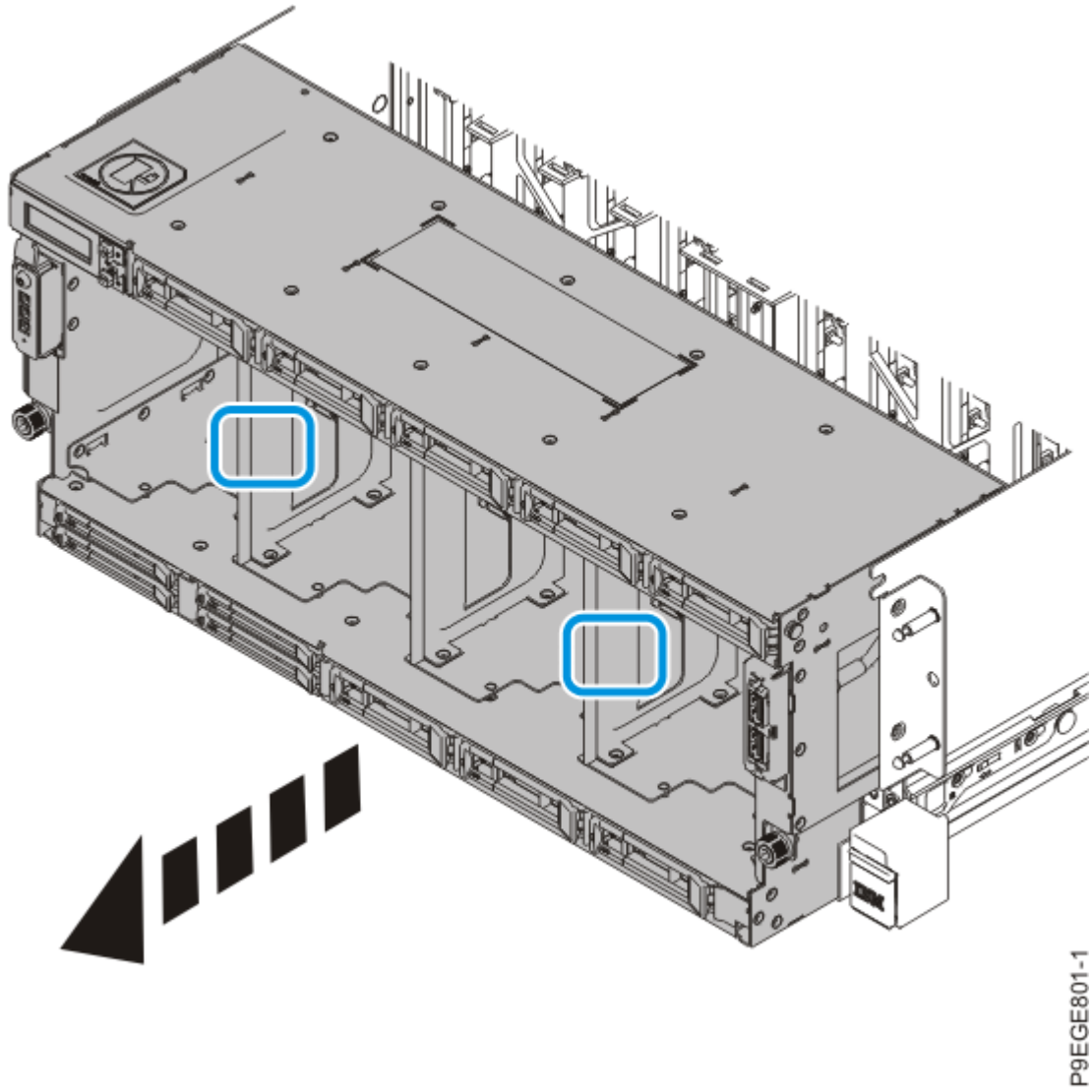

Figure 18. Fully removing the disk drive backplane

g) Place the disk drive backplane on an ESD surface.

16. Install the system-to-rail locking clips onto each rail. The system-to-rail locking clips keep the front end of the system from dislodging from the rails when you move the system into the service position.
    a) On the right side of the rail, pull the blue latch marked **R** (**A**).

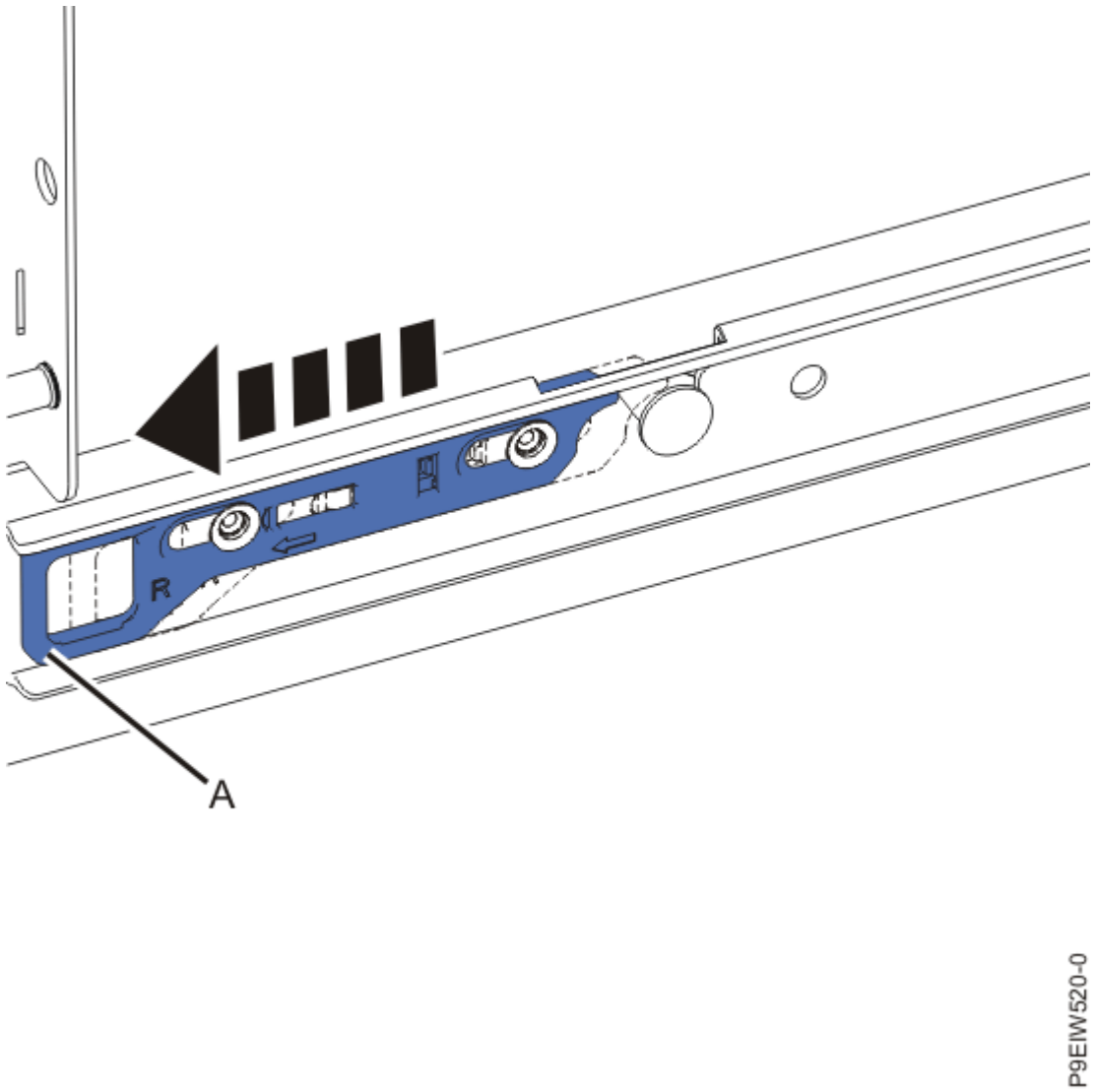

Figure 19. Pulling the blue rail latch

b) Each side of each clip is stamped with an **L** and an **R**. For the right side of the rail, ensure that the side stamped **R** is facing outward.

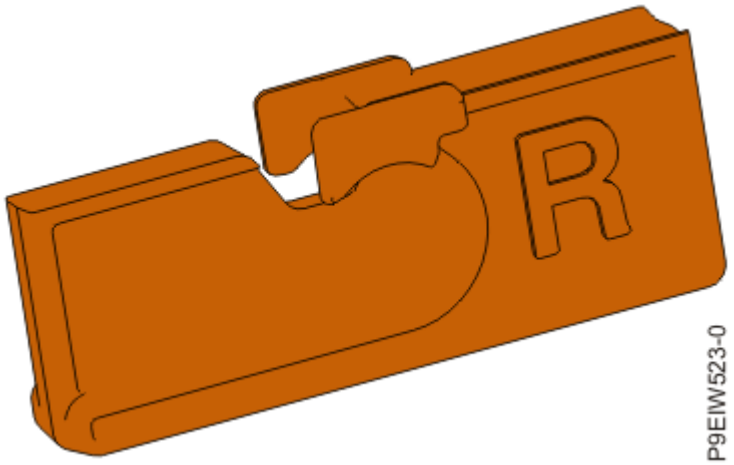

Figure 20. Right system-to-rail locking clip

c) While holding the blue latch (**A**), rotate the clip (**B**) into the rail until it clicks into place.

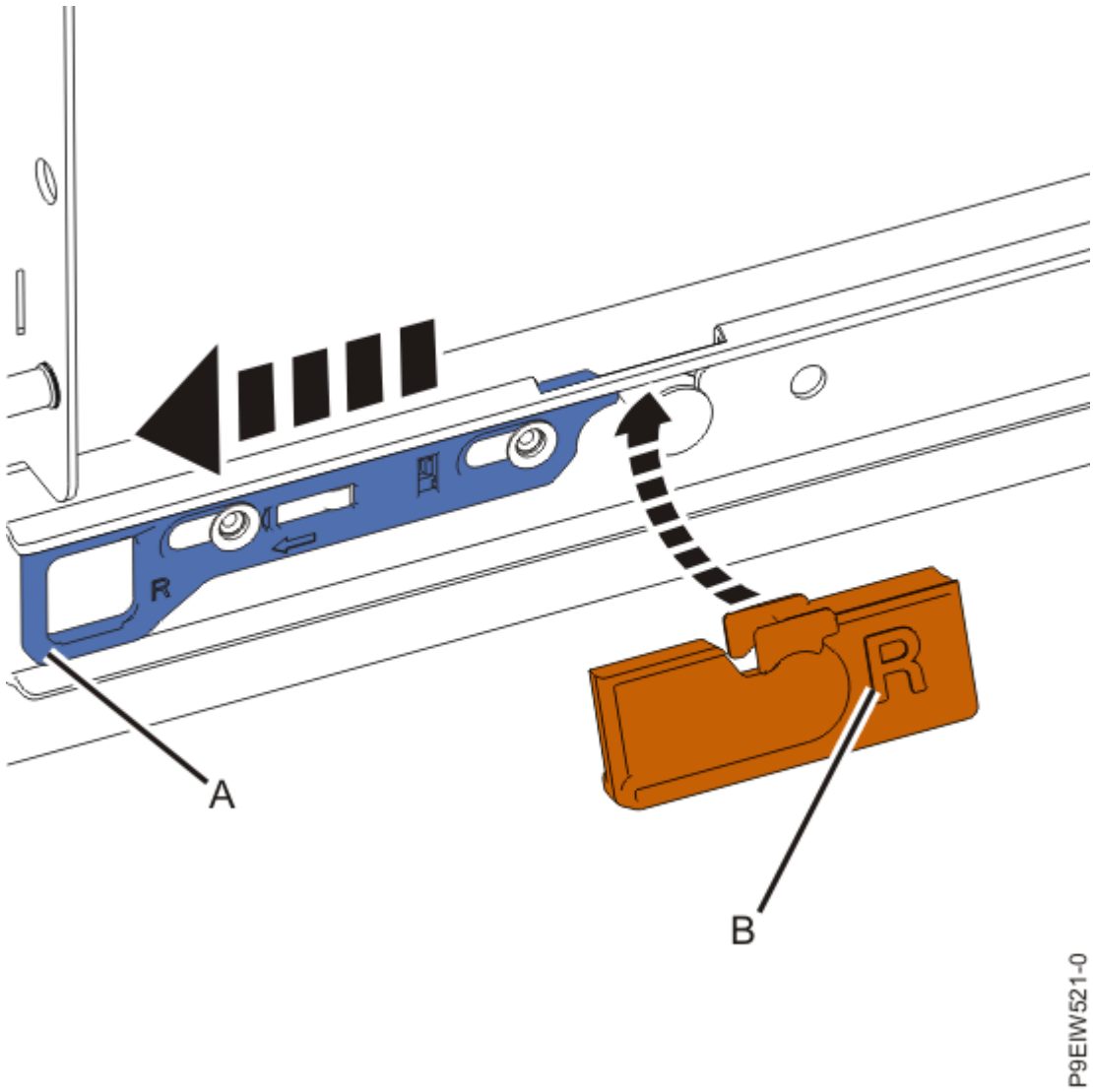

Figure 21. Installing the clip onto the rail

d) Ensure that the clip (**C**) is flush with the rail and that the system chassis pin is seated in the clip, as shown in the following figure.

e) Release the blue latch (**D**).

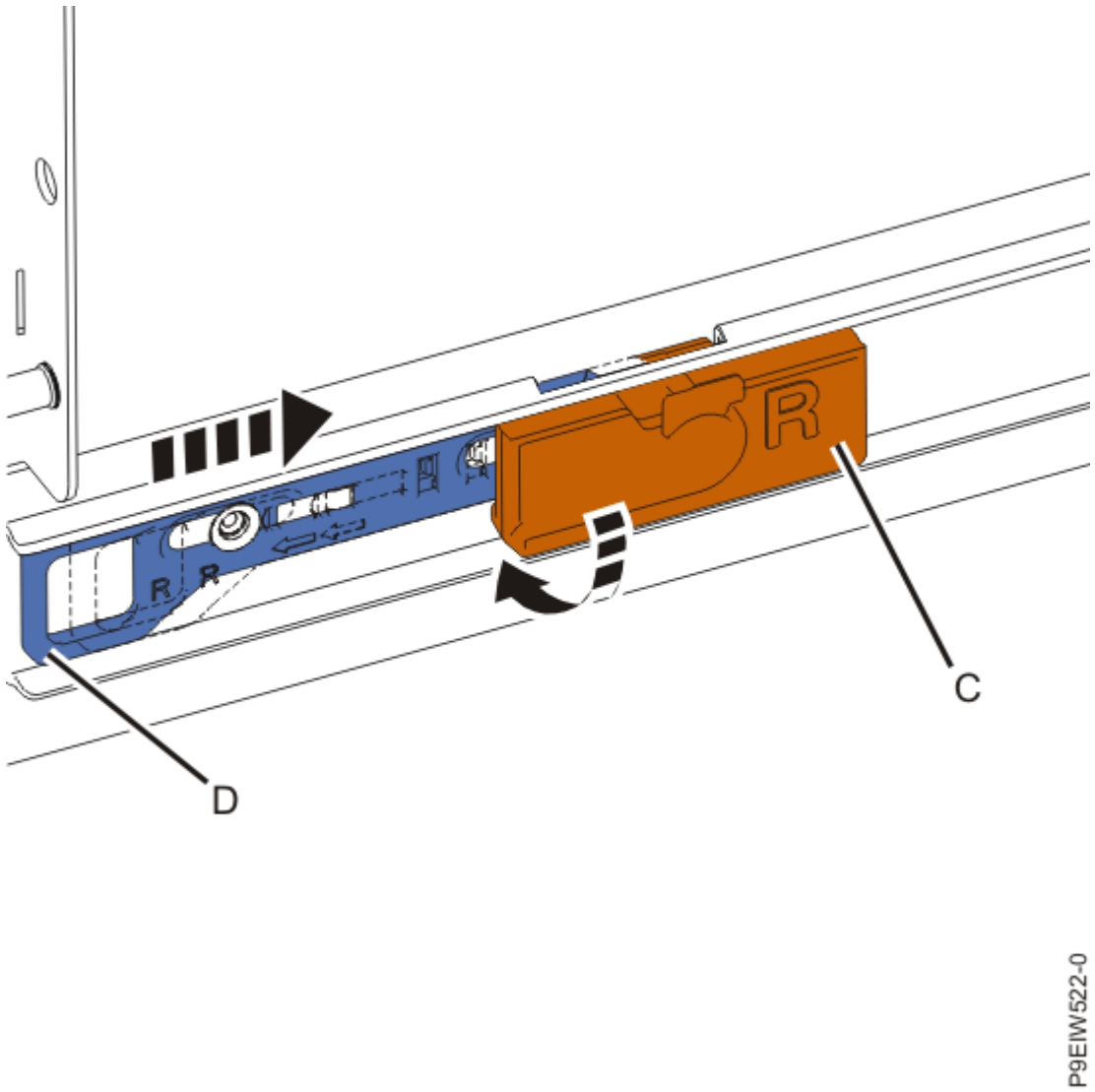

Figure 22. Releasing the blue latch

a) Repeat these steps for the **L** slide rail, using the clip with the side stamped **L** facing outward.

17. Complete the following steps to place the system in the service position.

    Do not pull out or install any drawer or feature if the rack stabilizer brackets are not attached to the rack. Do not pull out more than one drawer at a time. The rack might become unstable if you pull out more than one drawer at a time.

a. If not already removed, remove the shipping screws **(A)** as shown in the following figure by using a Phillips screwdriver.

b. Release the side latches **(B)** by pressing them downward as shown in the following figure.

c. Pull out the system **(C)** as shown in the following figure.

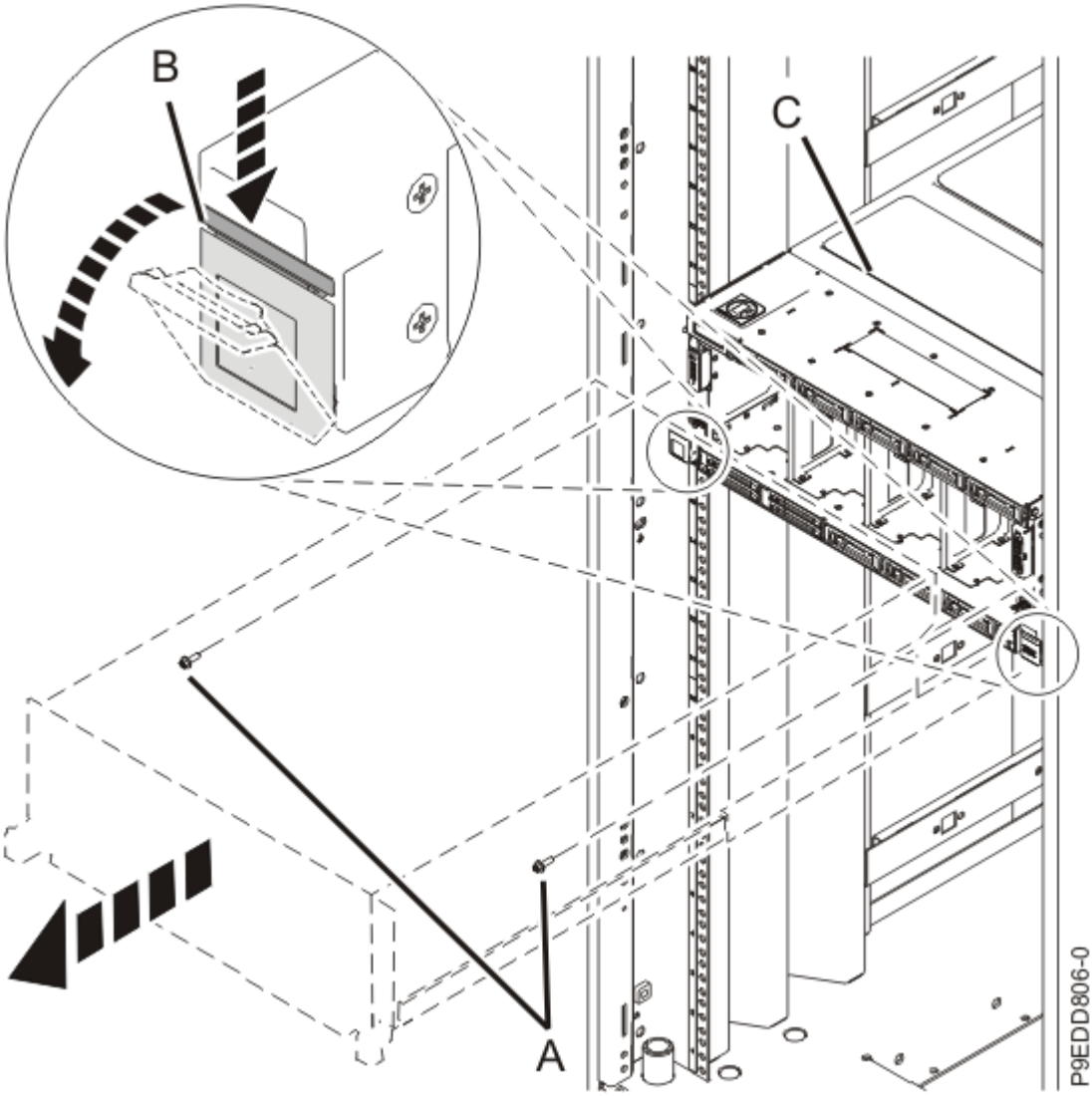

Figure 23. Placing the system in service position

18. Remove the memory voltage regulator modules from locations P1-C25, P1-C30, P1-C31, and P1-C36.

    Tip: As you remove parts from inside the system, take notes about the location for each part. It is important that you replace parts in the exact location from which they were removed.

    a) Unlock the levers **(A)** to release the voltage regulator module from its connector. Refer to the following image.

    b) Rotate the levers in the direction shown.

    c) While holding the voltage regulator module by its levers, pull upward to remove the card from its slot.

    d) Place the voltage regulator module on an appropriate ESD surface.

    e) Repeat steps “18.a” on page 25 through “18.d” on page 25 to remove the remaining memory voltage regulator modules.

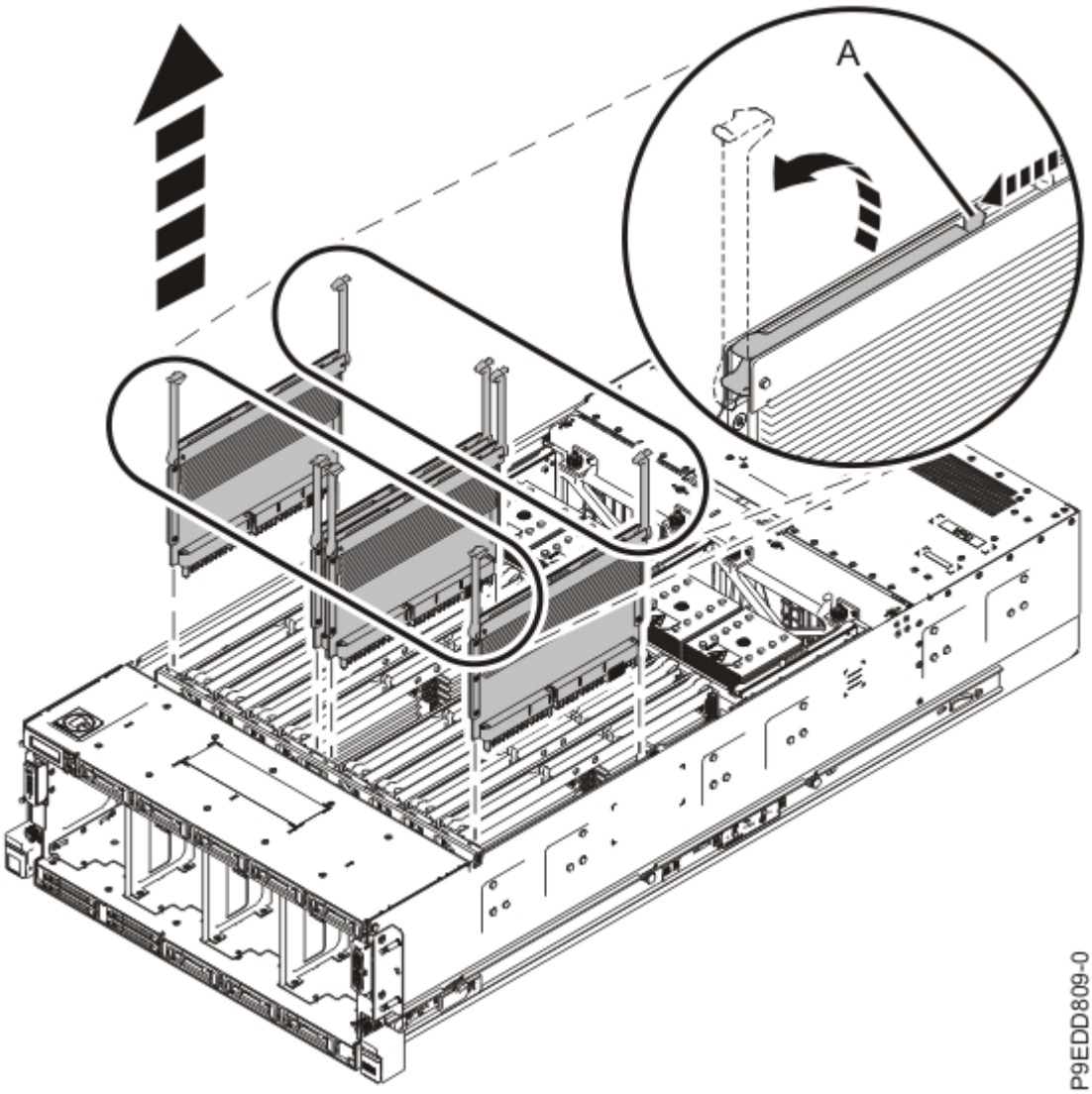

Figure 24. Removing the memory voltage regulator modules

19. Remove the memory module riser cards from locations P1-C26, P1-C27, P1-C28, P1-C29, P1-C32, P1-C33, P1-C34, and P1-C35.

    As you remove the cards, take notes about the locations from which you are removing the memory module riser cards.

    a) Open the release latches **(A)** on the memory module riser card as shown in the following figure.

    Open the latches to the fully upright 90 degree position.

    b) Pull out the memory riser module card from the slot by holding onto the latches.

    c) Place the memory riser module card on an appropriate ESD surface.

    d) Repeat steps “19.a” on page 26 through “19.c” on page 26 for the remaining memory module riser cards.

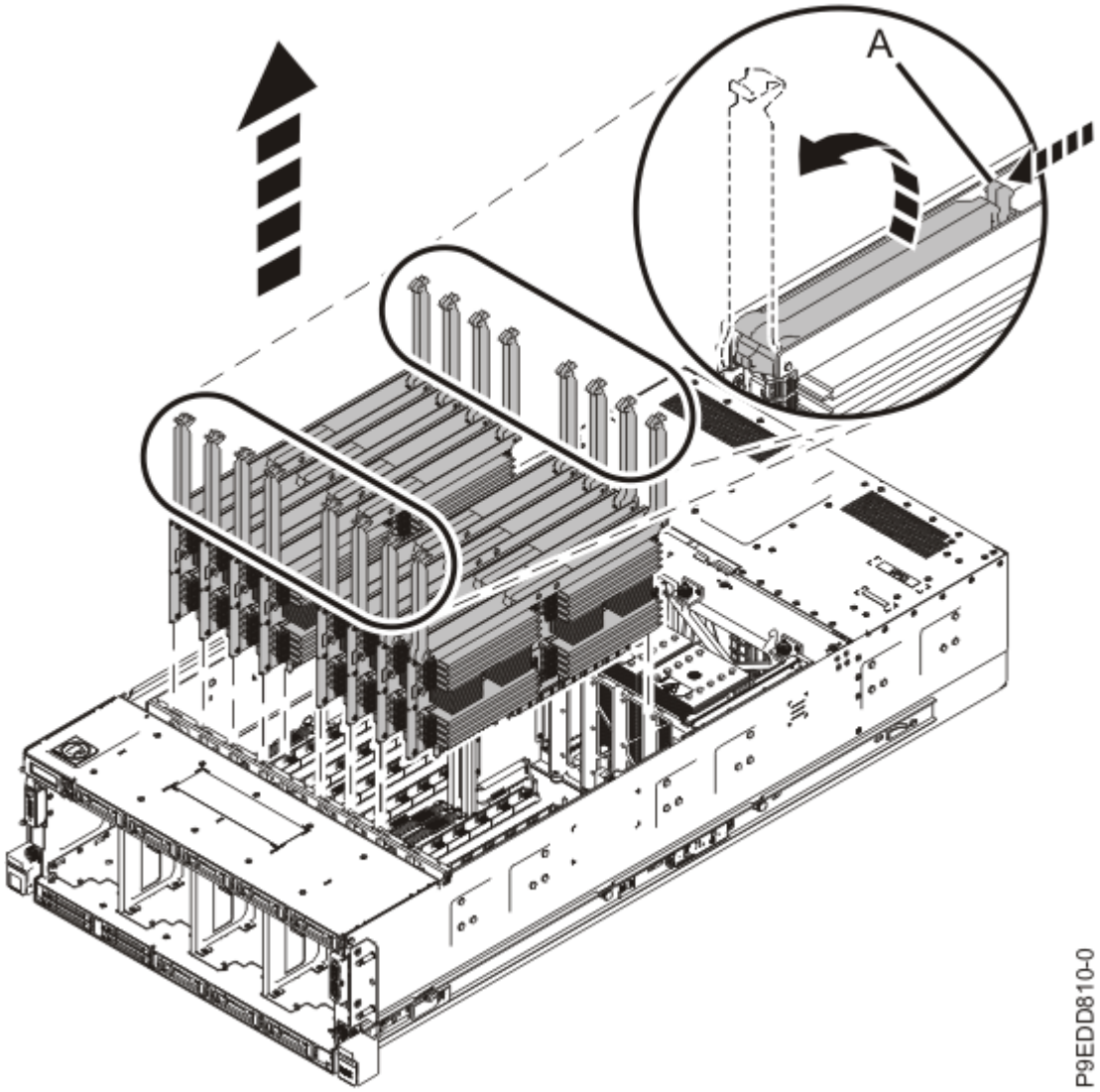

Figure 25. Removing the memory module riser cards

20. Remove the trusted platform module (TPM) card from location P1-C21.
    a) Grasp the TPM card by the plastic housing. Refer to the following image.
    b) Pull the TPM card out of its slot on the system backplane.

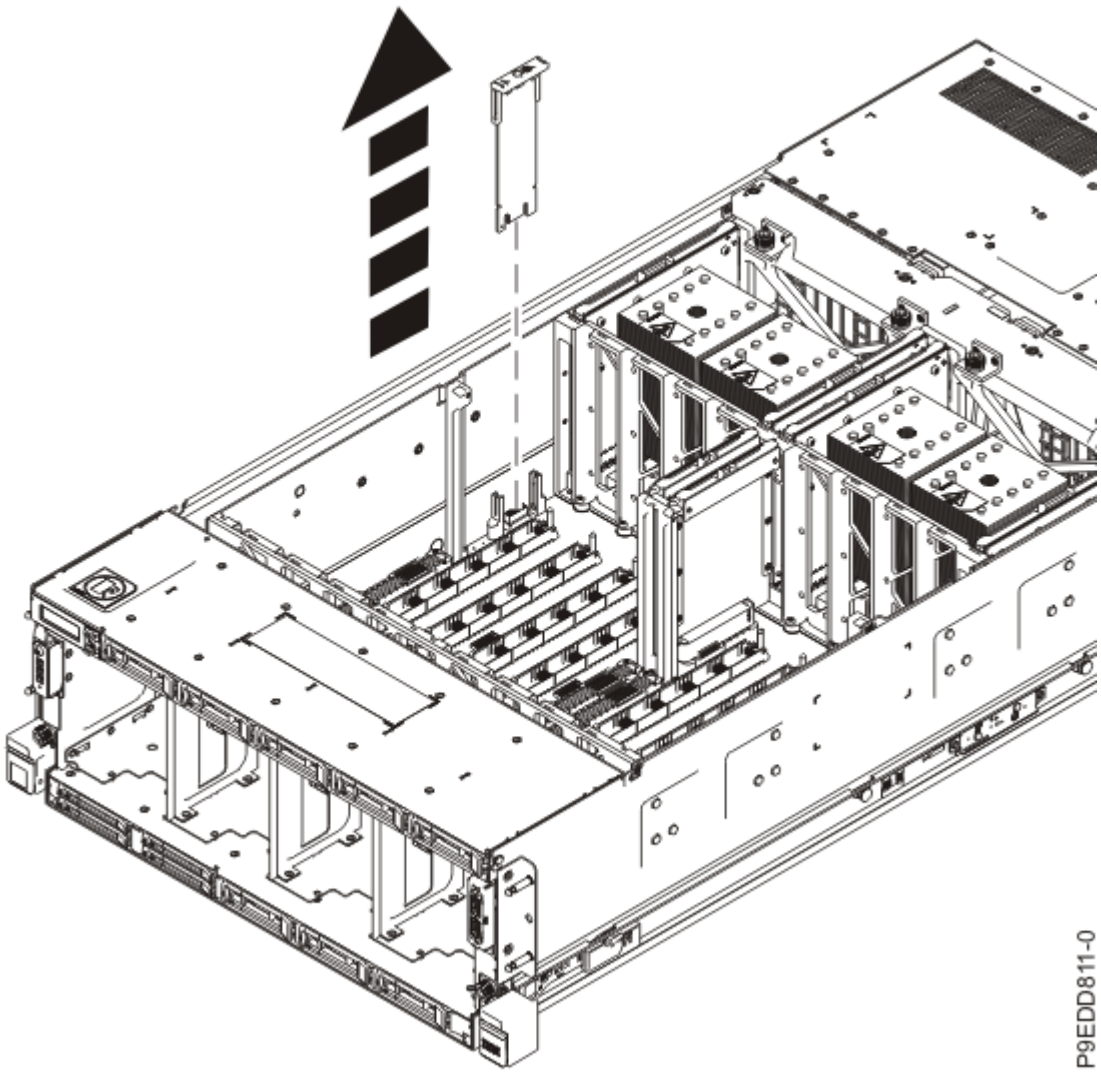

Figure 26. Removing the TPM card

21. Remove the standby voltage regulator module from location P1-C22.
    a) Unlock the levers **(A)** to release the voltage regulator module from its connector. Refer to the following image.
    b) Rotate the levers in the direction shown.
    c) While holding the voltage regulator module by its levers, pull upward to remove the card from its slot.

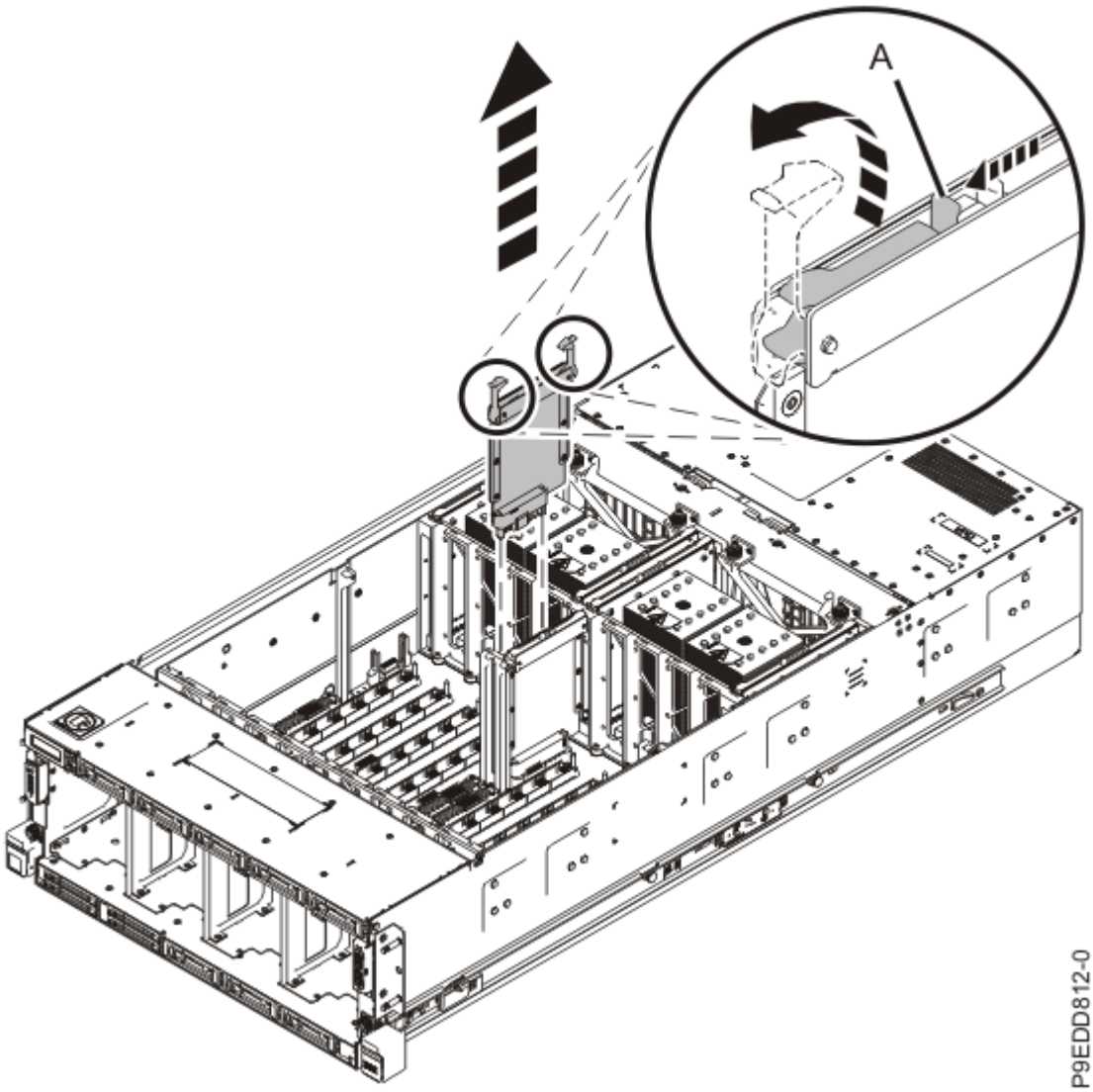

Figure 27. Removing the standby voltage regulator module

22. Remove the I/O voltage regulator module from location P1-C23.
    a) Unlock the levers **(A)** to release the voltage regulator module from its connector. Refer to the following image.
    b) Rotate the levers in the direction shown.
    c) While holding the voltage regulator module by its levers, pull upward to remove the card from its slot.

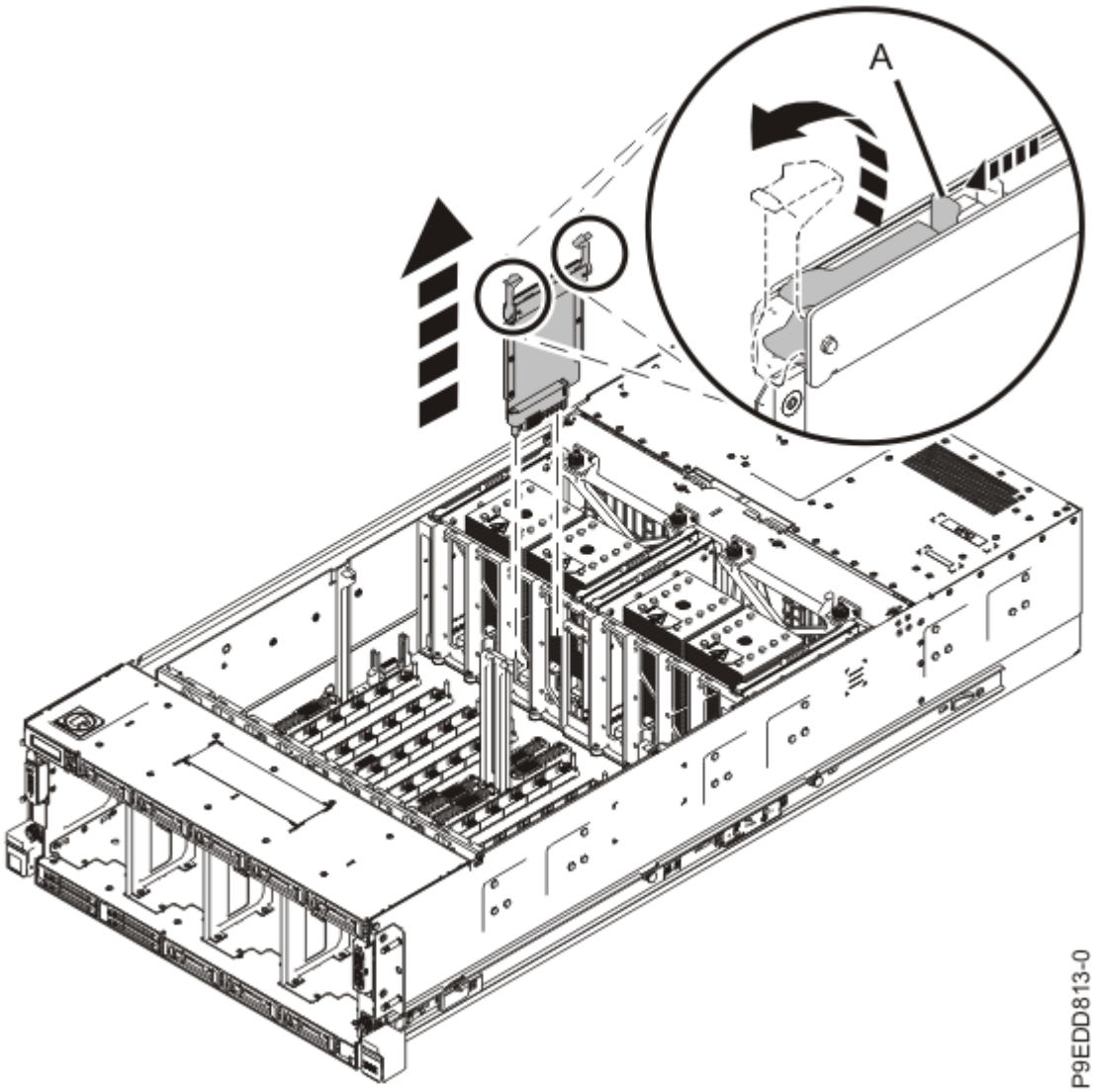

Figure 28. Removing the I/O voltage regulator module

23. Disconnect the rear USB cable.
    a) Press the cable release **(A)** to disconnect the rear USB cable from the system backplane as shown in the following figure.

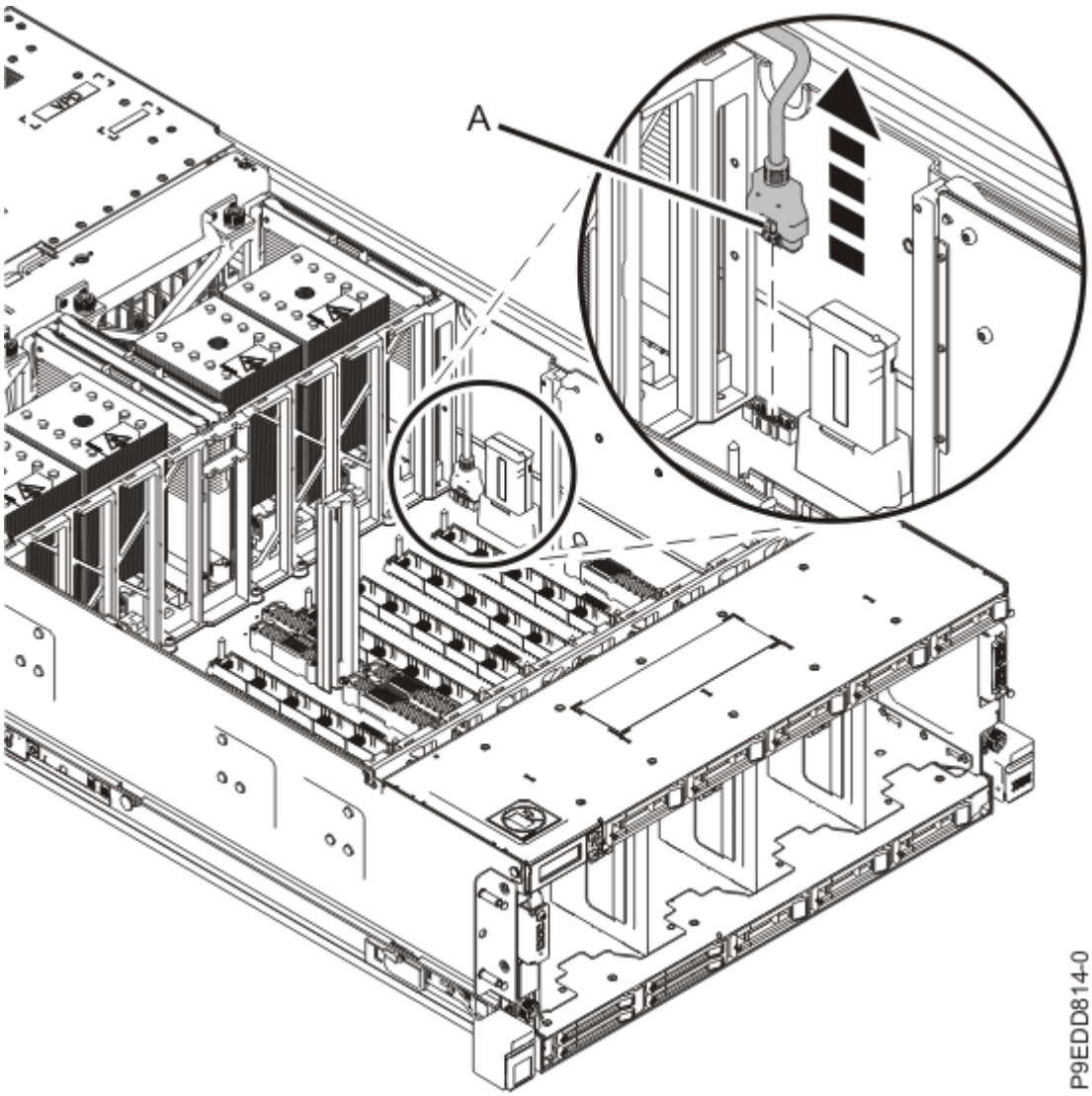

Figure 29. Disconnecting the rear USB cable from the system backplane

b) Route the rear USB cable over the side of the system to prevent it from interfering with the removal of the system backplane.

24. Remove the vital product data (VPD) card from location P1-C24.
    a) Grasp the VPD card by the plastic housing. Refer to the following image.
    b) Pull the VPD card out of its slot on the system backplane.

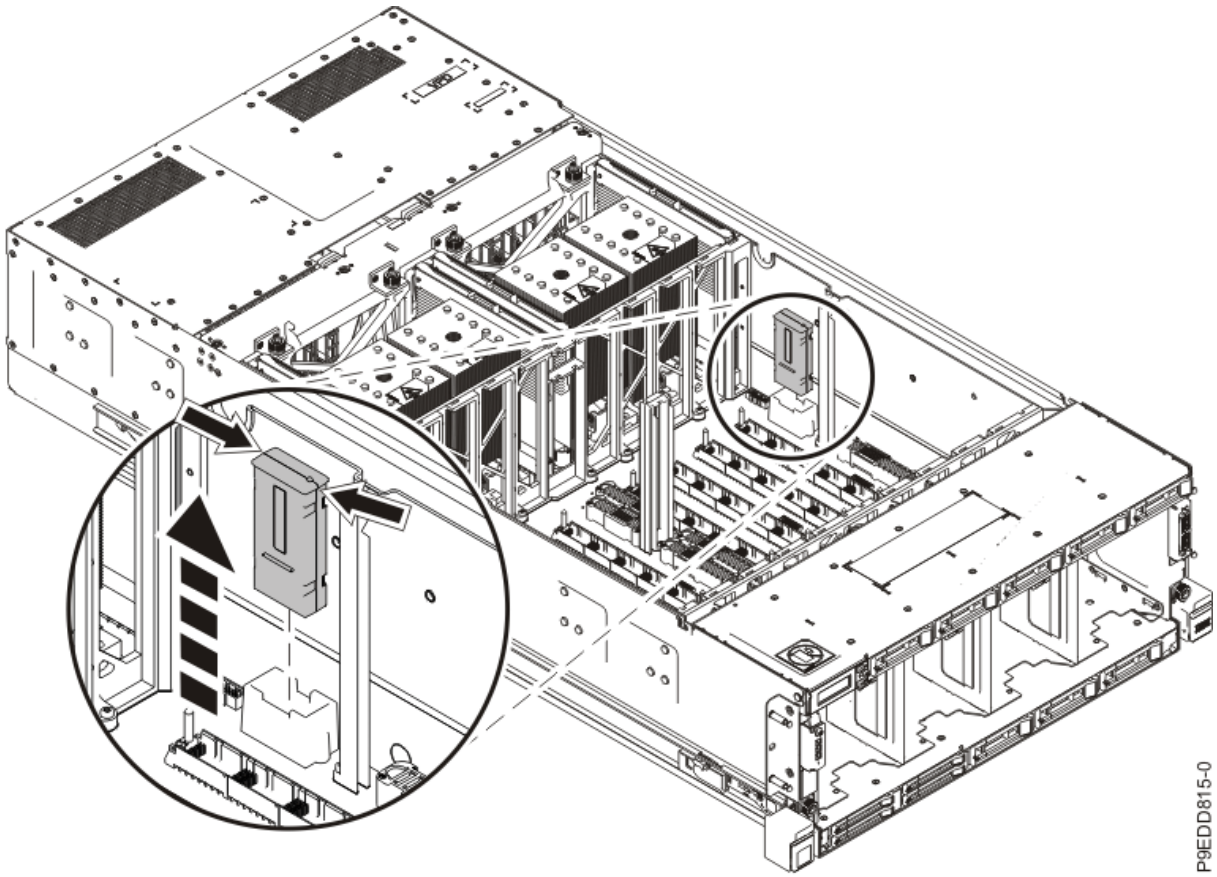

Figure 30. Removing the VPD card

25. Remove the processor voltage regulator modules or processor voltage regulator fillers from locations P1-C13, P1-C16, P1-C17, and P1-C20.
    a) Unlock the levers **(A)** to release the voltage regulator module or filler from its connector. Refer to the following image.
    b) Rotate the levers in the direction shown.
    c) While holding the voltage regulator module or filler by its levers, pull upward to remove the voltage regulator module or filler from its slot.
    d) Place the voltage regulator module or filler on an appropriate ESD surface.
    e) Repeat steps “25.a” on page 32 through “25.d” on page 32 to remove the remaining processor voltage regulator modules or fillers.

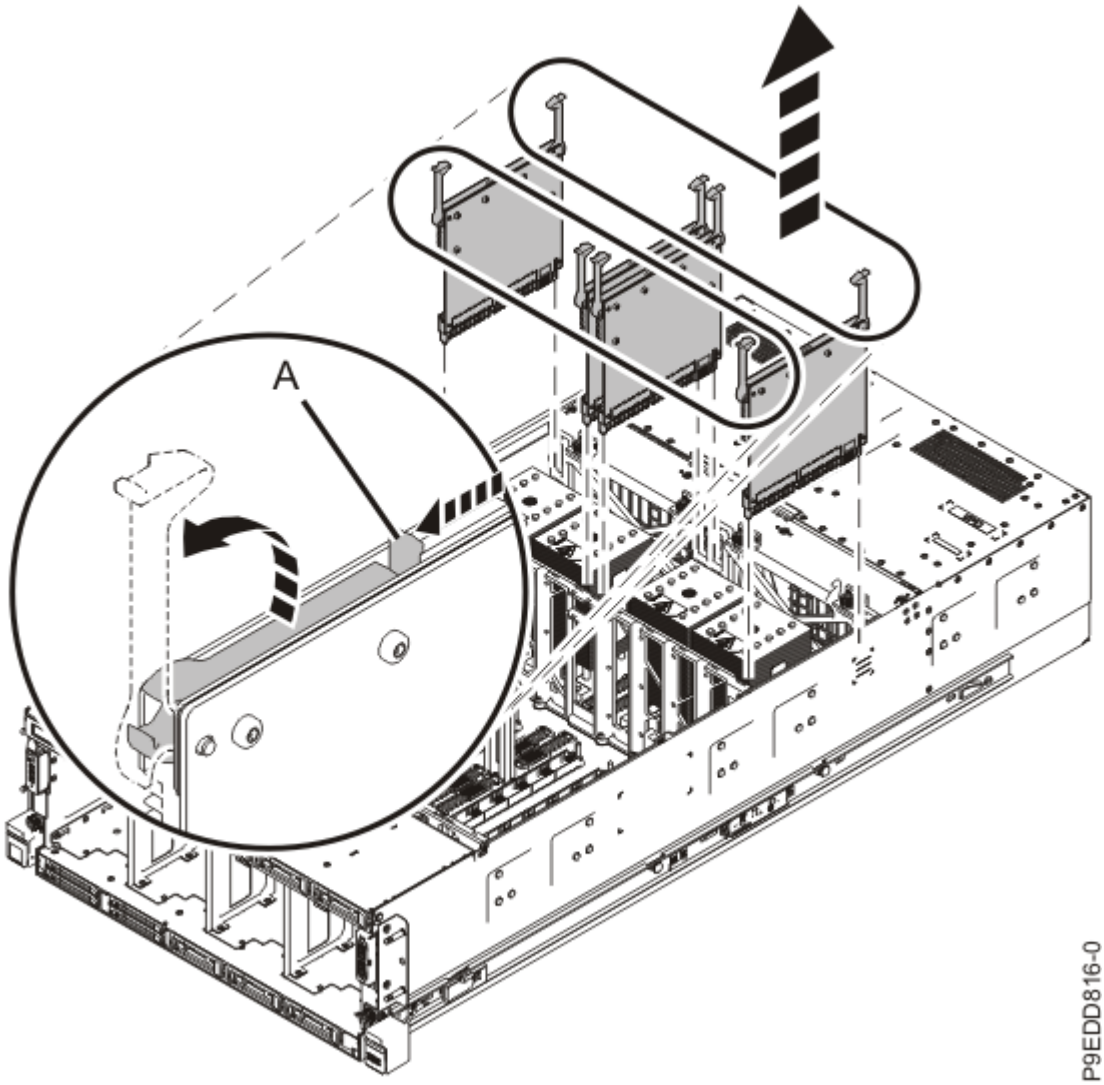

Figure 31. Removing the processor voltage regulator modules or fillers

26. Remove the heat sink and TIM from the system processor in location P1-C18. As you face the front of the system, location P1-C18 is the third processor from the left.
    a) Loosen the heat sink actuation screw by turning the supplied hex key counterclockwise **(A)**. Loosen the screw until it moves freely. Refer to the following image.
    b) Grip the heat sink **(B)** on opposing sides and remove the heat sink by lifting it upward. Set the heat sink aside with the module side facing upward.
    c) If the thermal interface material (TIM) is still sitting on top of the system processor module after you remove the heat sink, use tweezers to remove it.

       Important: The heat sink and TIM cannot be reused. The SAS cable kit includes a new heat sink and TIM.

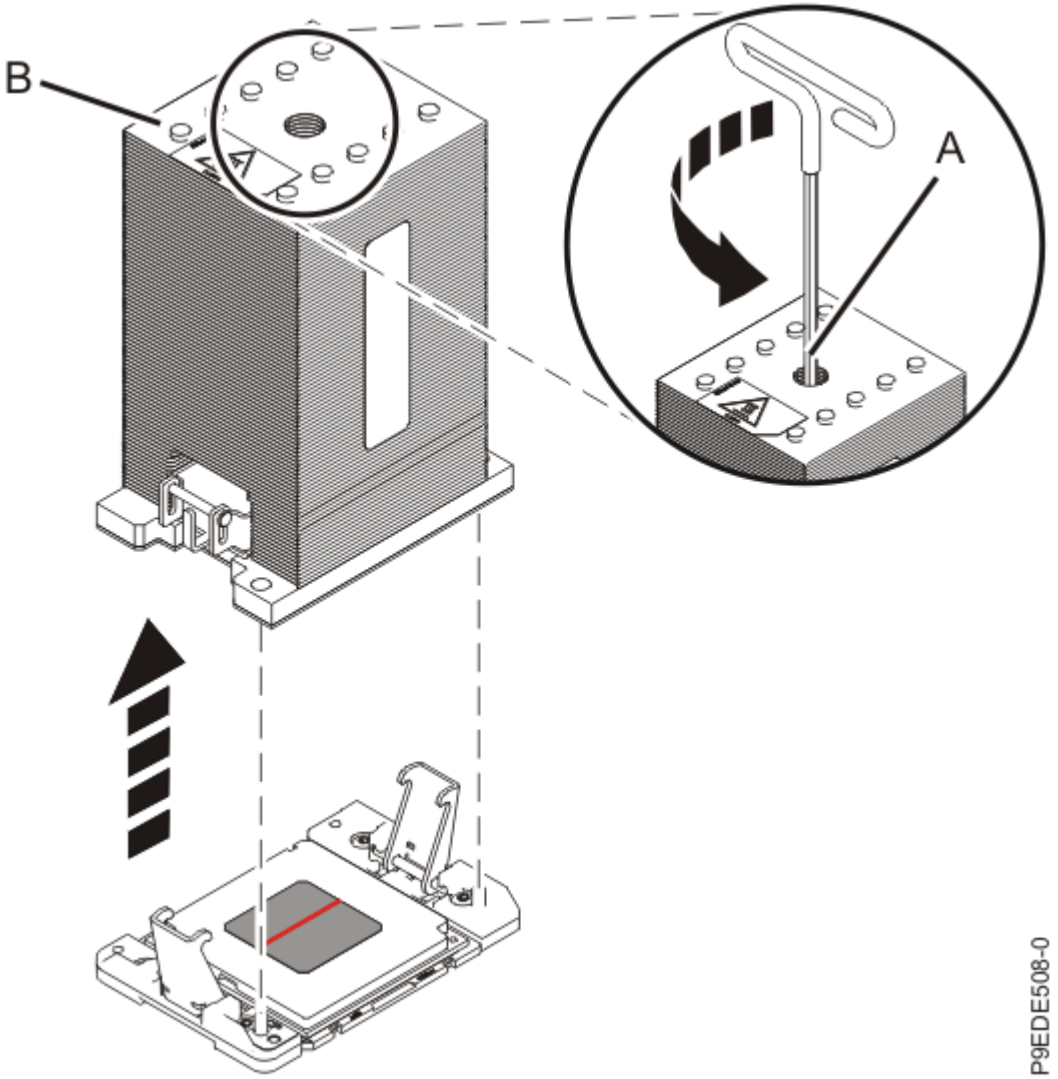

Figure 32. Removing the heat sink

27. Remove the system processor module in location P1-C18.
    a) Open the system processor module tray package, which was included with the SAS cable kit.
    b) Place the bottom of the system processor module tray on an appropriate ESD surface so that the guide pins face upwards, as shown in the following figure.

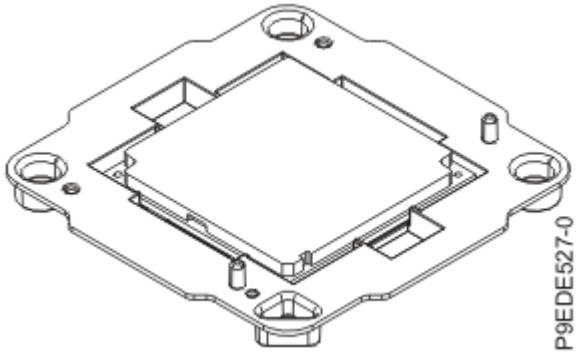

Figure 33. Placing the bottom of the system processor module tray so that the guide pins face upwards

    c) Ensure that the system processor removal tool **(A)** is in the open position as shown in the following figure. The middle ring **(B)** must be pushed down and blue tabs **(C)** must be turned inward.

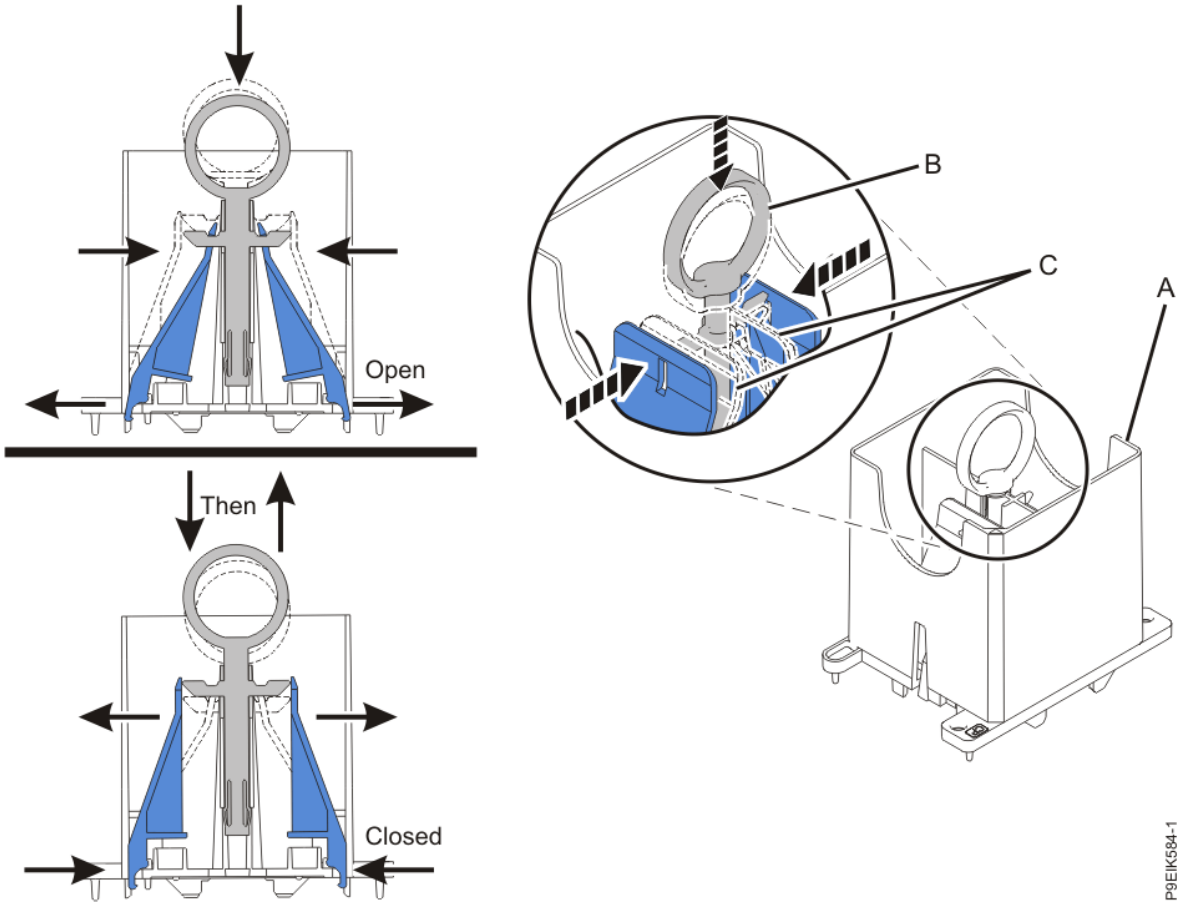

Figure 34. Ensuring that the removal tool is in the open position

d) Align the tool over the system processor module.

   Ensure that the beveled edge on the tool aligns with the beveled edge of the processor **(C)** as shown in the following figure.

e) Lower the tool over the system processor module.

   Ensure that the two guide pins **(A)** insert into the alignment holes **(B)** on each side of the tool as shown in the following figure.

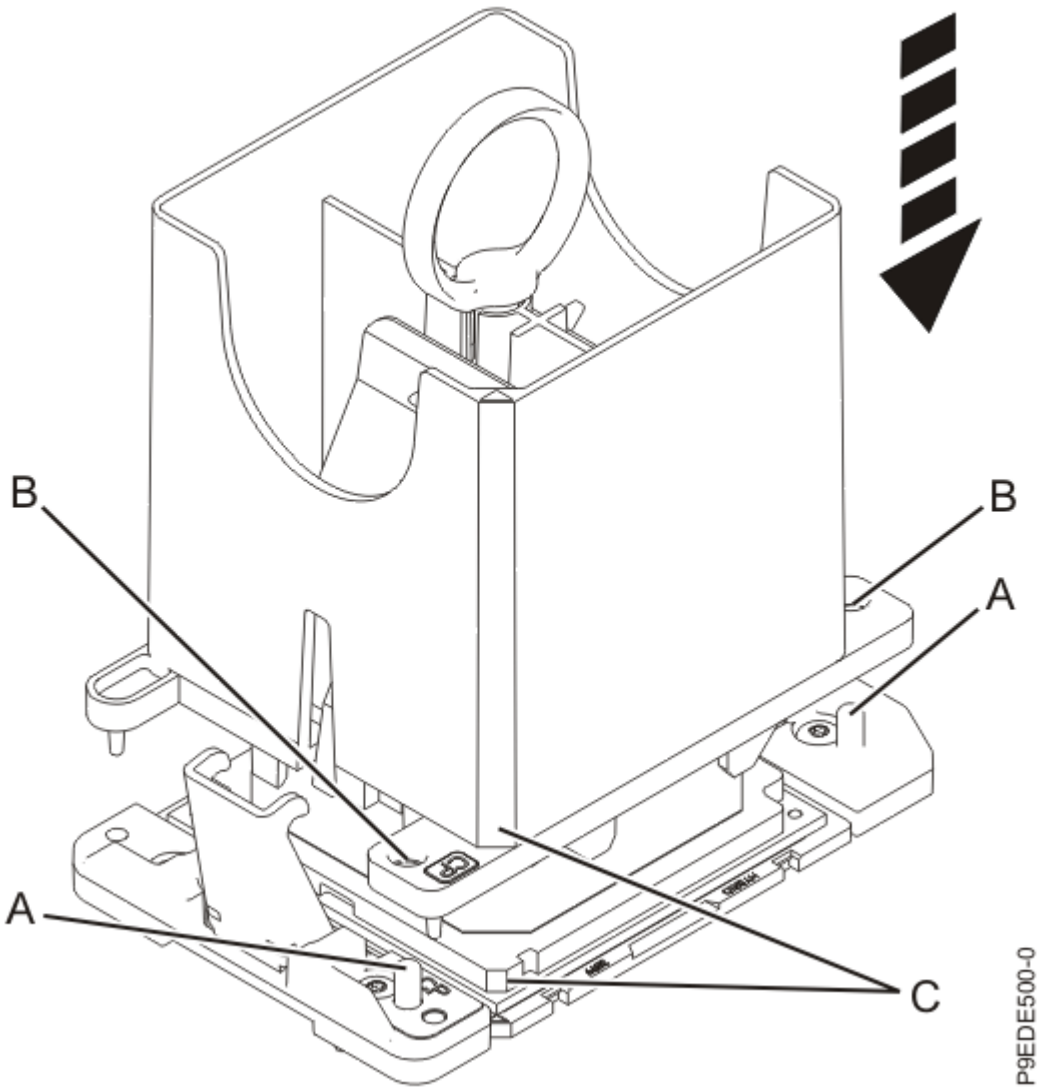

Figure 35. Lowering the removal tool onto the system processor module

f) With the removal tool sitting on top of the system processor module, push down on the ring **(A)** slightly so that the blue tabs **(B)** snap outward and the jaws engage with the system processor module as shown in the following figure.

Make sure that both of the tool jaws are locked onto the system processor module by pushing down on the tool.

Important: Do not press the blue release ring until directed to do so later.

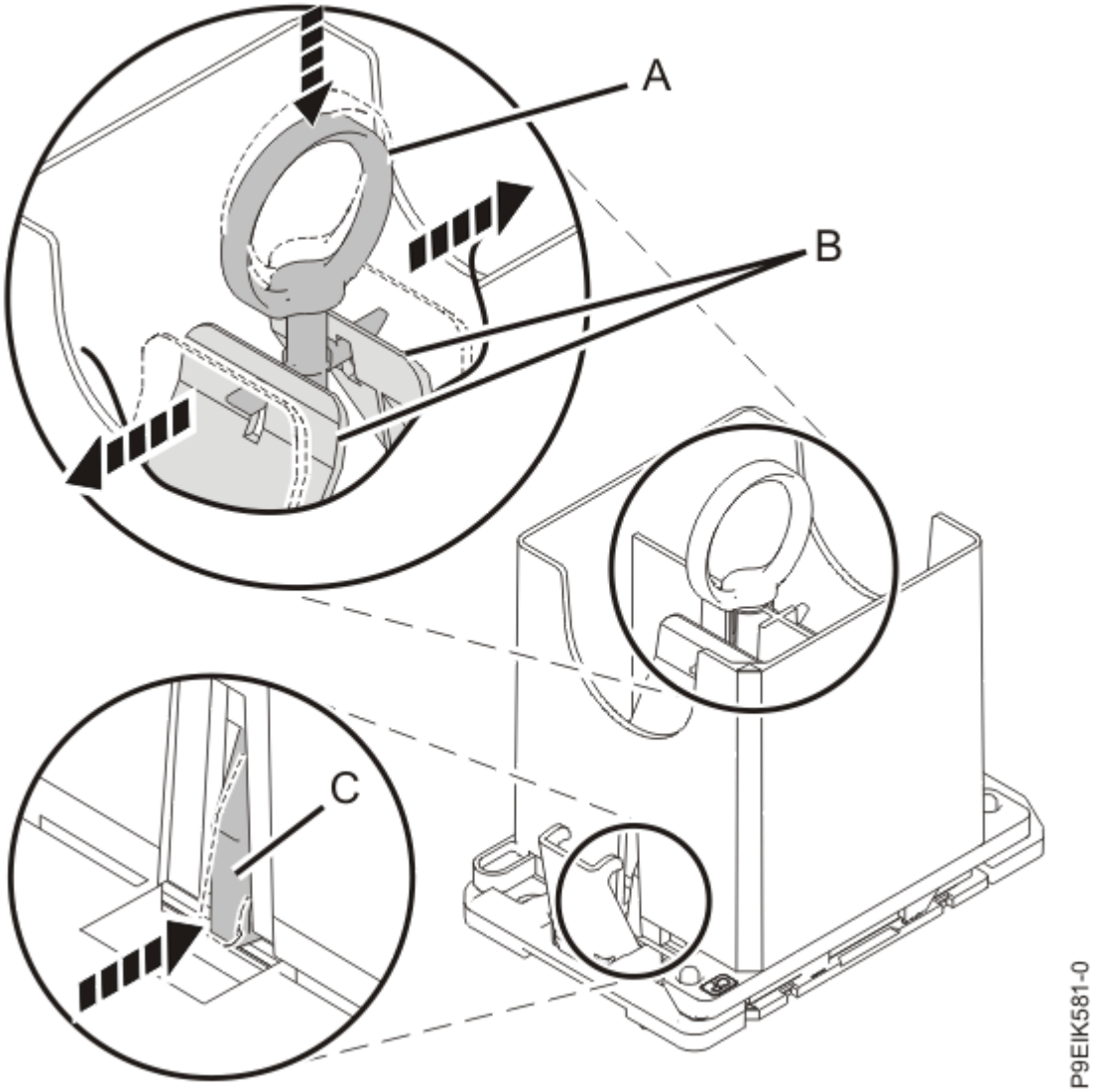

Figure 36. Locking the system processor module into the tool

g) Hold the outside of the tool and lift the tool and system processor module from the socket.

Lift the tool upward slowly to ensure that the jaws are fully engaged with the system processor module. Ensure that the system processor module does not disengage and fall back into the socket of the system processor module. If the system processor module falls back into the socket of system processor module, the pins might be damaged.

Place the system processor module at an angle on the system processor module tray as shown in the following figure. Setting the tool and system processor module at an angle on the system processor module tray makes it easier to place the system processor module in the tray.

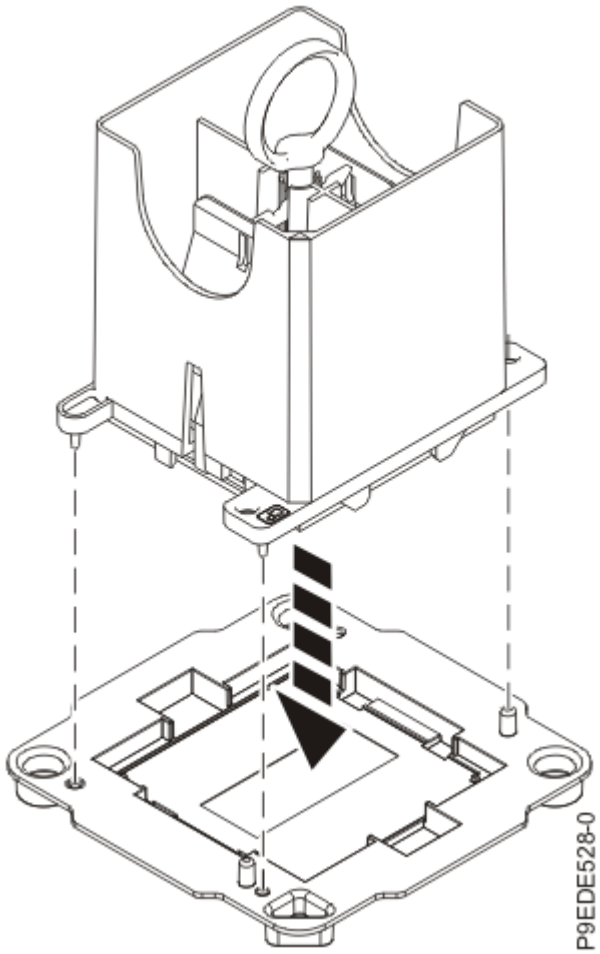

Figure 37. Placing the tool at an angle on the system processor module tray

h) Release the system processor module by pushing the ring **(B)** downwards. Hold the ring **(B)** down while pushing the blue tabs **(C)** inwards as shown in the following figure. Ensure that the ring catches the openings on the blue tabs, and that the blue tabs are locked in a fixed position.

   To prevent the system processor module from falling, pull up on the round lever before you place the tool on the system processor module tray.

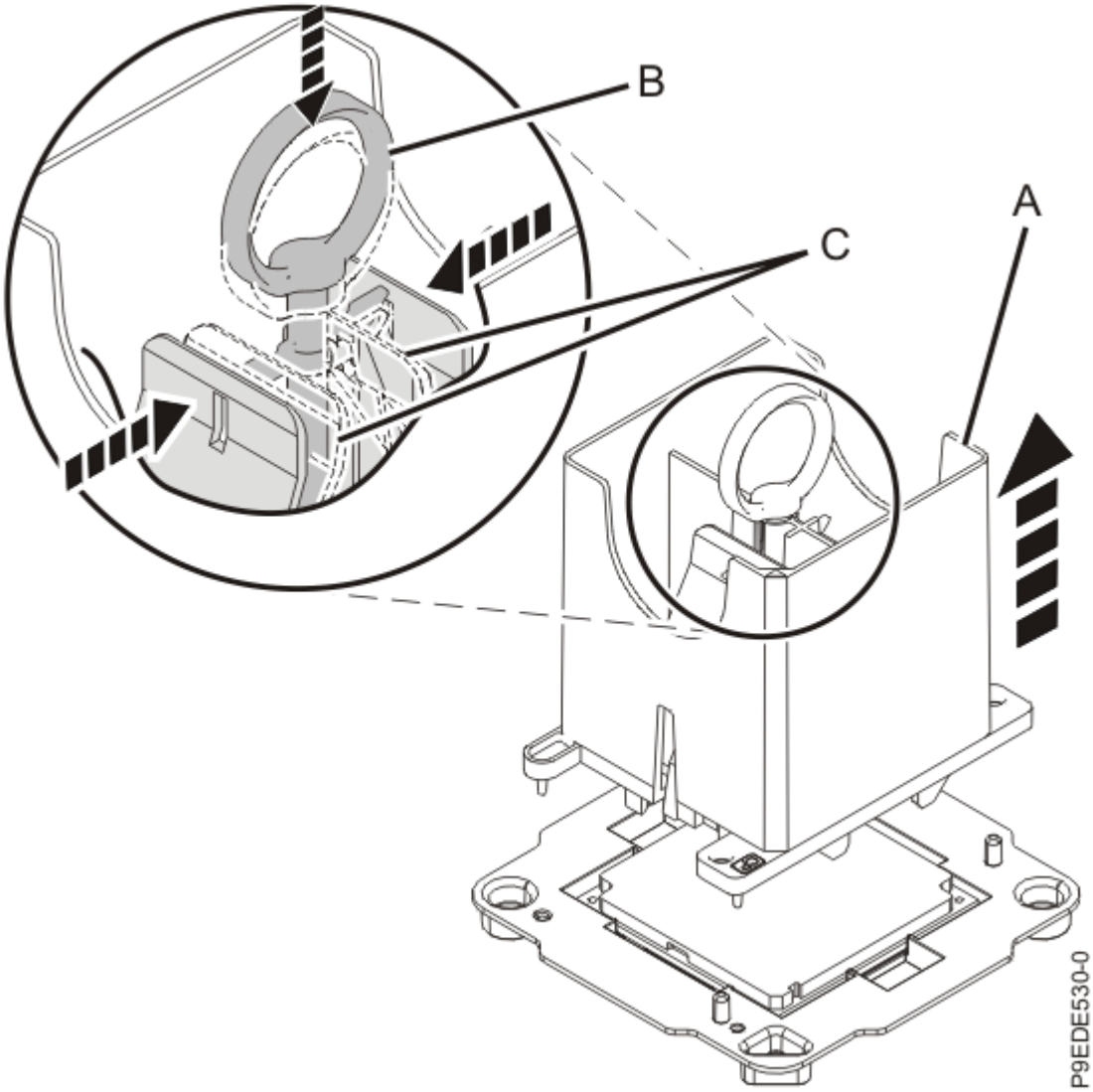

Figure 38. Releasing the system processor module from the tool

28. Install a socket dust cover in location P1-C18. Lower the socket dust cover over one of the sockets on the system backplane and ensure that the holes **(B)** on the socket dust cover align with the two guide pins **(A)** on the system backplane. Push straight down until the latches **(D)** on the socket dust cover engage with the latches **(C)** on the backplane. Refer to the following figure.

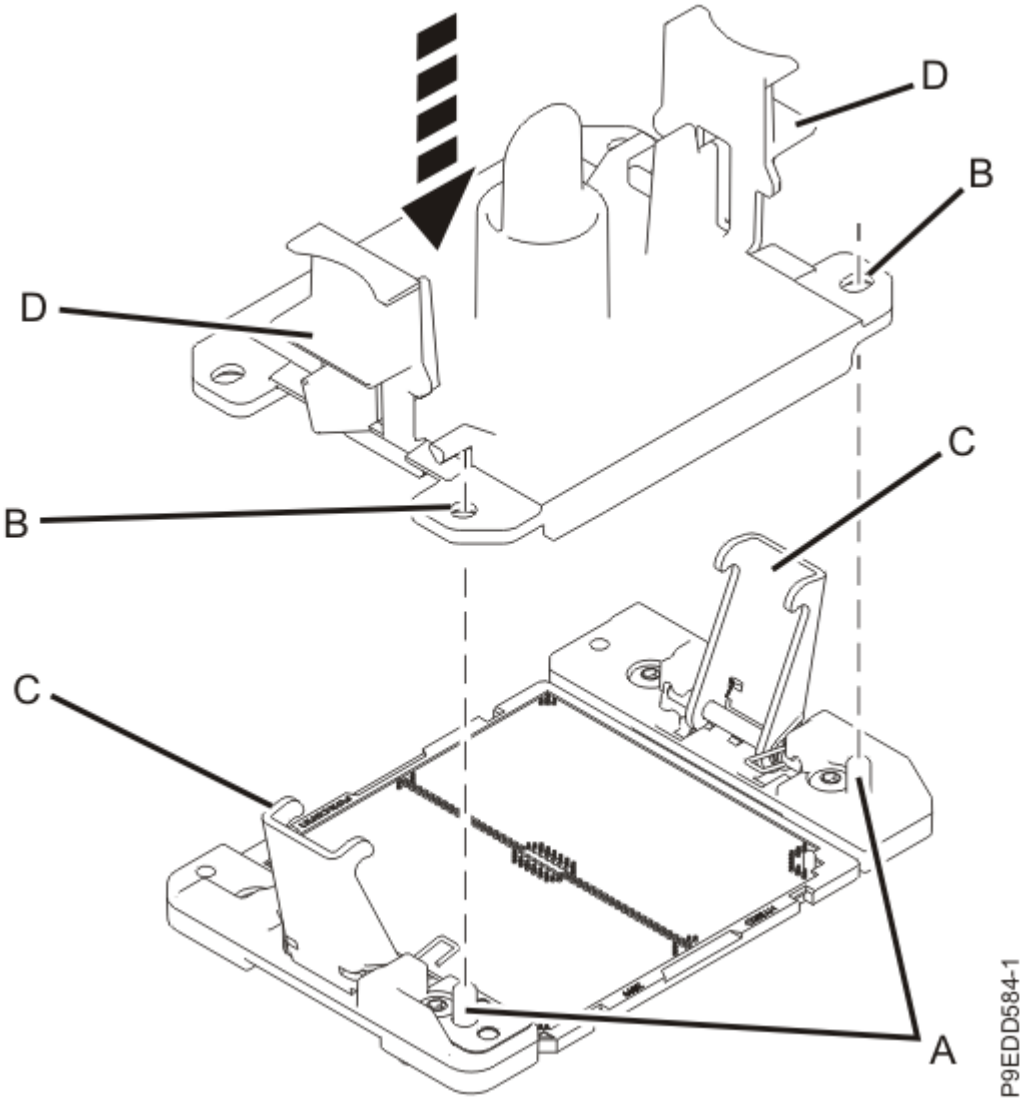

Figure 39. Placing a dust cover on the system processor module socket on the system backplane

29. Remove the power midplane.
    a) Unplug the cable from its connector on the power midplane.

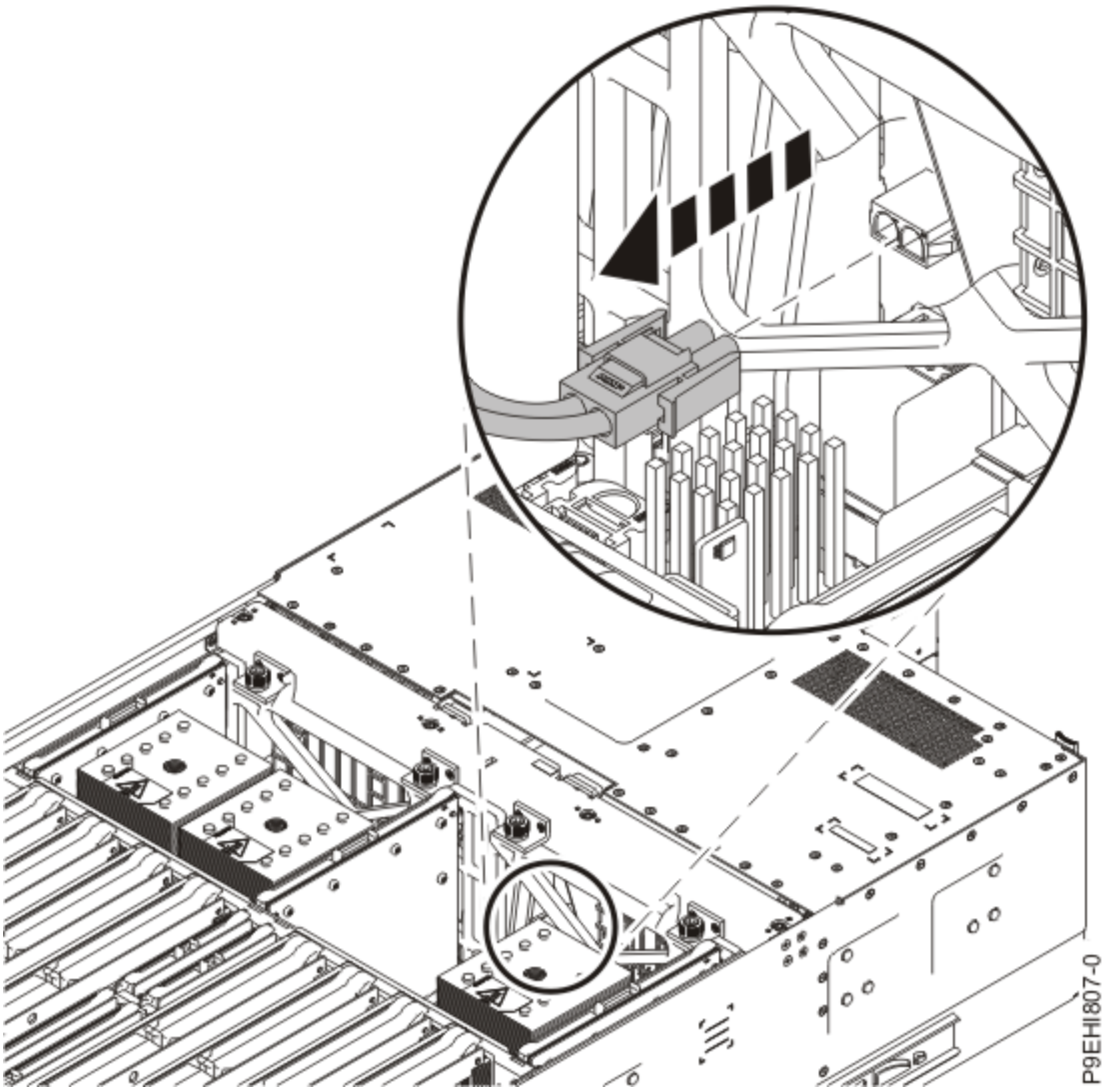

Figure 40. Unplugging the cable from its connector on the power midplane

b) Using a 4mm Hex driver, loosen the four captive screws **(A)** on the power midplane bulkhead. The screws attach the power midplane to the system chassis. Refer to the following image.

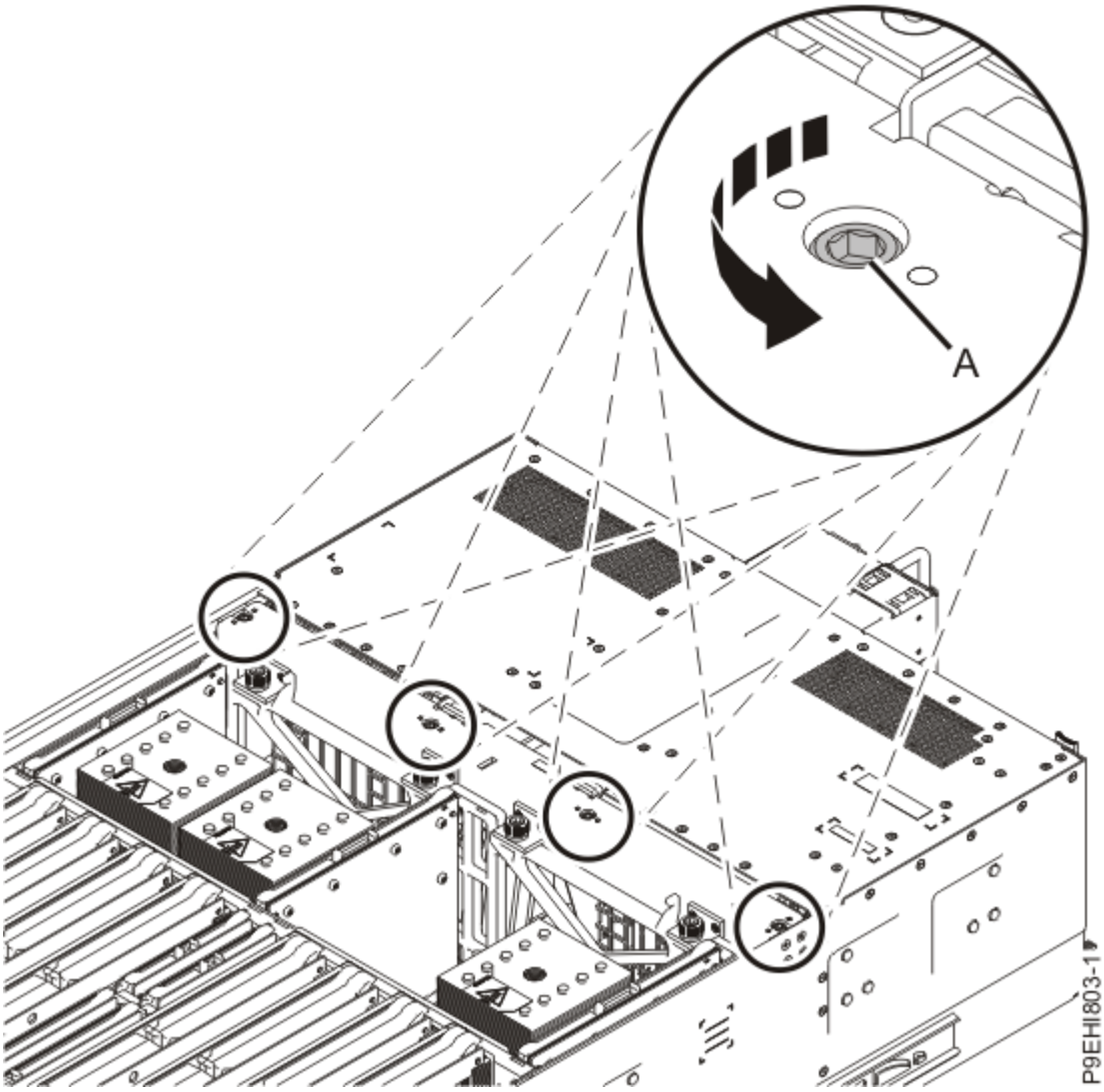

Figure 41. Loosening the captive screws on the power midplane bulkhead

c) Using a 4mm Hex driver, loosen the four thumbscrews **(B)** that secure the power midplane to the metal brackets inside the system.

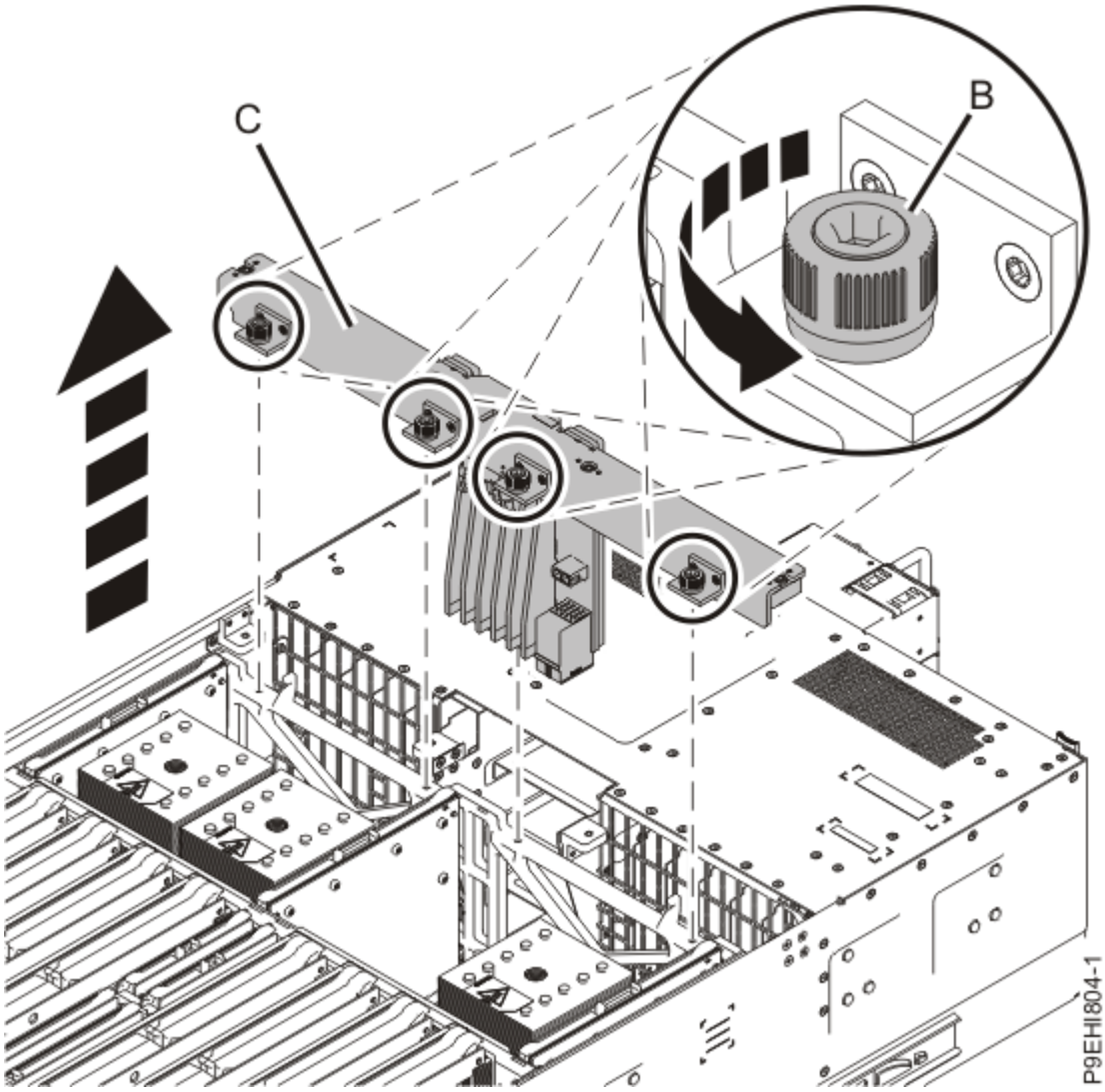

Figure 42. Loosening the thumbscrews and removing the power midplane

d) Lift the power midplane by its bulkhead **(C)** and pull it out of the system. Refer to the previous image.

Note: You might find it helpful to tilt the power midplane forward as you lift it out of the system.

e) Place the power midplane on an appropriate ESD surface.

30. Remove the system backplane.

a) Using a 4 mm Hex driver, loosen but do not remove the four captive screws **(A)** that mount the backplane to the chassis. Refer to the following image for the location of the screws.

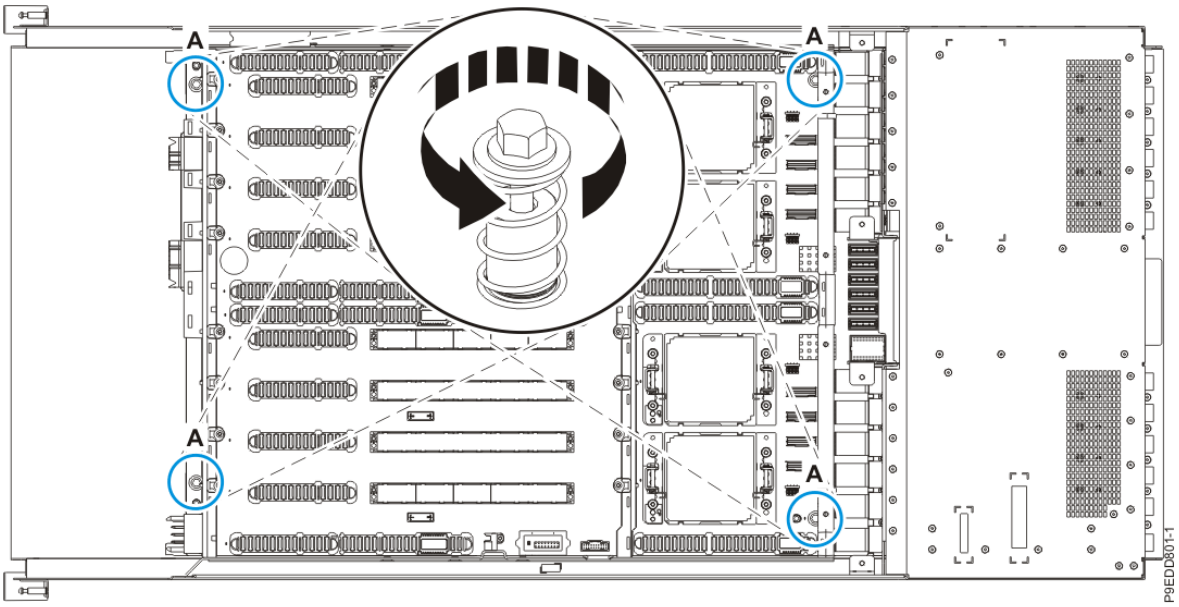

Figure 43. System backplane screw locations

b) Grasp the system backplane by the front **(A)** or middle **(B)** metal bulkheads and the rear metal bulkhead **(C)**. Lift straight up to disengage the four alignment pins from the bottom of the chassis.

Note: After you remove the heat sink from location P1-C18, the weight of the system backplane is no longer evenly distributed. Use caution as you lift the system backplane out of the chassis.

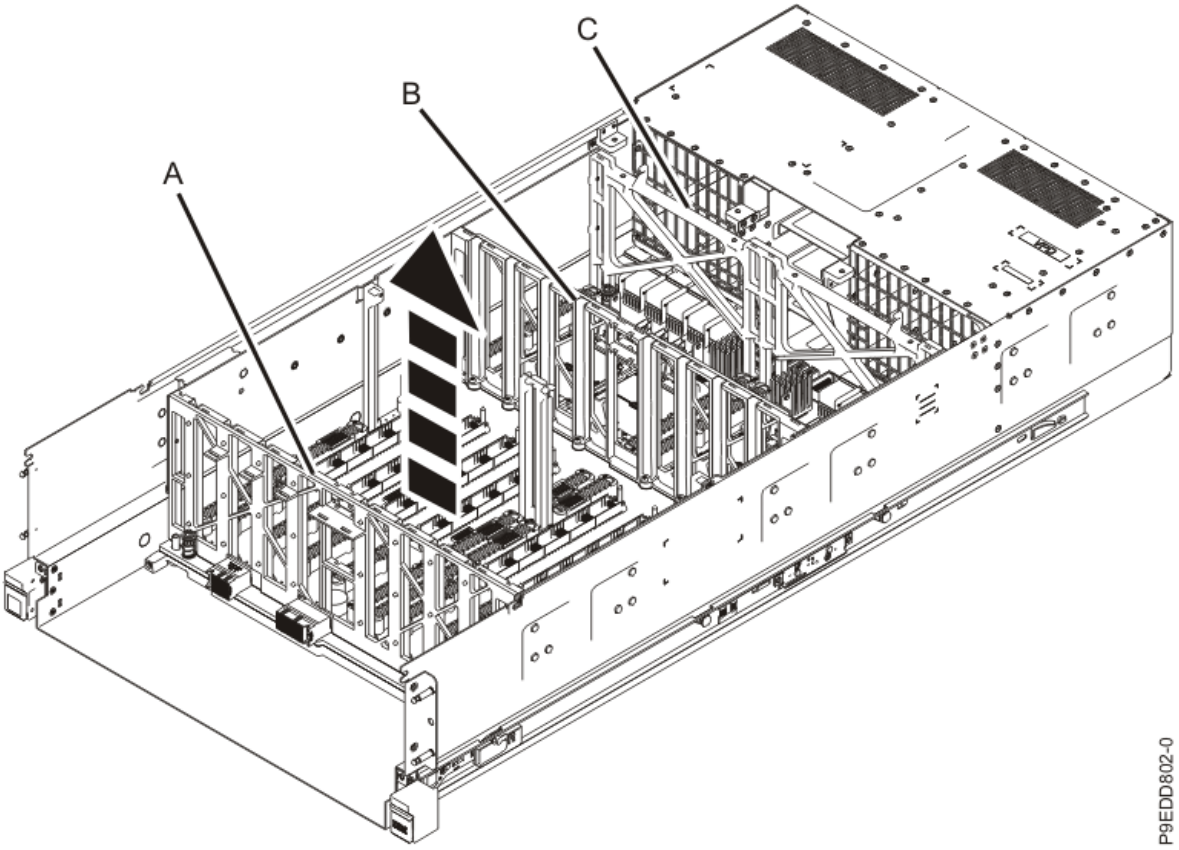

Figure 44. Grasping the system backplane and disengaging the pins

c) Place the system backplane on an appropriate ESD surface.

31. Remove the internally-secured SAS cable holder from inside the server as shown in the following figure.

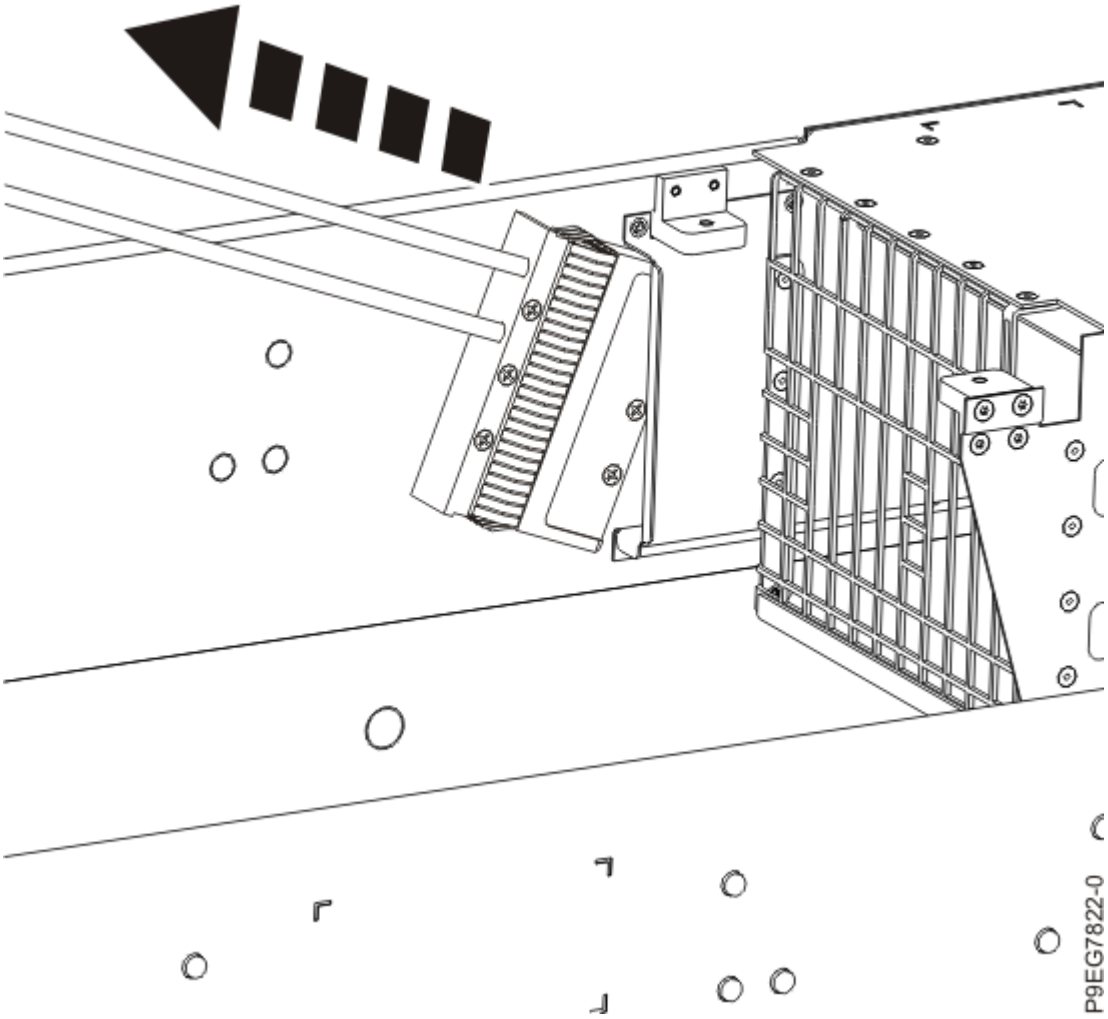

Figure 45. Removing the internally-secured SAS cable holder

32. To remove the internally-secured SAS cables from the chassis, complete the following steps.
    a) Guide the SAS cables into the system from the rear.
       Ensure that the SAS cables do not get caught in the chassis.
    b) Carefully pull the SAS cables that extend out of the rear of the server into the middle server area as shown in the following figure.

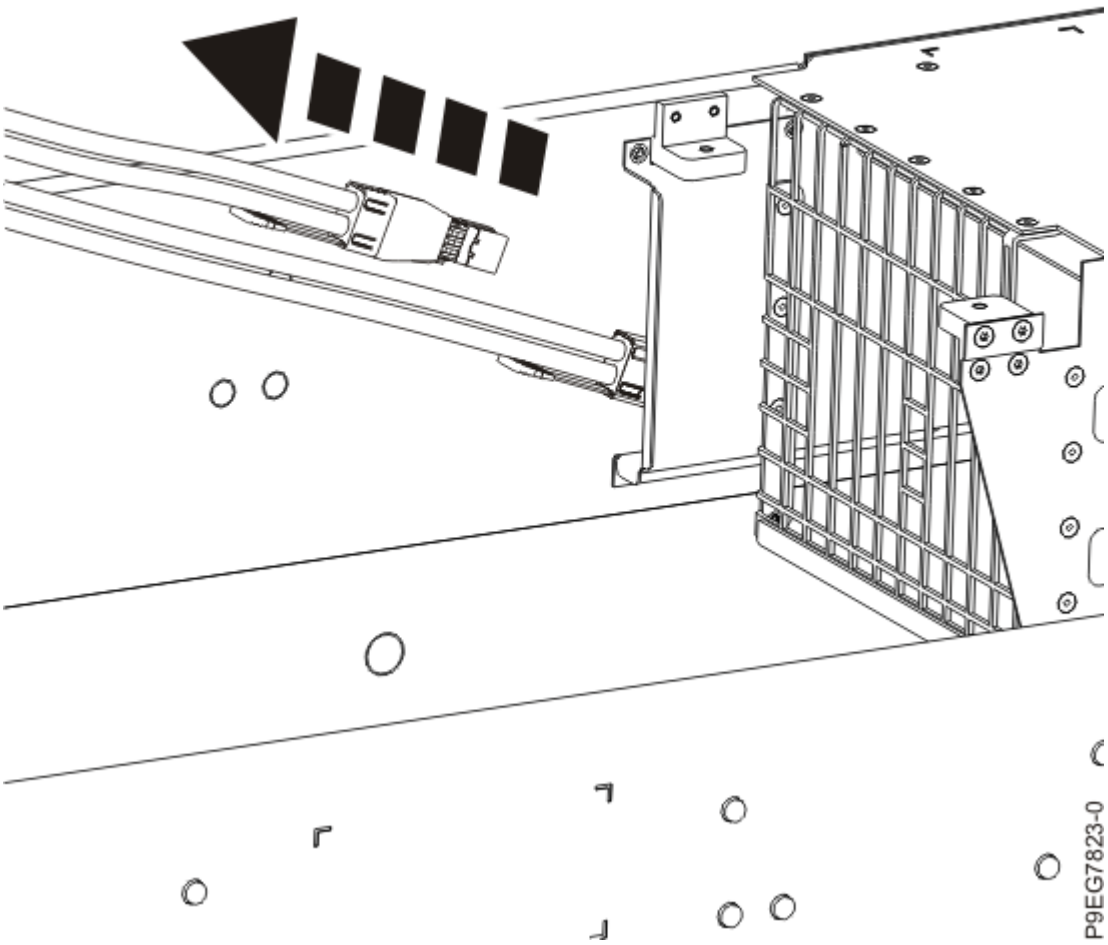

Figure 46. Removing the internally-secured SAS cables

33. Replace the system backplane by completing the following steps.
    a) Grasp the system backplane by the front **(A)** and middle **(B)** or rear metal bulkheads **(C)**. As you lower the backplane straight down into the chassis, take care to ensure that the pins on the bottom of the backplane align with the holes in the chassis.

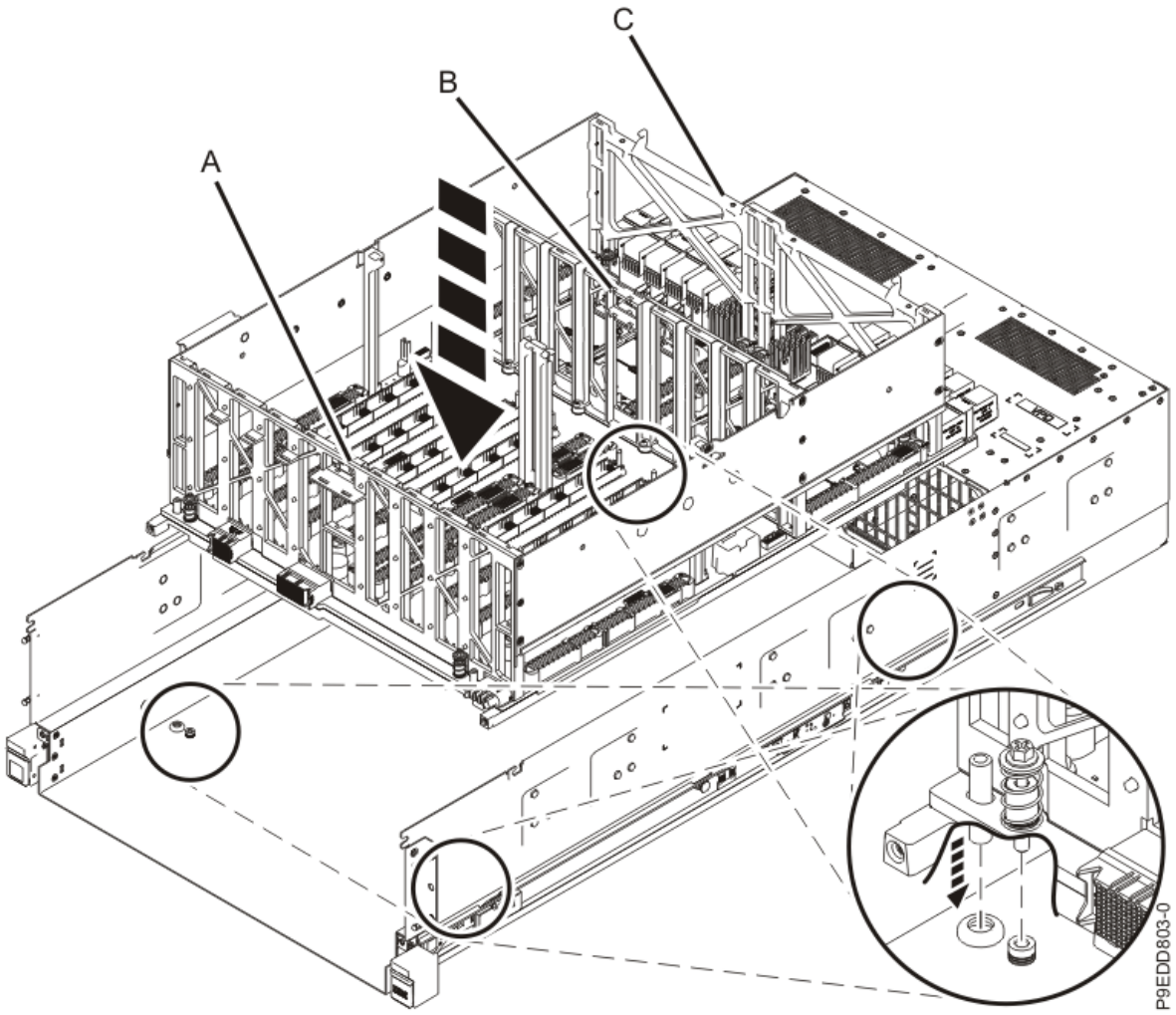

Figure 47. Lowering the system backplane into the chassis

b) Using a 4 mm Hex driver, tighten the four captive screws **(A)** that mount the backplane to the chassis. Refer to the following image for the location of the screws.

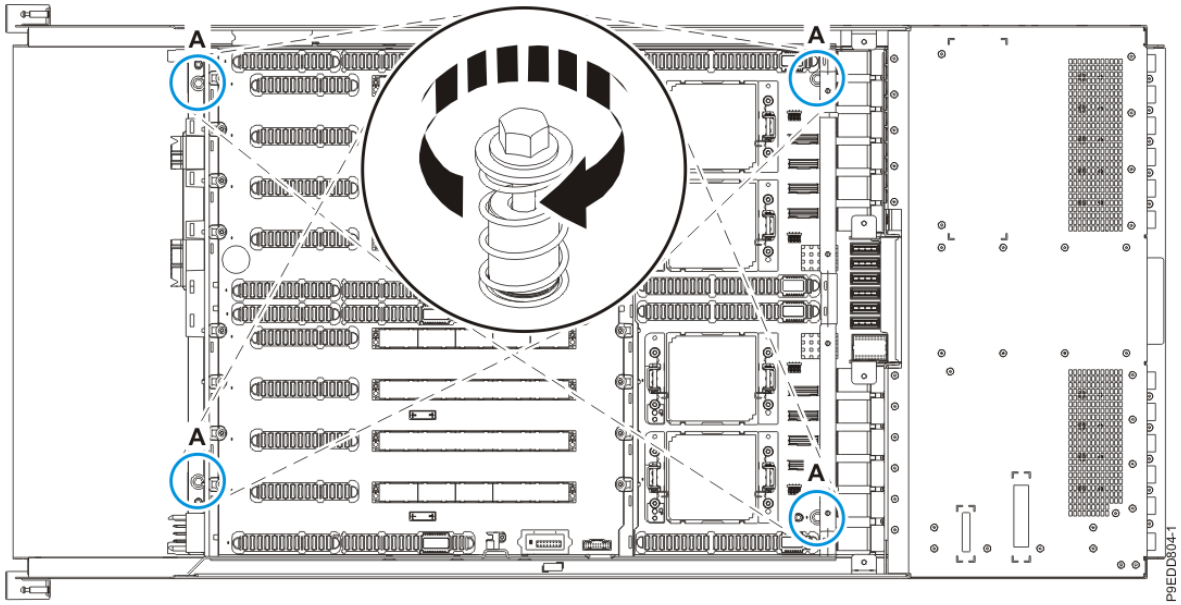

Figure 48. System backplane screw locations

34. Replace the power midplane.

a) Grasp the power midplane by its bulkhead **(A)** and lower it into the system chassis. Refer to the following image.

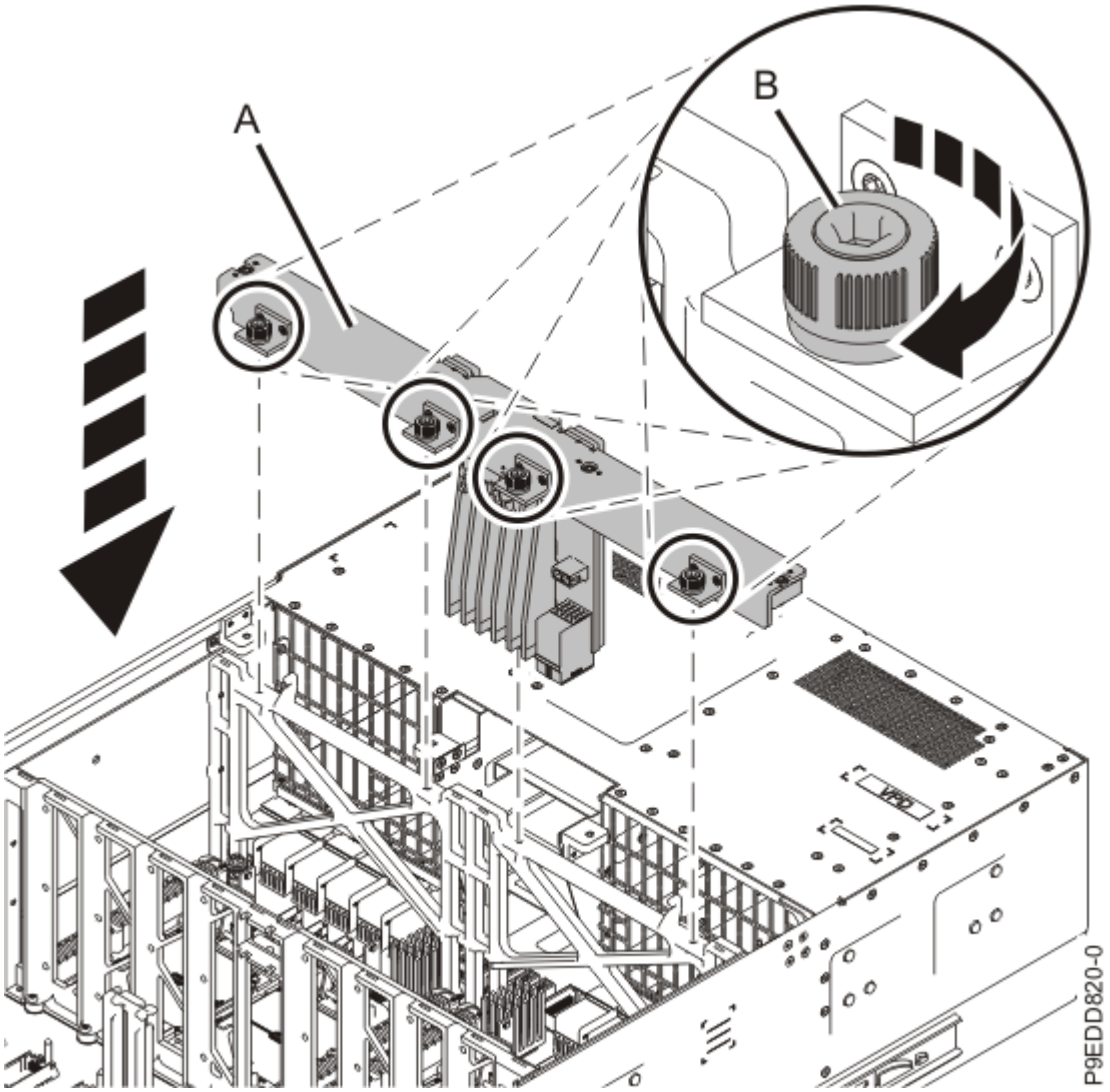

Figure 49. Replacing the power midplane

b) Using a 4mm Hex driver, tighten the four captive thumbscrews **(B)** on the power midplane bulkhead. Refer to the previous image.

c) Using a 4mm Hex driver, tighten the four captive screws **(C)** so that the power midplane bulkhead is securely attached to the system chassis. Refer to the following image.

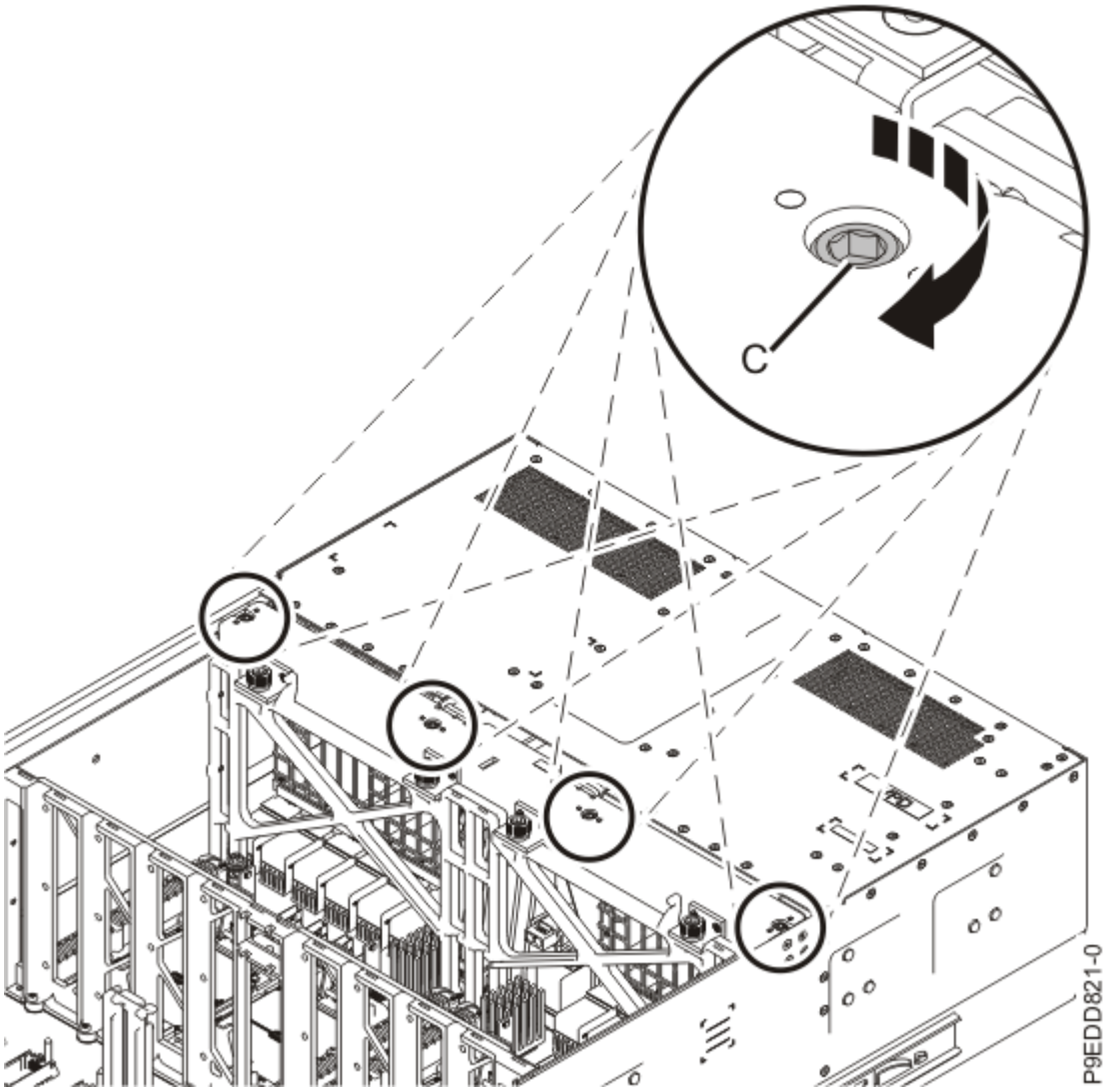

Figure 50. Tightening the captive screws on the power midplane bulkhead

d) Reconnect the cable to its connector on the power midplane.

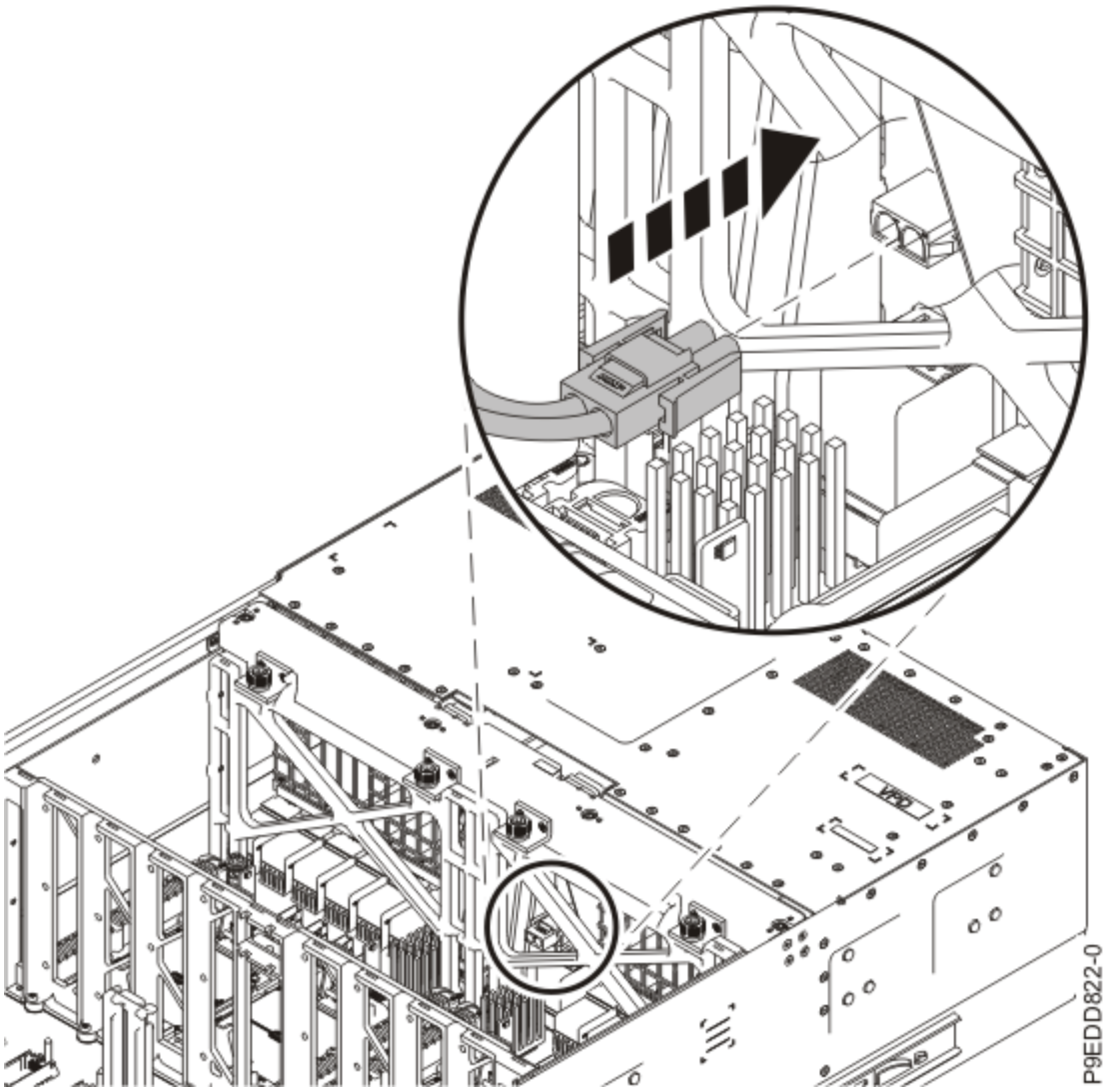

Figure 51. Reconnecting the cable to its connector on the power midplane

35. Remove the socket dust cover from location P1-C18.
    a) Grasp the latches on both sides of the socket dust cover and squeeze them inwards until the latches release from the pins on the system backplane.
    b) Lift the socket dust cover straight up as shown in the following figure. Set the dust cover aside.

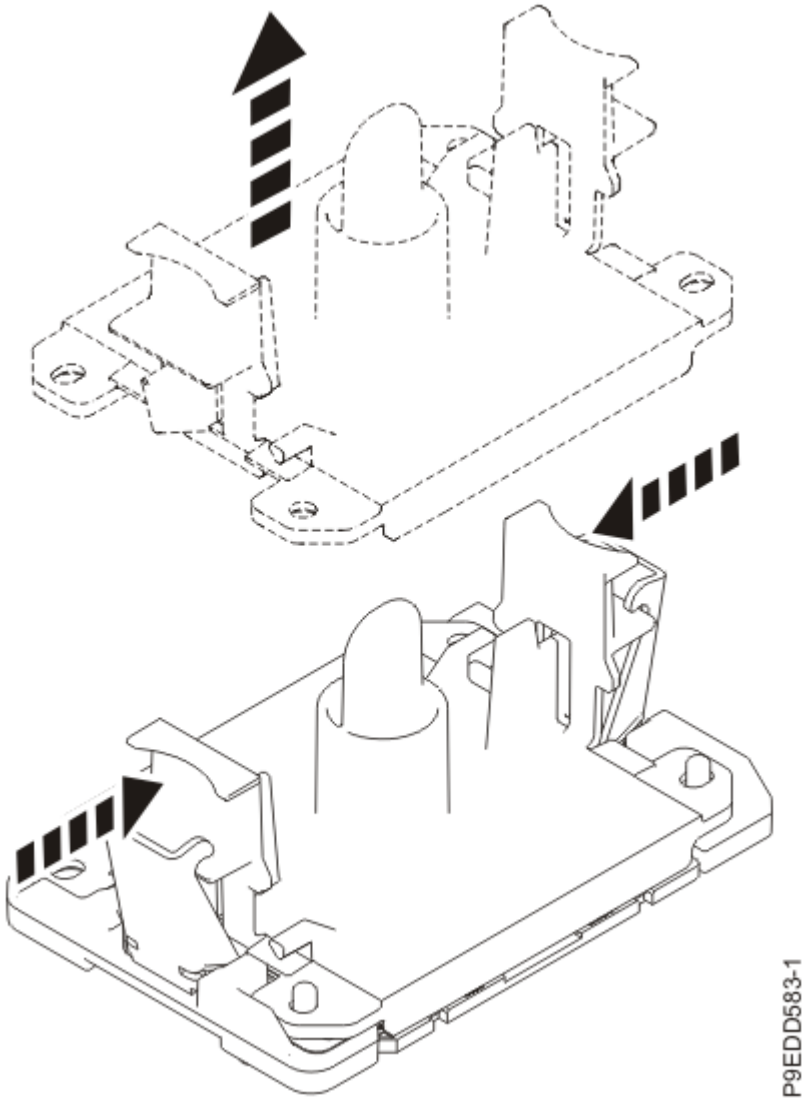

Figure 52. Removing a socket dust cover

36. Replace the system processor module in location P1-C18.
    a) Ensure that the removal tool is in the open position as shown in the following image. The middle ring must be pushed down and blue tabs must be turned inward.

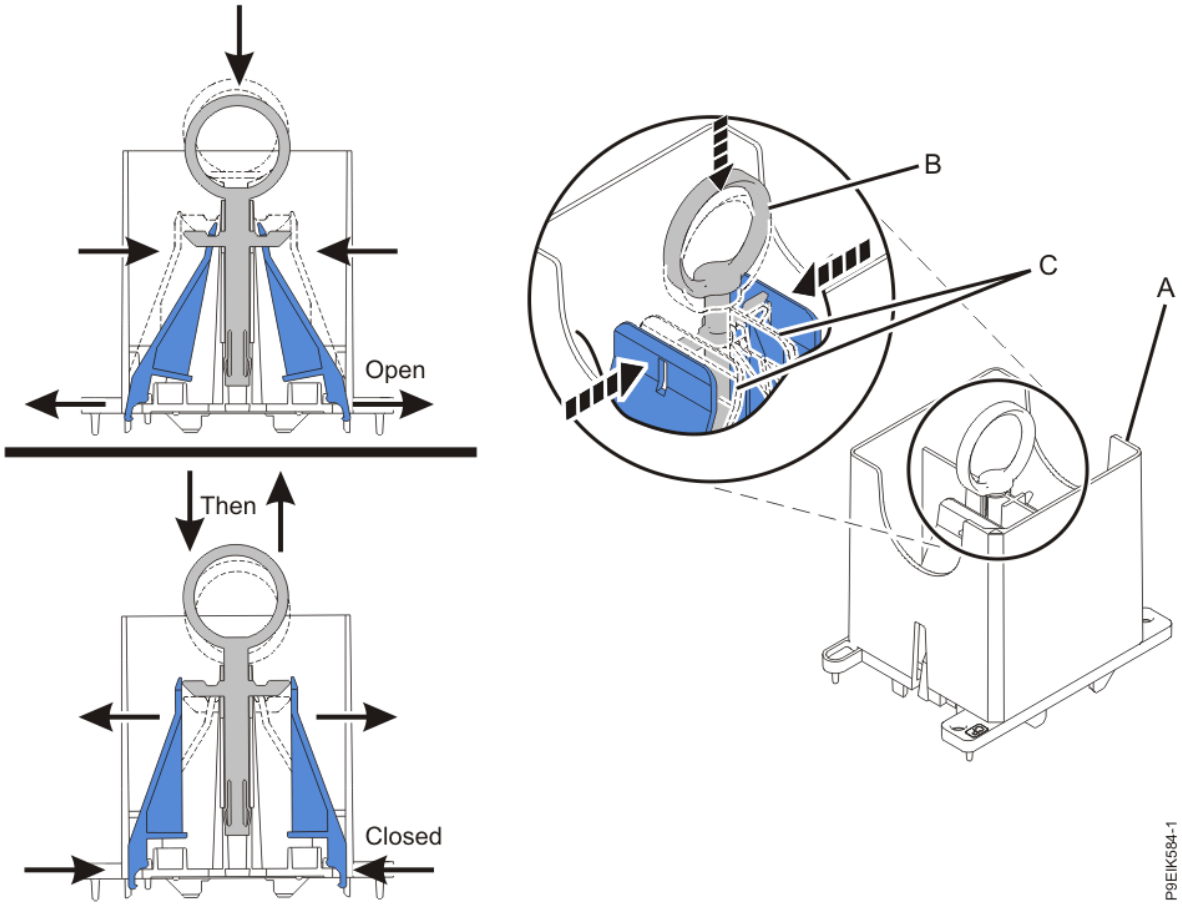

Figure 53. Ensuring that the removal tool is in the open position

b) Lower the tool over the system processor module as shown in the following image. Ensure that the beveled edge on the tool aligns with the beveled edge of the processor. Ensure that the two guide pins **(A)** are inserted into the alignment holes **(B)** on each side of the tool.

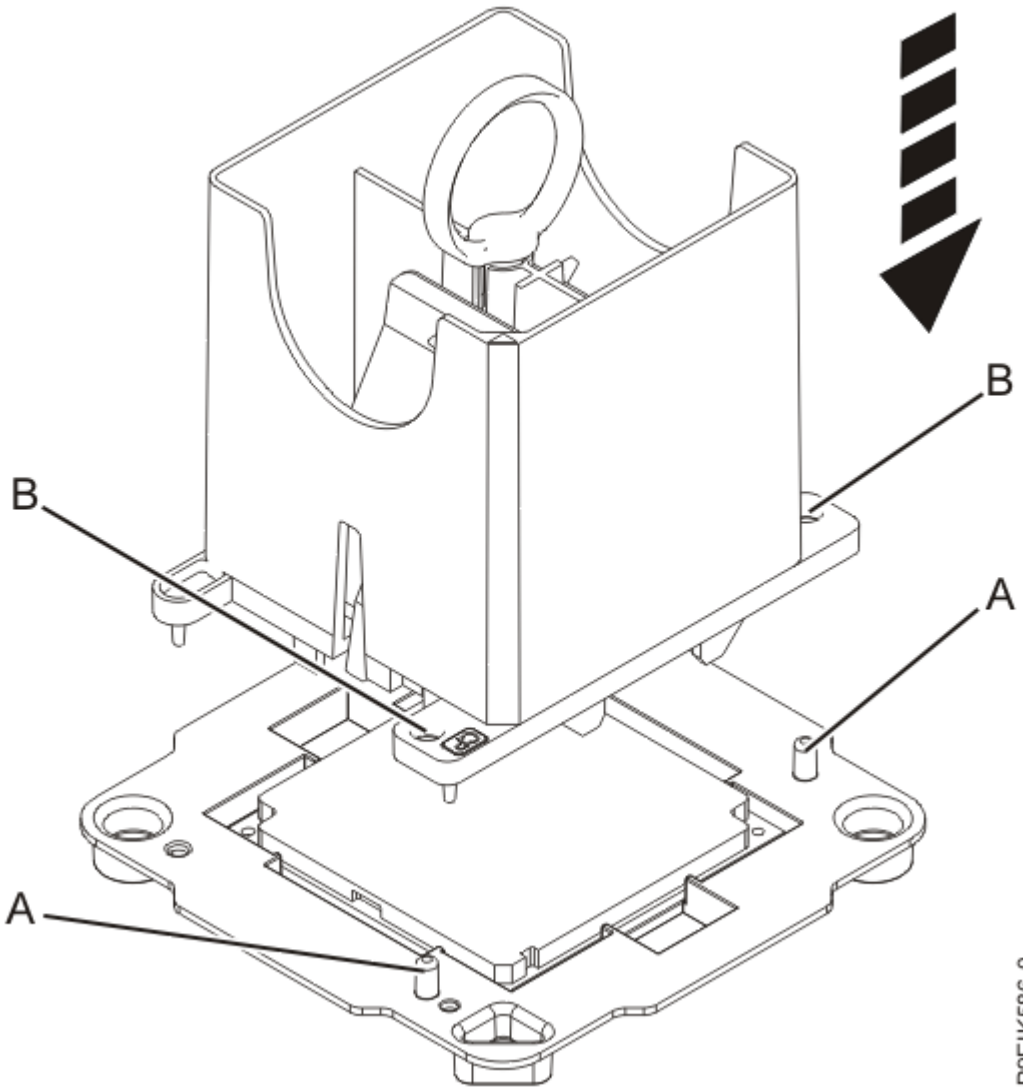

Figure 54. Lowering the removal tool onto the system processor module

c) With the removal tool sitting on top of the system processor module, push down on the ring **(A)** slightly so that the blue tabs **(B)** snap outward and the jaws engage with the system processor module **(C)** as shown in the following figure.

Make sure that both of the tool jaws are locked onto the system processor module by pushing down on the tool.

Important: Do not press the blue release tabs until directed to do so later.

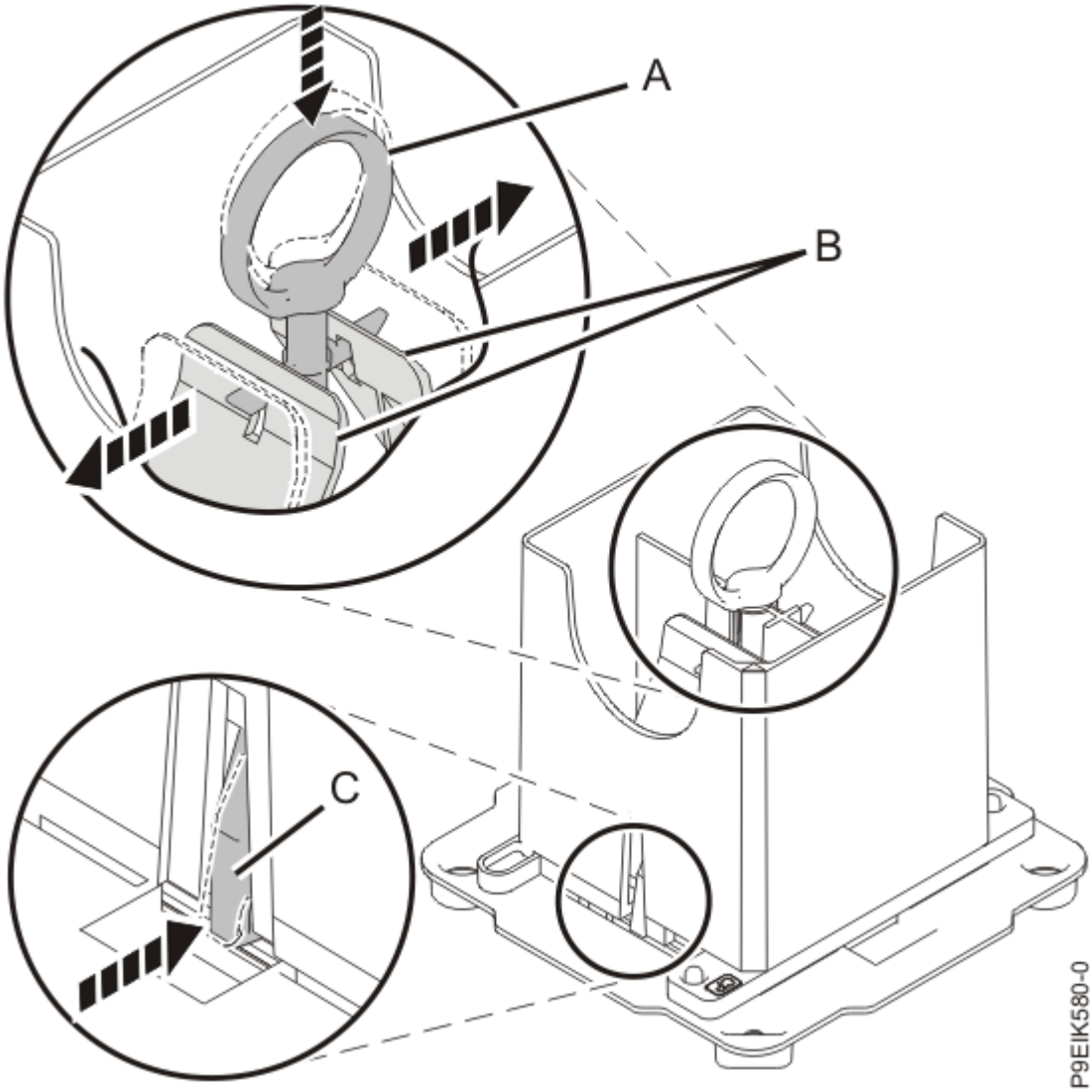

Figure 55. Locking the system processor module into the tool

d) Hold the sides of the tool with system processor module and carefully lift the tool out of the system processor module tray.

e) Lower the tool and system processor module onto the socket. Align the beveled corner of the tool with the beveled corner on the socket. Align the guide pins **(A)** with the alignment holes **(B)** on each side of the tool. Use care to lower the tool evenly without tilting the tool.

Refer to the following figure.

Note: Do not attempt to slide the tool and the system processor module in any direction while the system processor module is touching the socket. If the tool and the system processor module are not aligned with the guide pins, lift the tool and the system processor module and reposition them.

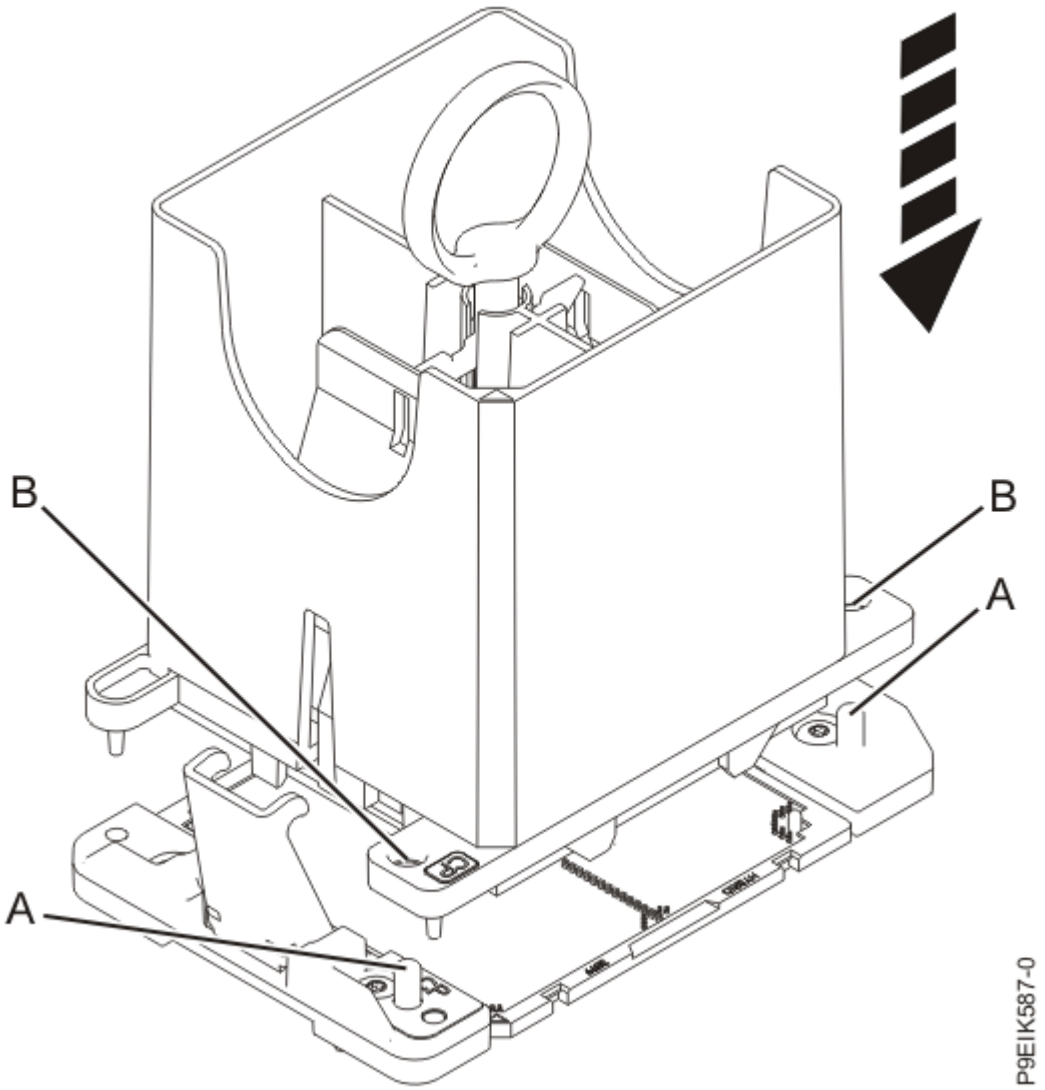

Figure 56. Installing the system processor module

f) Open the latches that hold the system processor module in the supplied removal tool **(A)** as shown in the following figure. Push down on the ring **(B)** while pressing in on the tabs **(C)**.

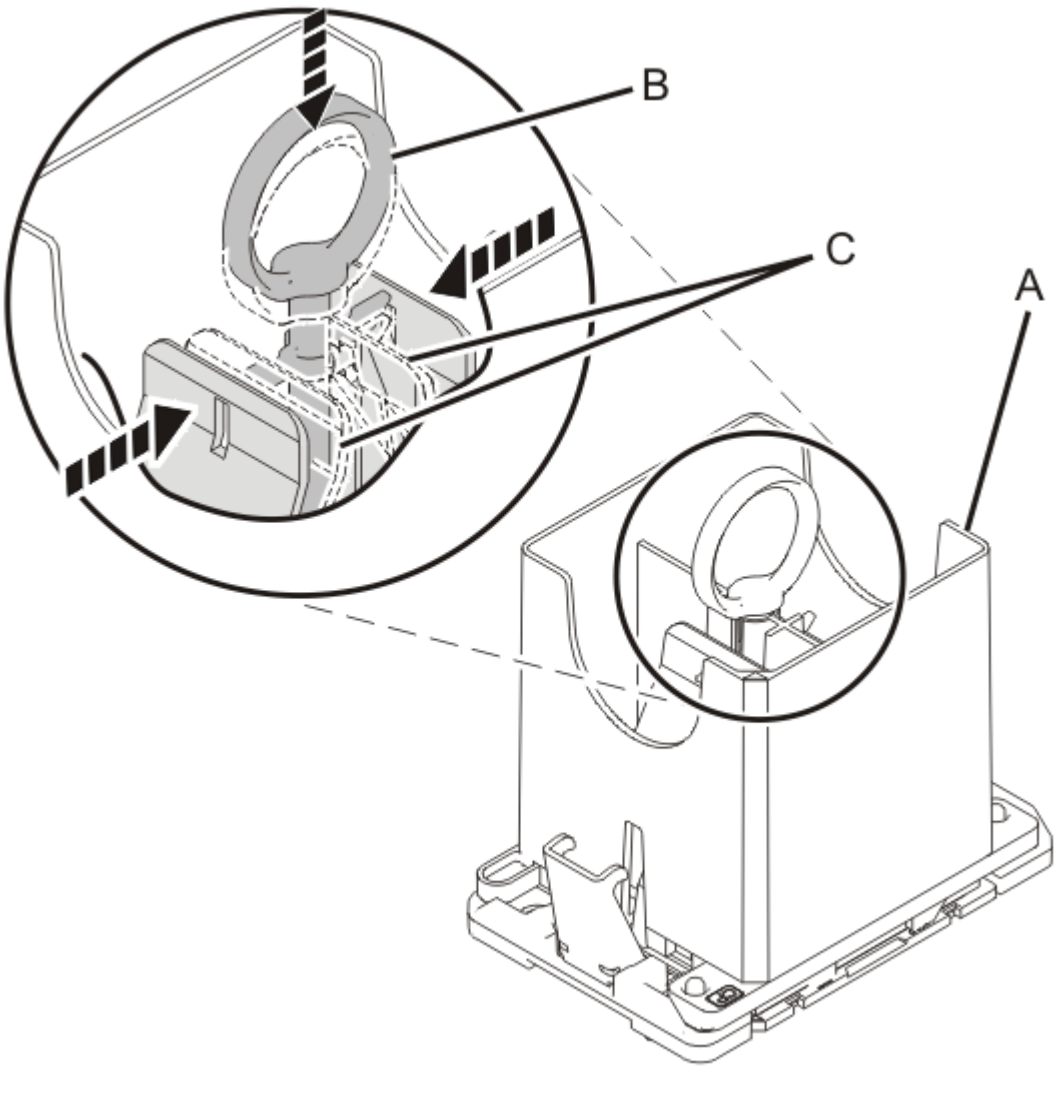

Figure 57. Removing the system processor module tool

g) Lift the tool off the system processor module.

37. Install the new TIM and heat sink in location P1-C18.

a) Open the TIM packaging and carefully remove the TIM, holding it by the edges of the carrier strip and holding it away from the shipping container.

b) Remove the protective film from the clear carrier strip by using the supplied tweezers.

The TIM must remain flat. Small wrinkles are acceptable, but folds are not acceptable.

c) Using the tweezers, remove the TIM from the carrier strip and center it onto the system processor module.

The silver-colored TIM must have the red stripe up. Align the beveled corners of the silver-colored TIM and the system processor module **(A)**, as shown in the following figure.

Use the alignment marks on the top of the system processor module to properly place the TIM. You must center the TIM in the alignment marks on the system processor module.

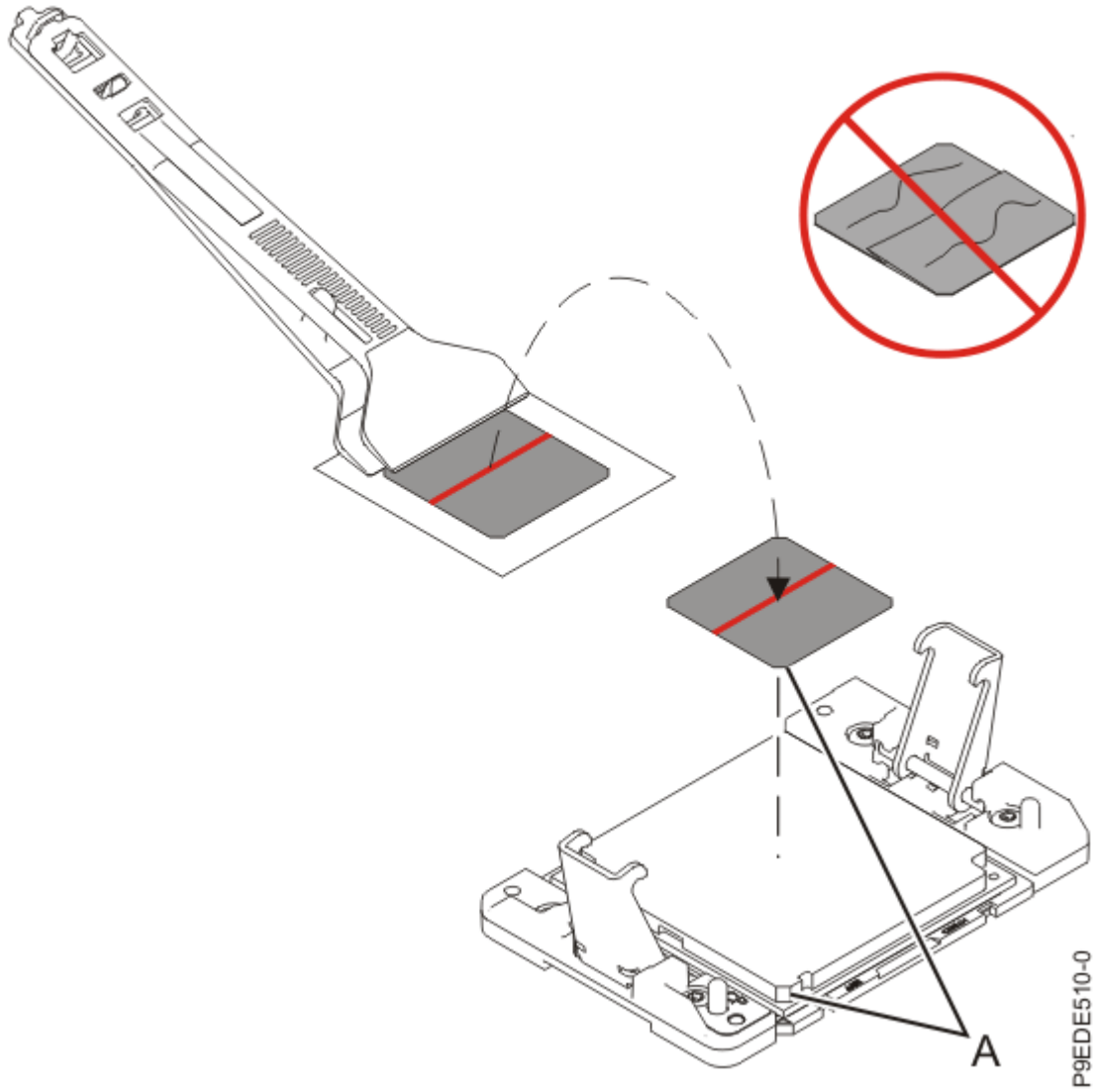

Figure 58. Installing the silver-colored TIM onto the system processor module

d) Place the heat sink on the TIM as shown in the following figure.

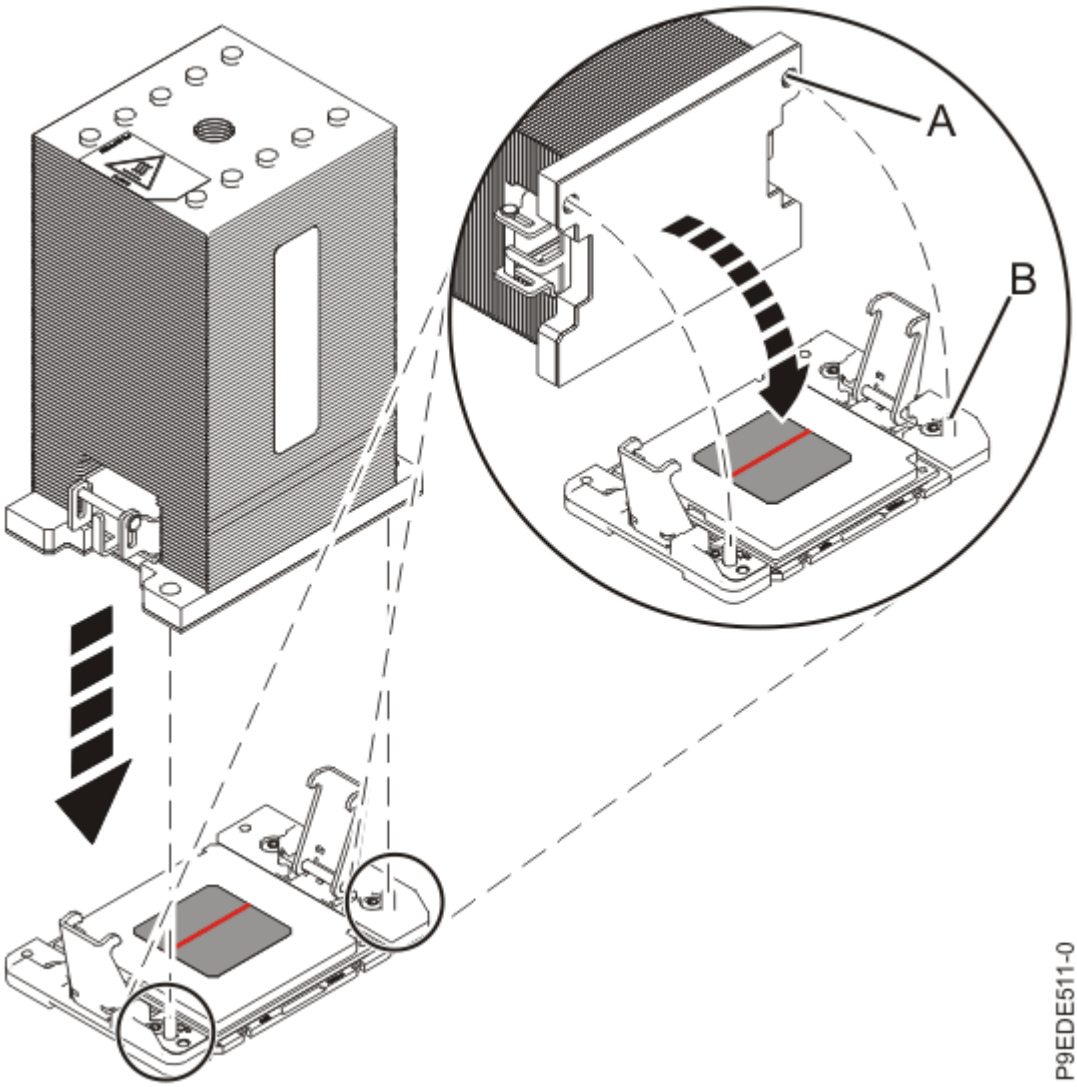

Figure 59. Installing the heat sink on the silver-colored TIM

38. Secure the TIM and heat sink to the socket of the system processor module.
    a) Ensure that the heat sink load arms are engaged as shown by **(A)** in Figure 60 on page 59.
    b) Tighten the center load screw clockwise by using the supplied hex key as shown by **(B)** in Figure 60 on page 59 until a firm stop is reached. If the heat sink moves noticeably, the load arms are not engaged. Unscrew the center load screw and repeat this step again.

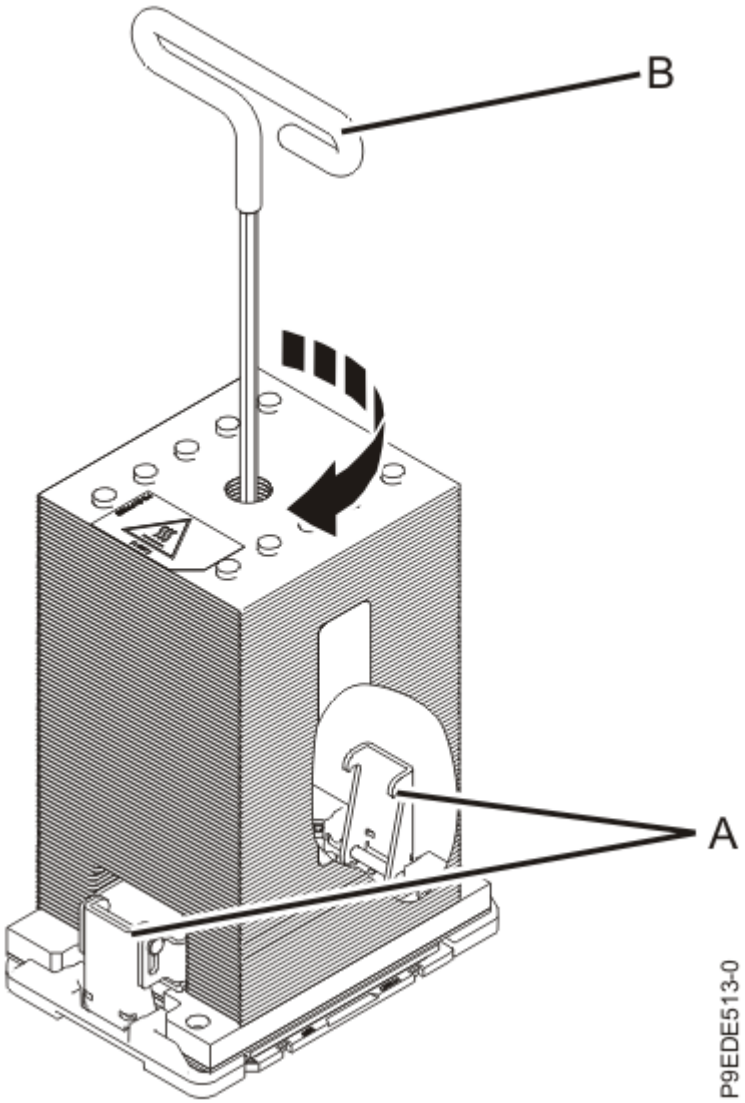

Figure 60. Tightening the center load screw on the heat sink

39. Replace the processor voltage regulator modules or processor voltage regulator module fillers in locations P1-C13, P1-C16, P1-C17, and P1-C20.
    a) With the levers **(A)** in the open position, hold the voltage regulator module or filler by its levers and lower the voltage regulator module or filler into its slot in the system. Refer to the following image.
    b) Gently push the voltage regulator module or filler into its connector.
    c) Rotate the levers in the direction that is shown and press down on the latches to secure the voltage regulator module or filler in its slot.
    d) Repeat steps “39.a” on page 59 through “39.c” on page 59 to replace the remaining processor voltage regulator modules or fillers.

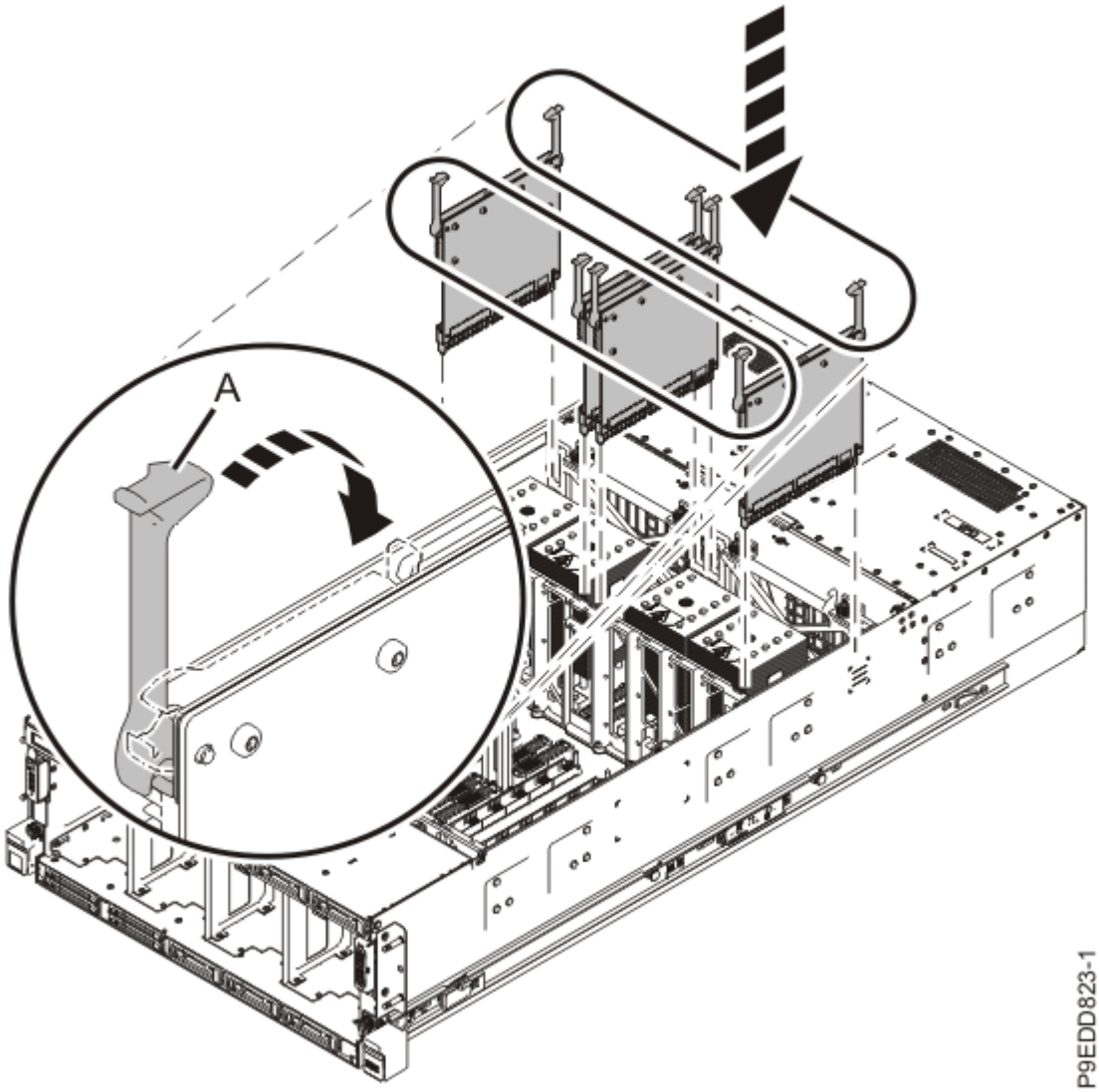

Figure 61. Replacing the processor voltage regulator modules or fillers

40. Replace the vital product data (VPD) card in location P1-C24.
    a) Align the VPD card in its slot on the system backplane. Refer to the following image.
    b) Press the VPD card firmly into place until it is fully seated.

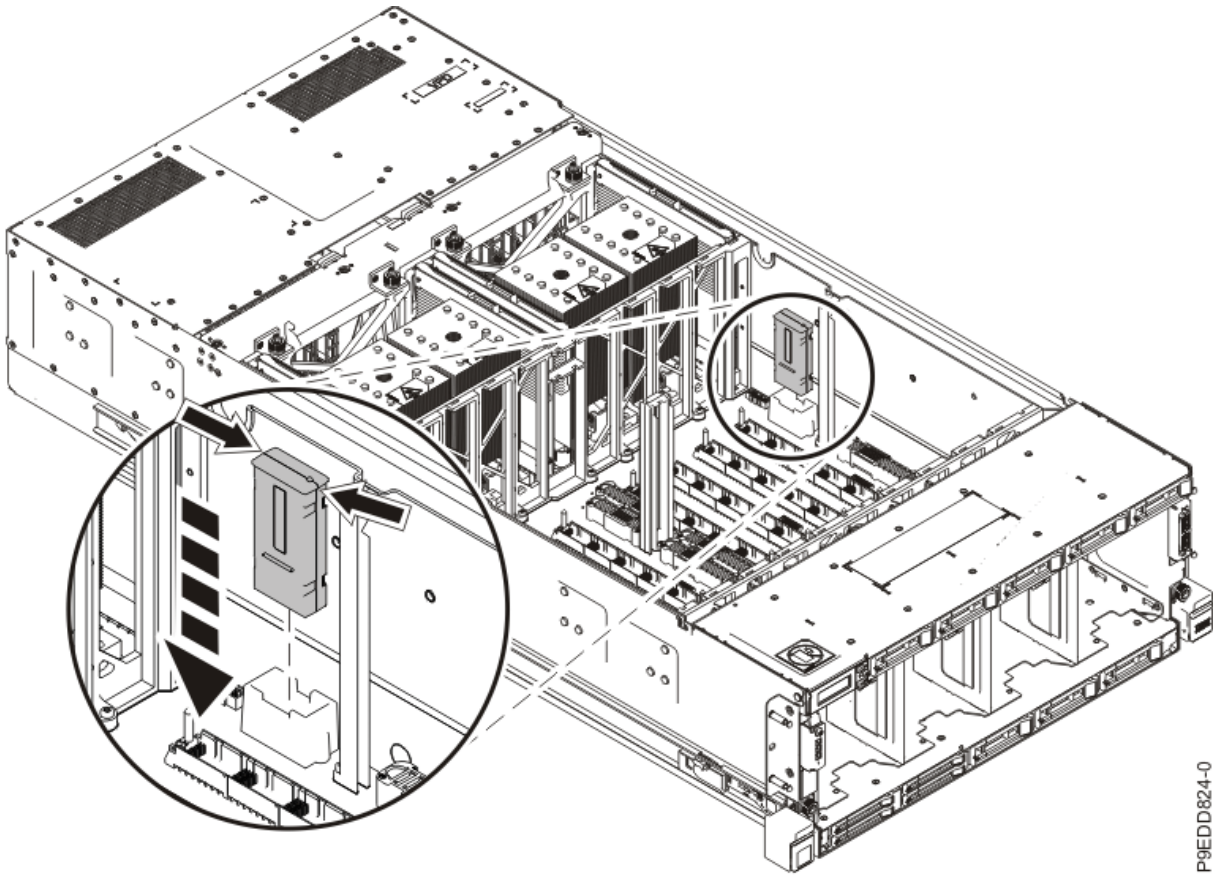

Figure 62. Replacing the VPD card

41. Reconnect the rear USB cable **(A)** in the USB socket on the system backplane as shown in the following figure.

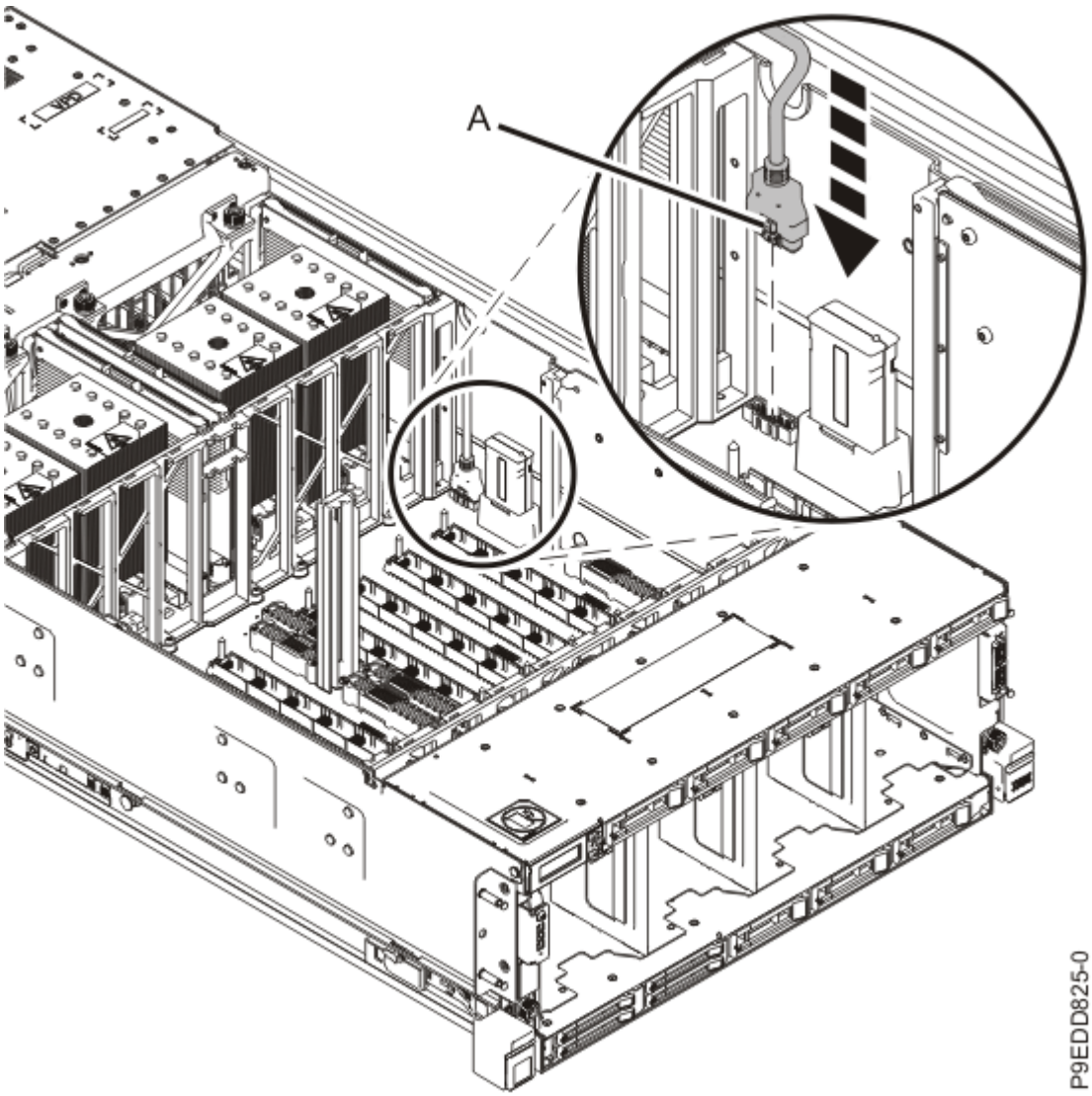

Figure 63. Reconnecting the rear USB cable in the USB socket on the system backplane

42. Replace the I/O voltage regulator module in location P1-C23.
    a) With the levers **(A)** in the open position, hold the voltage regulator module by its levers and lower the voltage regulator module into its slot in the system. Refer to the following image.
    b) Gently push the voltage regulator module into its connector.
    c) Rotate the levers in the direction shown and press down on the latches to secure the voltage regulator module in its slot.

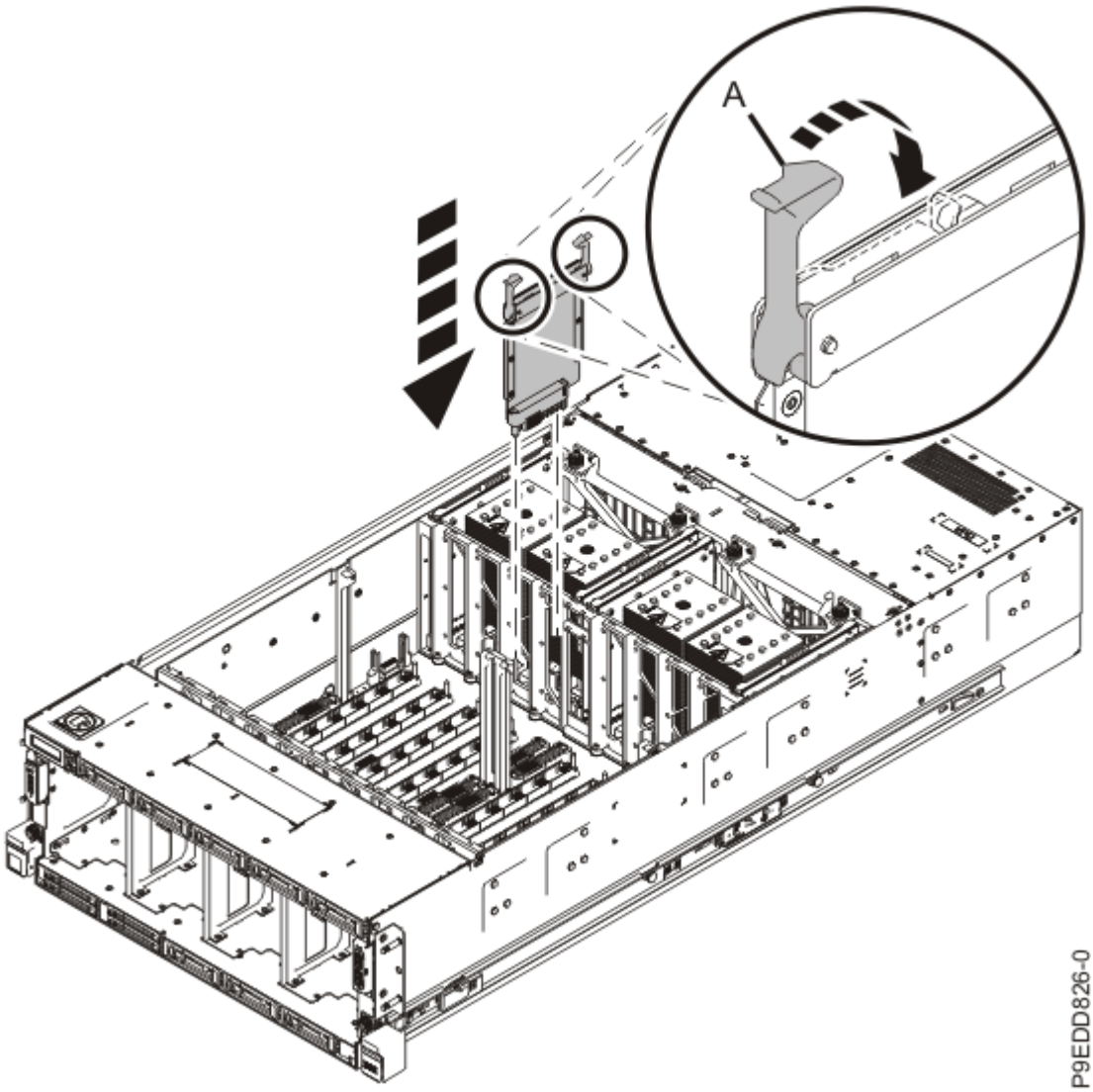

Figure 64. Replacing the I/O voltage regulator module

43. Replace the standby voltage regulator module in location P1-C22.
    a) With the levers **(A)** in the open position, hold the voltage regulator module by its levers and lower the voltage regulator module into its slot in the system. Refer to the following image.
    b) Gently push the voltage regulator module into its connector.
    c) Rotate the levers in the direction shown and press down on the latches to secure the voltage regulator module in its slot.

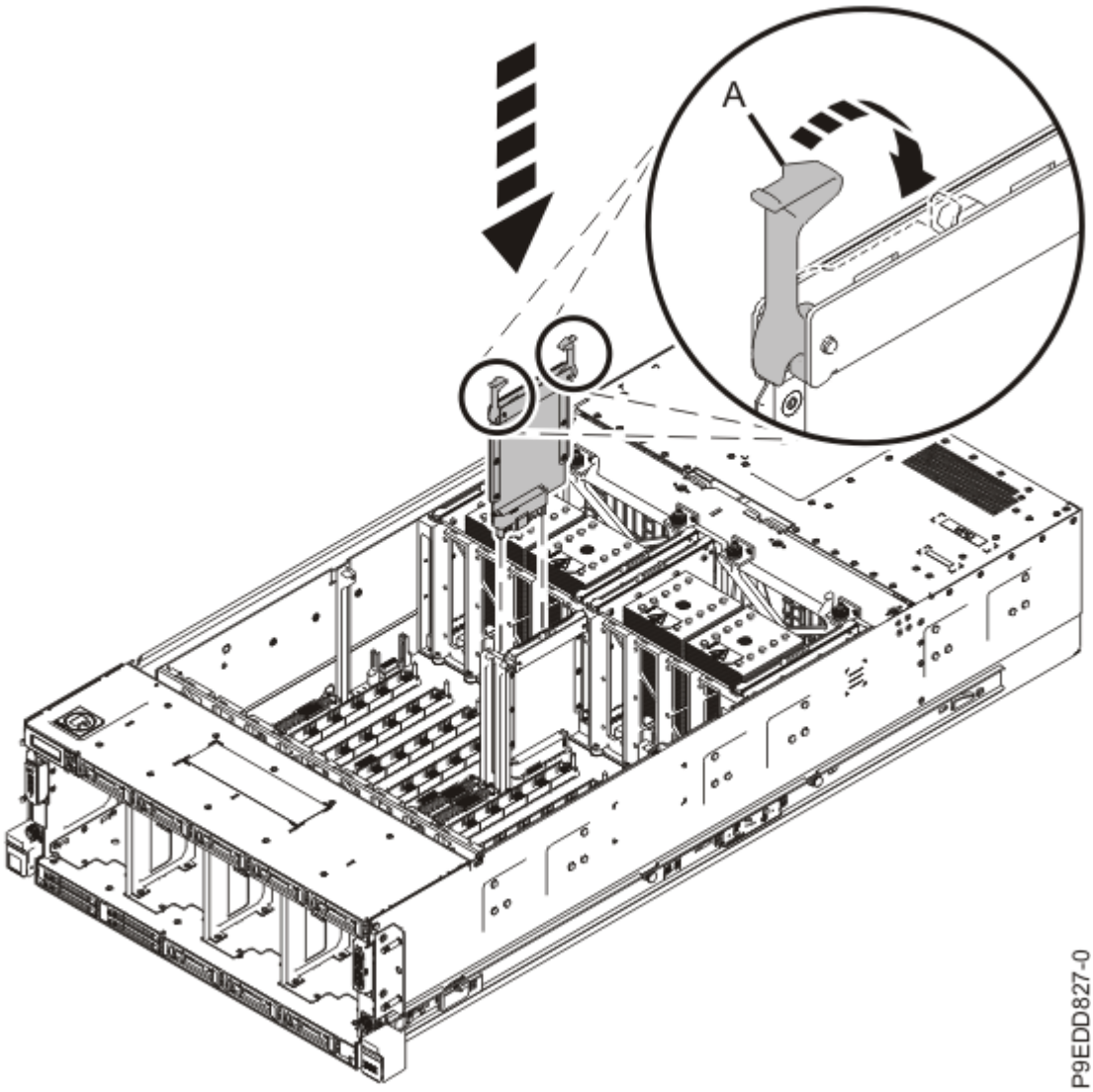

Figure 65. Replacing a standby voltage regulator module

44. Replace the trusted platform module (TPM) card in location P1-C21.
    a) Insert the TPM card into its slot on the system backplane. Refer to the following image.
    b) Push the TPM card into place until it is fully seated.

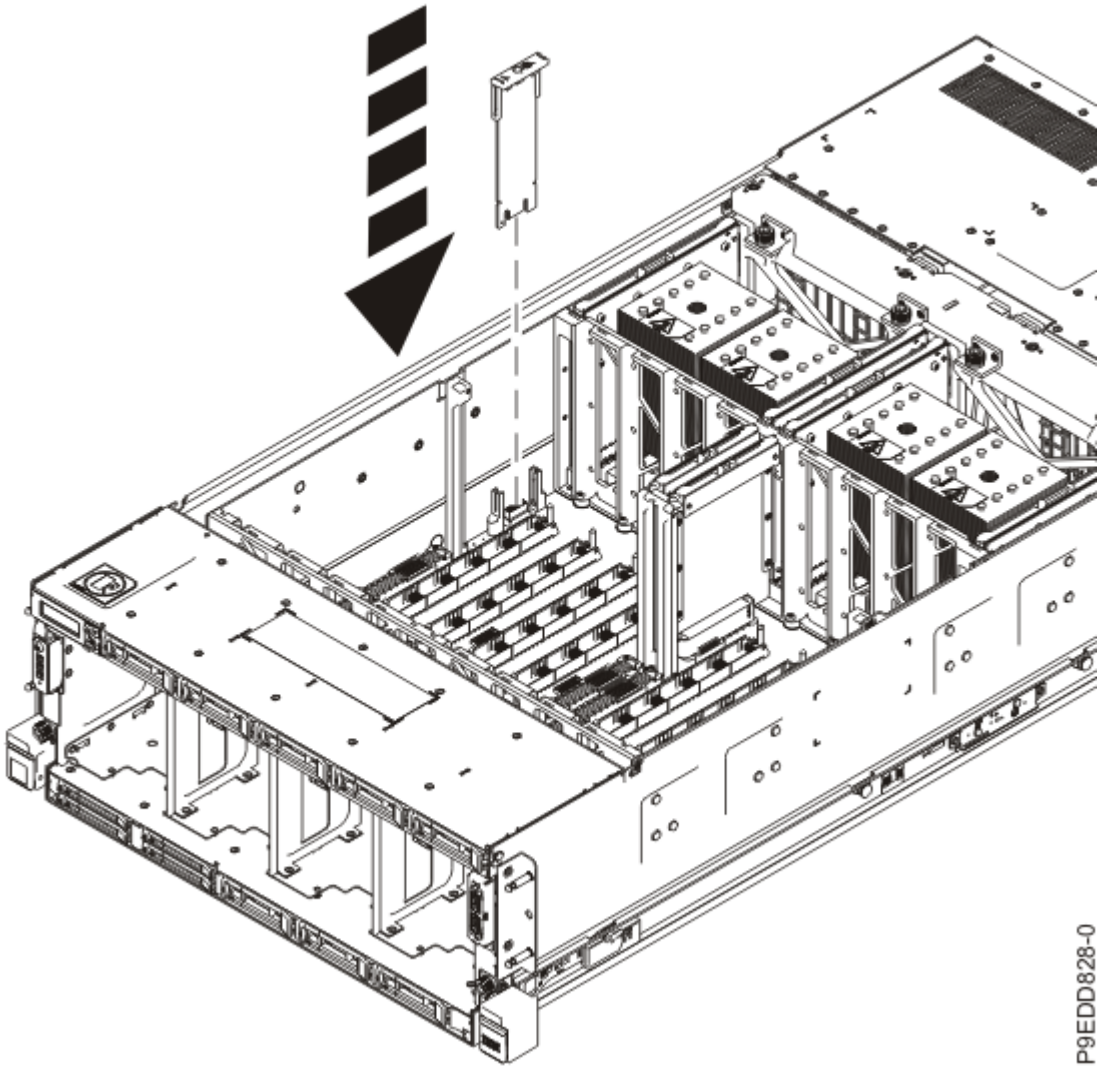

Figure 66. Replacing the TPM card

45. Replace the memory module riser cards in locations P1-C26, P1-C27, P1-C28, P1-C29, P1-C32, P1-C33, P1-C34, and P1-C35.
    a) Ensure the release latches **(A)** are fully open to a 90 degree angle as shown in the following figure.
    b) Align the memory module riser card with the connector.
    c) Press the memory module riser card firmly into the connector.
    d) Rotate the release latches into the closed position, and press the release latches down to ensure that the memory module riser card is fully seated into the connector.
    e) Repeat steps “45.a” on page 65 through “45.d” on page 65 for the remaining memory module riser cards.

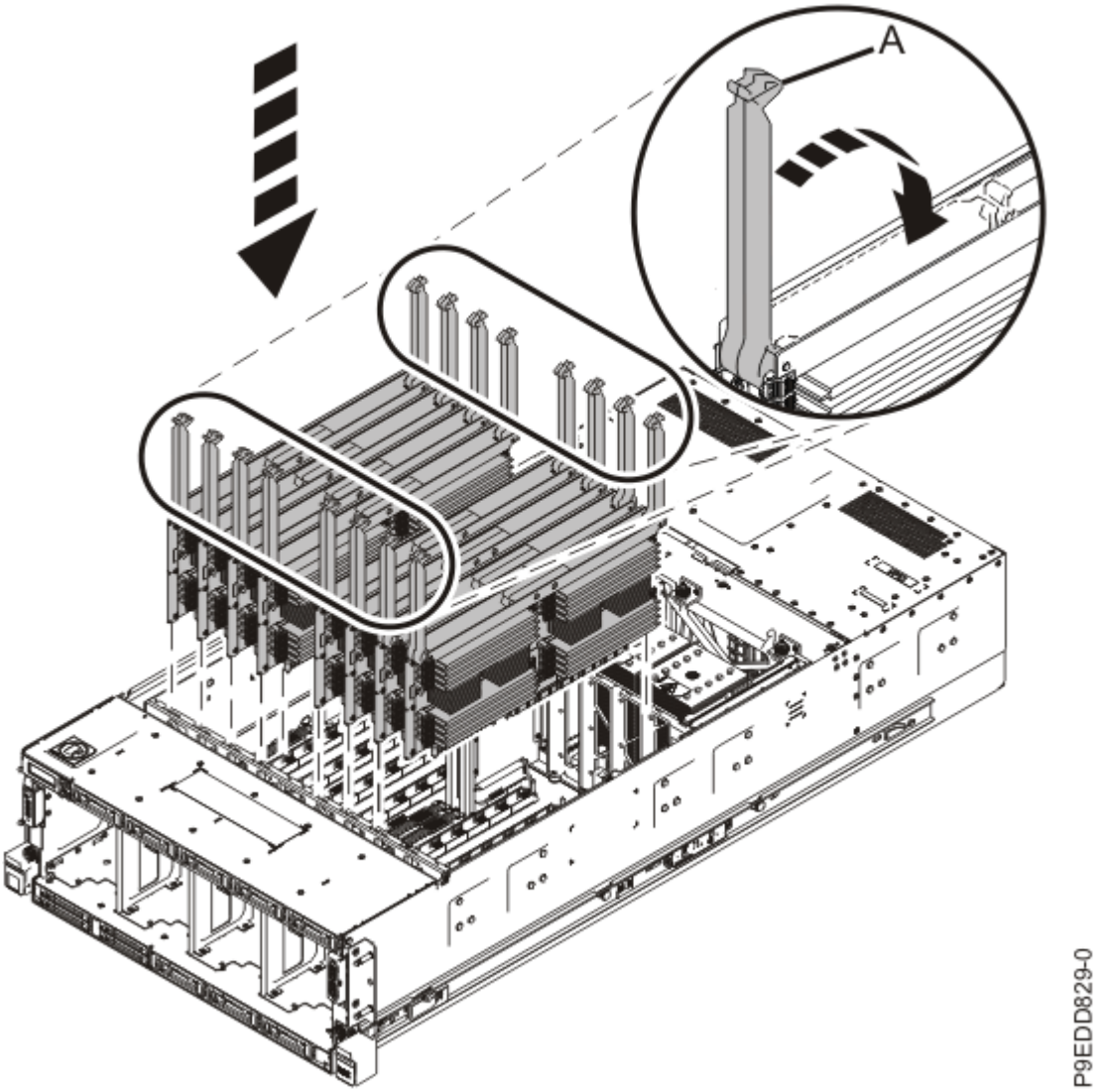

Figure 67. Replacing the memory module riser cards

46. Replace the memory voltage regulator modules in locations P1-C25, P1-C30, P1-C31, and P1-C36.
    a) With the levers **(A)** in the open position, hold the voltage regulator module by its levers and lower the voltage regulator module into its slot in the system. Refer to the following image.
    b) Gently push the voltage regulator module into its connector.
    c) Rotate the levers in the direction shown and press down on the latches to secure the voltage regulator module in its slot.
    d) Repeat steps “46.a” on page 66 through “46.c” on page 66 to replace the remaining memory voltage regulator modules.

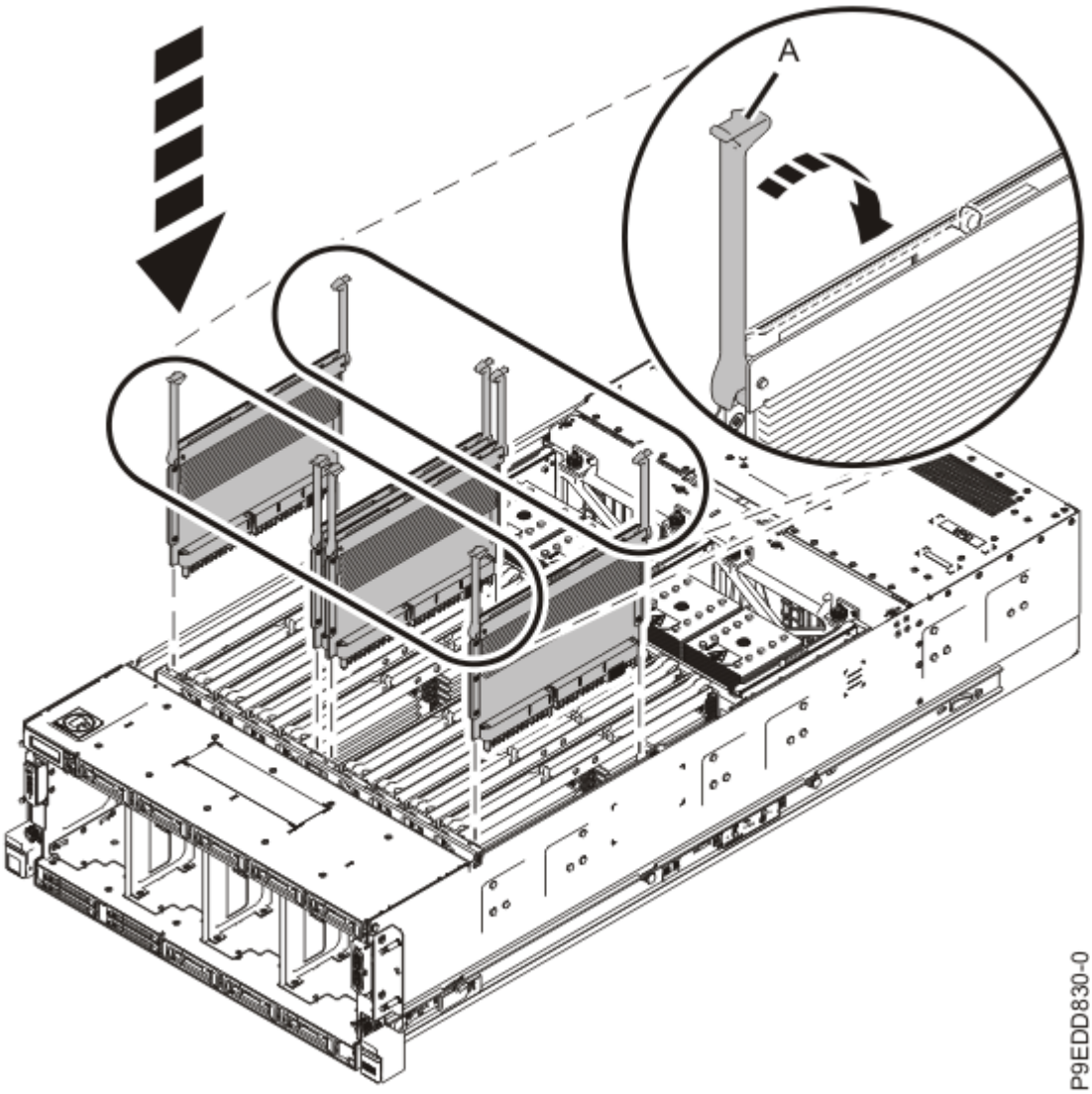

Figure 68. Replacing the memory voltage regulator modules

47. Replace the service access cover.
    a) Lower the cover **(A)** onto the system unit. Ensure that the cover alignment pins **(C)** on each side of the cover fit into the matching slots in the chassis.
    b) Slide the cover **(A)** onto the system unit. Ensure that the tabs **(D)** tuck under the mesh along the front opening of the chassis.
    c) Close the release latches **(B)** by pushing it in the direction that is shown in the following figure.

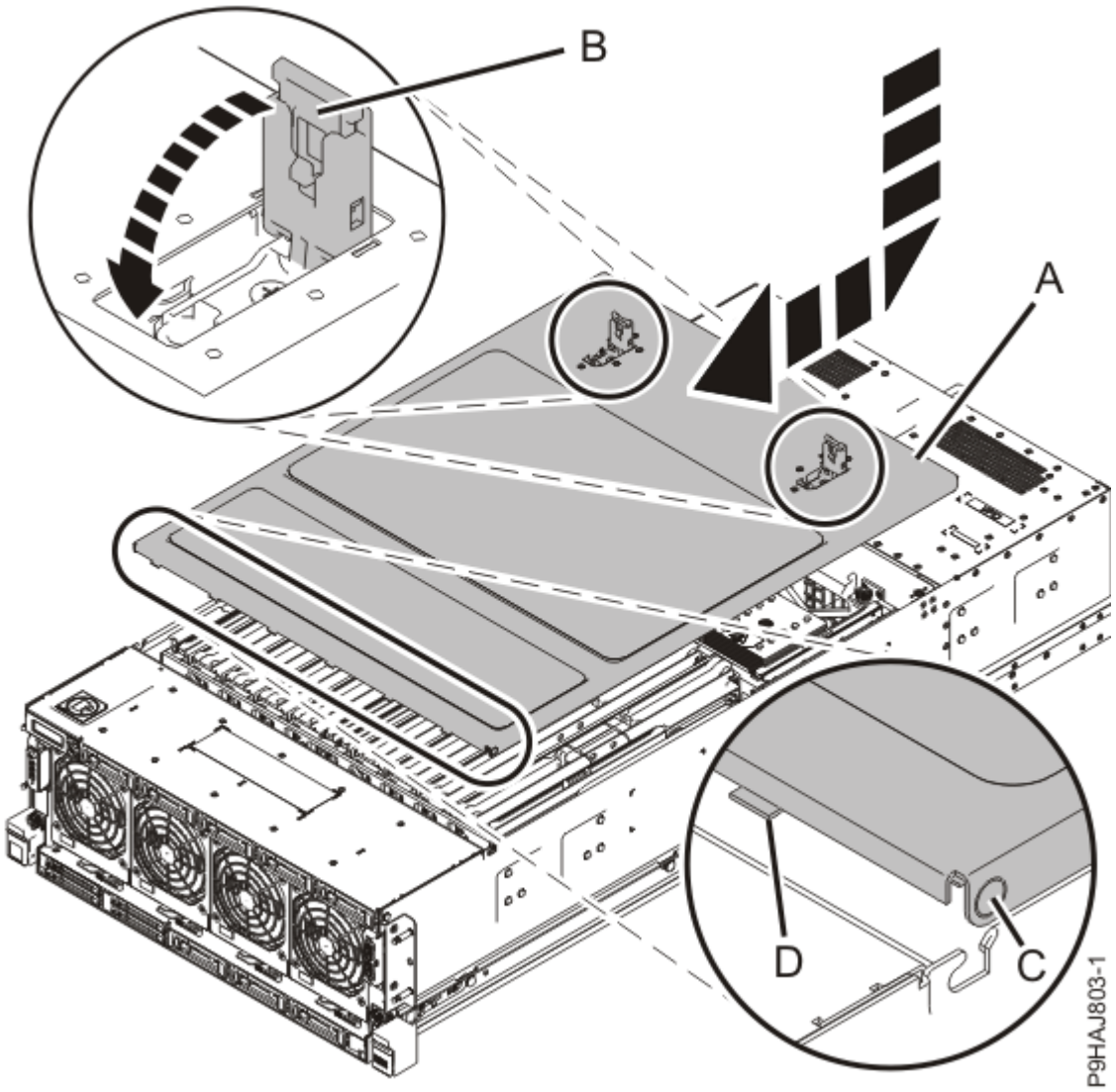

Figure 69. Installing the service access cover

48. Remove the system-to-rail locking clips.
    a) On the right rail, pull the blue latch marked **R**.
    b) While holding the blue latch, rotate the clip off the rail.
    c) Release the blue latch.
    d) Repeat steps “48.a” on page 68 through “48.c” on page 68 to remove the system-to-rail locking clip from the left rail.
49. Complete the following steps to place the system in the operating position.
    a. If needed, unlock the blue rail safety latches **(A)** by pushing them towards the front as shown in the following figure.
    b. Push the system unit back into the rack as shown in the following figure until both release latches of the system unit lock into position. Ensure that any cables do not catch or bind as you push in the system.

    Note: Slide the system unit slowly into the rack to ensure that your fingers do not get caught in the side rails.

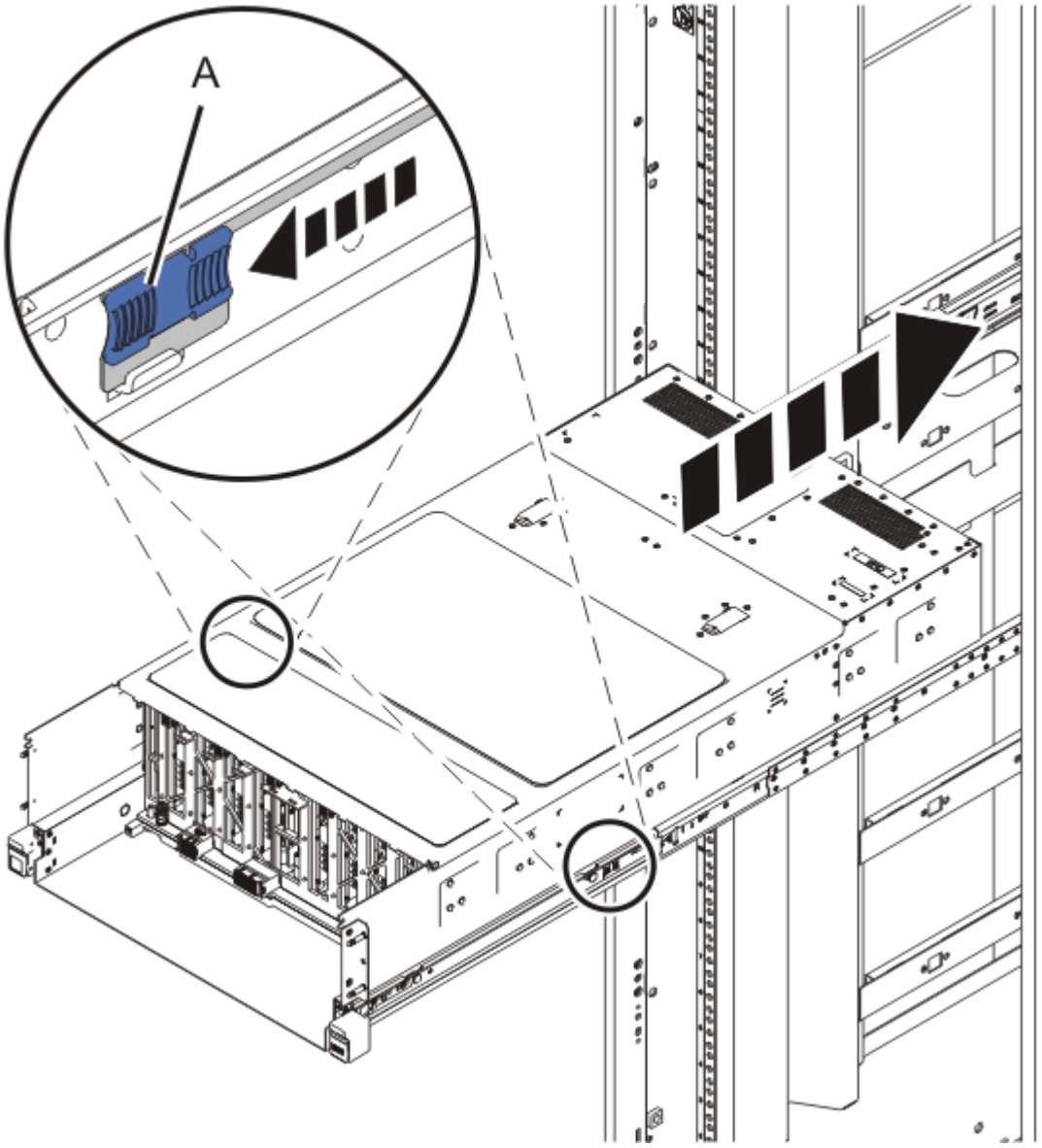

Figure 70. Placing the system into the operating position

50. Install the new replacement externally-secured SAS cable. Carefully insert the SAS cables into the rear of the system as shown in the following figure. Ensure that no connectors catch or bind on internal parts.
    a) Remove the protective covers for the smaller connectors that go through the system to the disk drive backplane.
    b) Do not yet remove the protective covers from the larger connectors that attach the SAS cables to the SAS PCIe adapters at the rear of the system.
    c) Push the SAS cables that connect to the disk drive backplane through to the front of the system.
    d) Insert the SAS cable holder **(A)** into the rear of the system.
    e) Secure the SAS cable holder with the screw **(B)**.

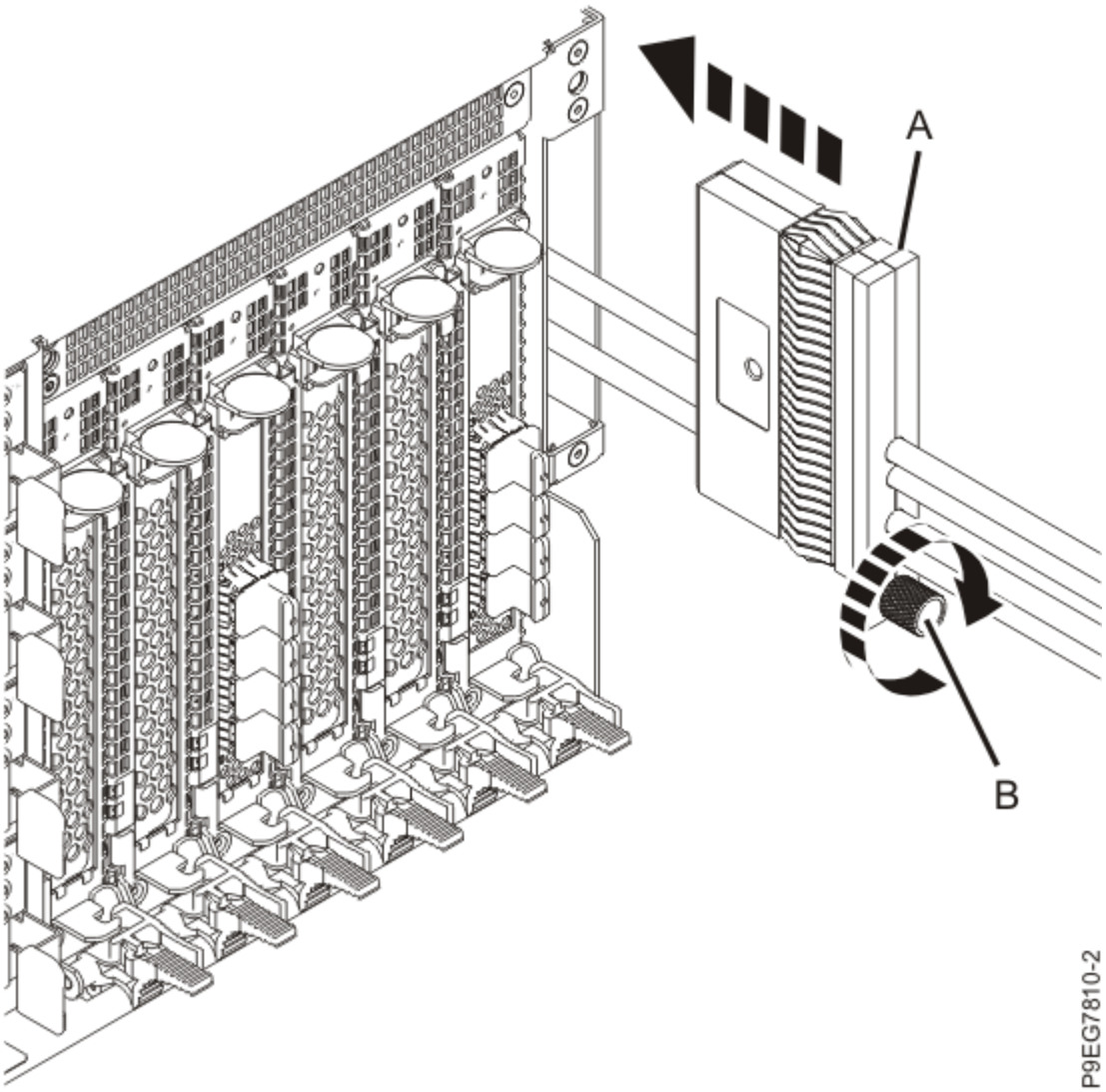

Figure 71. Inserting the SAS cables and SAS cable holder for a base function disk drive backplane

51. Move the system unit out of the rack at most 79 cm (31 in), enough to remove the top cover.

    Do not pull out or install any drawer or feature if the rack stabilizer brackets are not attached to the rack. Do not pull out more than one drawer at a time. The rack might become unstable if you pull out more than one drawer at a time.

    a. If not already removed, remove the shipping screws **(A)** as shown in the following figure by using a Phillips screwdriver.

    b. Release the side latches **(B)** by pressing them downward as shown in the following figure.

c. Pull out the system unit **(C)** at most 79 cm (31 in) from the rack as shown in the following figure. Ensure that any cables do not catch or bind as you pull out the system.

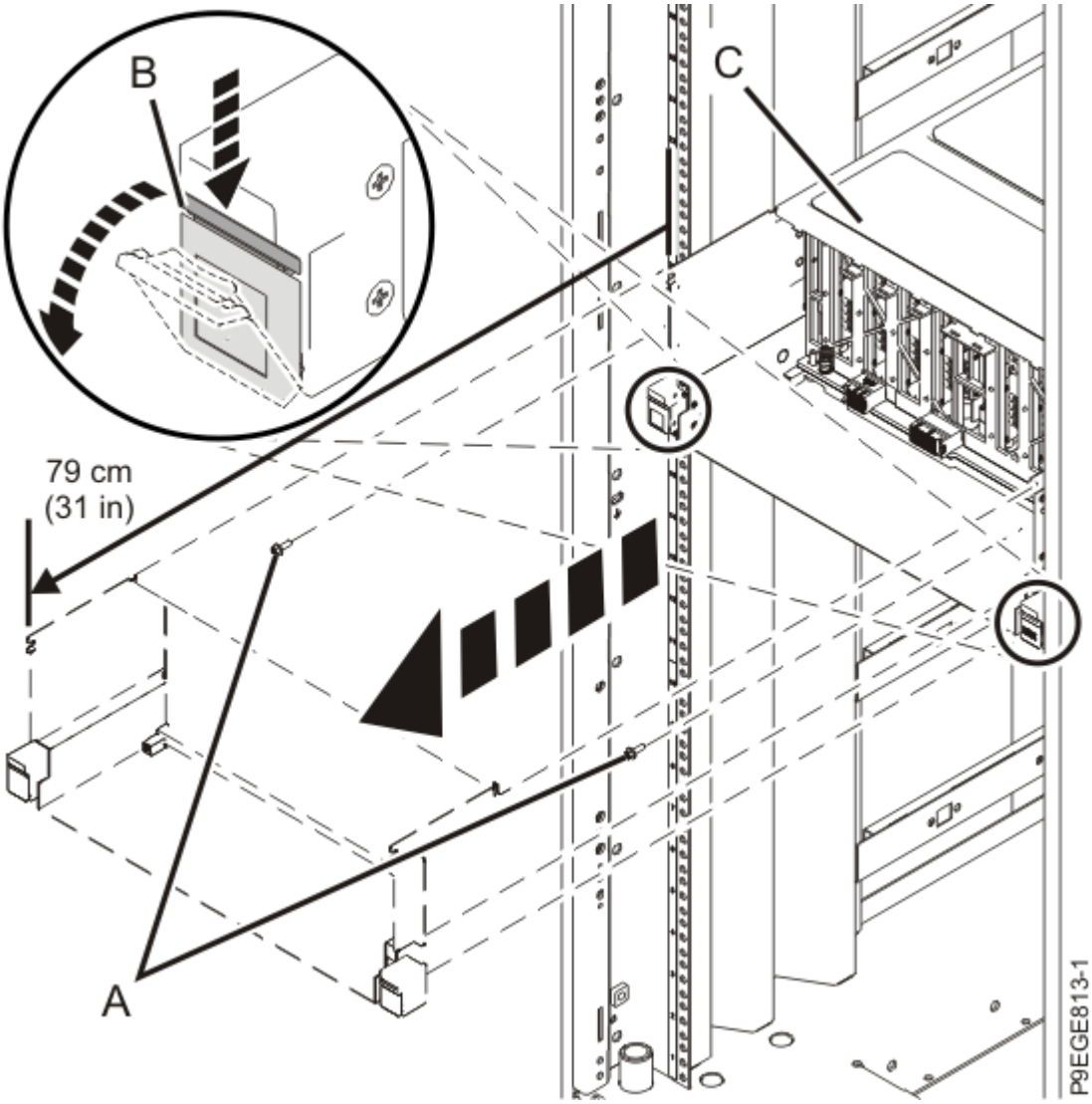

Figure 72. Partially sliding the system from the rack

52. Remove the service access cover by completing the following.

Attention: Operating the system without the service access cover on for more than 10 minutes when the system power is turned on might damage the system components.

a. Push the release latches **(A)** in the direction shown in the following figure.

b. Slide the cover **(B)** off the system unit as shown in the following figure. When the front of the service access cover has cleared the upper frame ledge, lift the cover up and off the system unit.

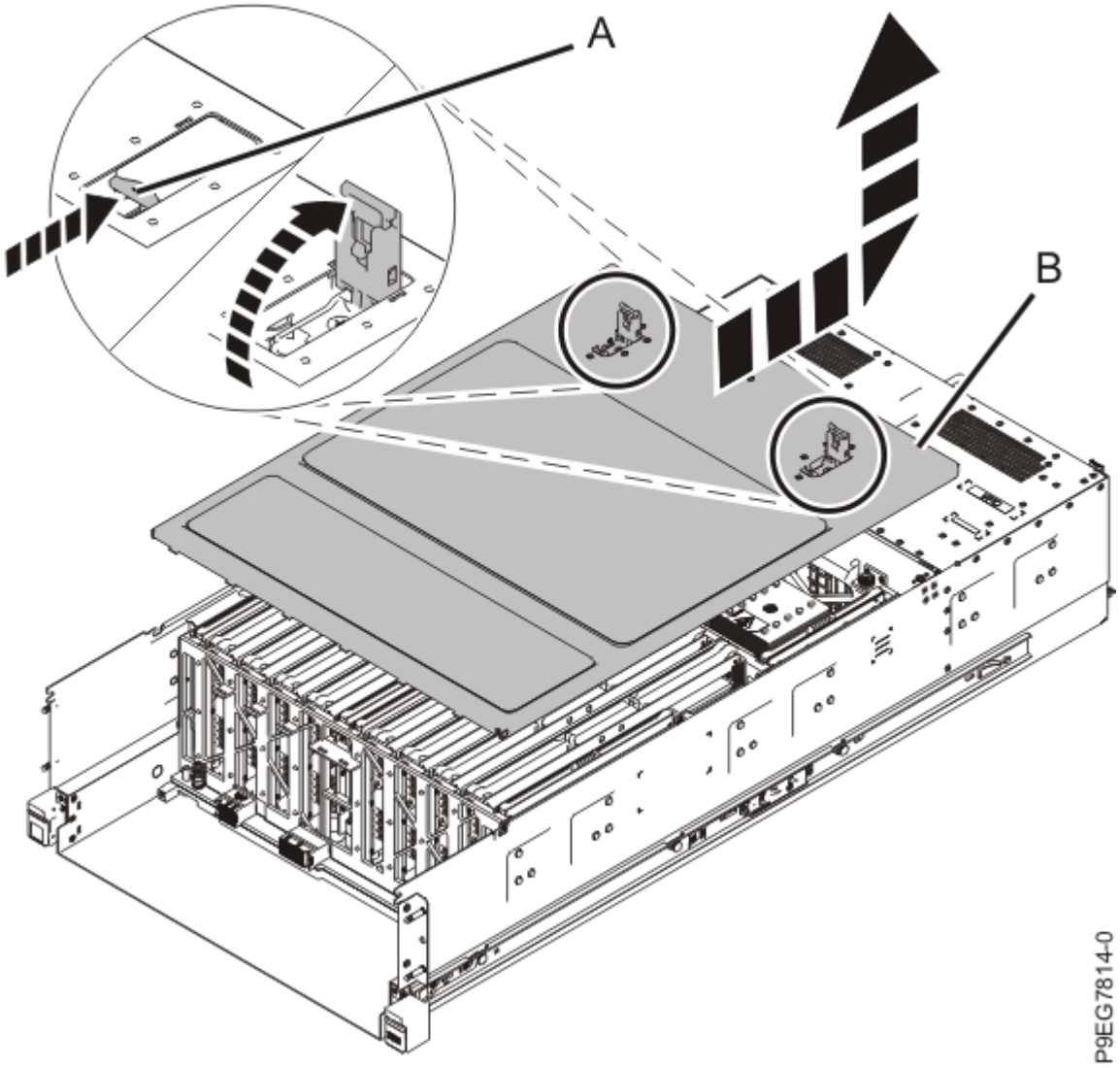

Figure 73. Removing the service access cover

53. Place the SAS cables **(A)** against the foam of the SAS cable support **(B)** as shown in the following figure. With your fingers holding the SAS cables against the foam, lower the SAS cable support **(B)** and SAS cables straight down between the alignment pins **(C)**.

    The foam holds the cables against the side of the system and prevents air from blowing through the side channel. Do not simply press the support **(B)** down in the channel on top of the cables.

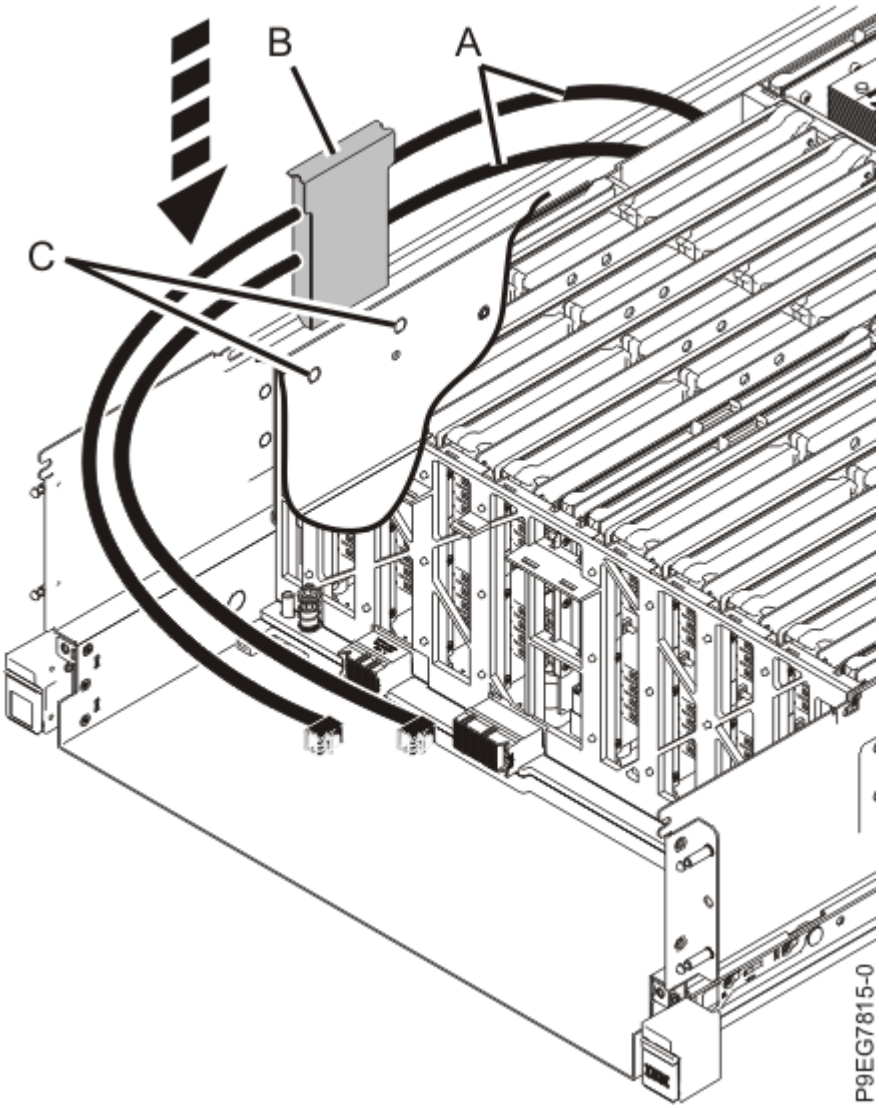

Figure 74. Replacing the SAS cable support for a base function disk drive backplane

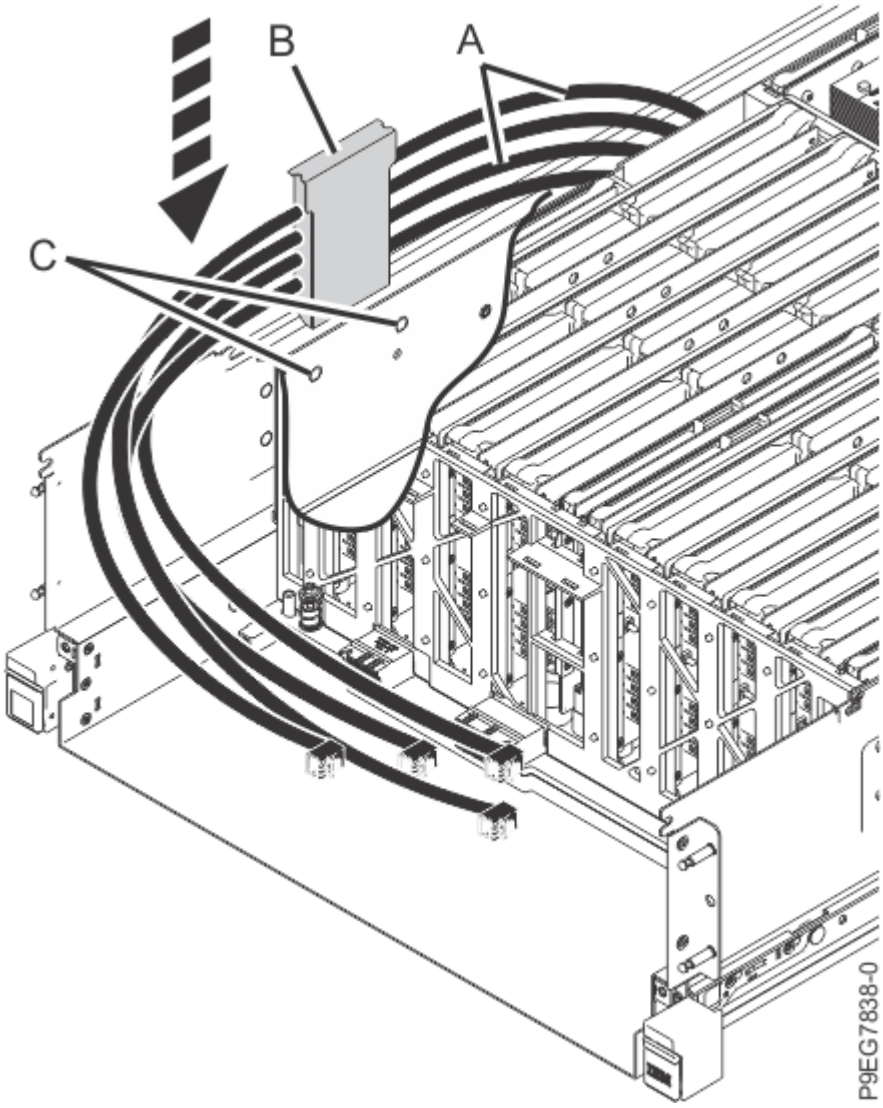

Figure 75. Replacing the SAS cable support for an expanded function disk drive backplane

54. Replace the service access cover.
    a) Lower the cover **(A)** onto the system unit. Ensure that the cover alignment pins **(C)** on each side of the cover fit into the matching slots in the chassis.
    b) Slide the cover **(A)** onto the system unit.
    c) Close the release latches **(B)** by pushing it in the direction that is shown in the following figure.

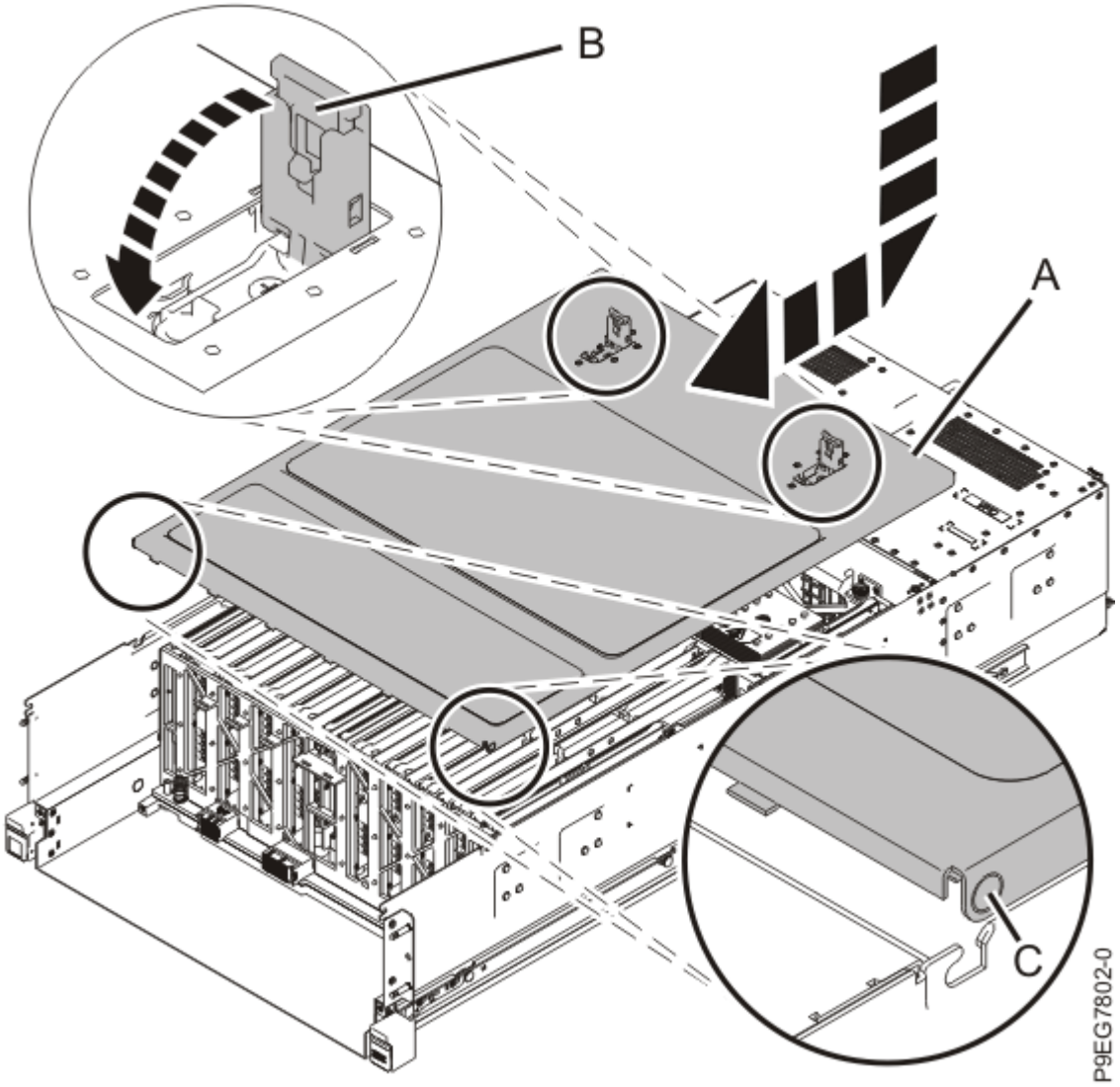

Figure 76. Installing the service access cover

55. Route the SAS cables around to the front of the system.

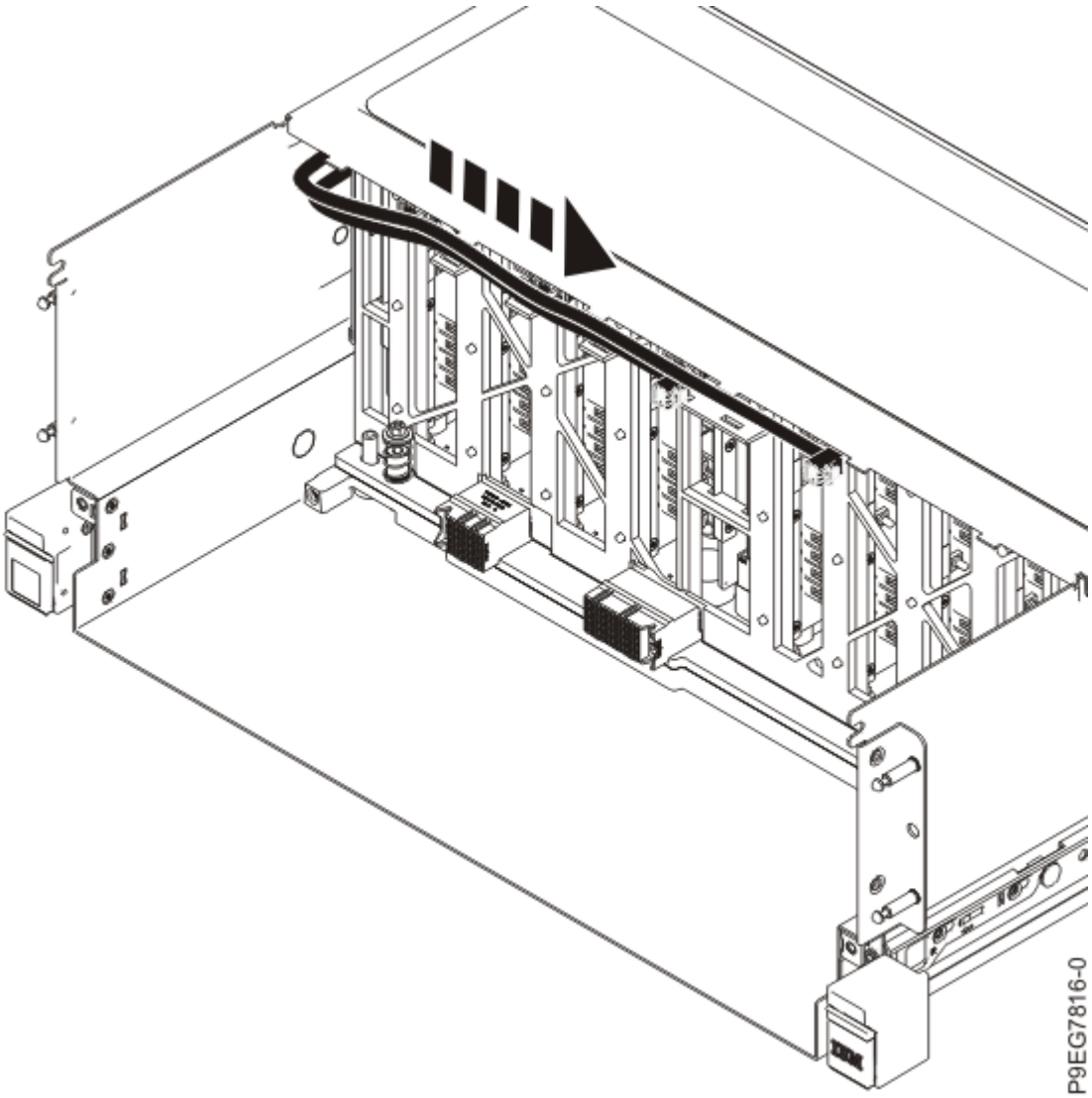

Figure 77. Routing the SAS cables for a base function disk drive backplane

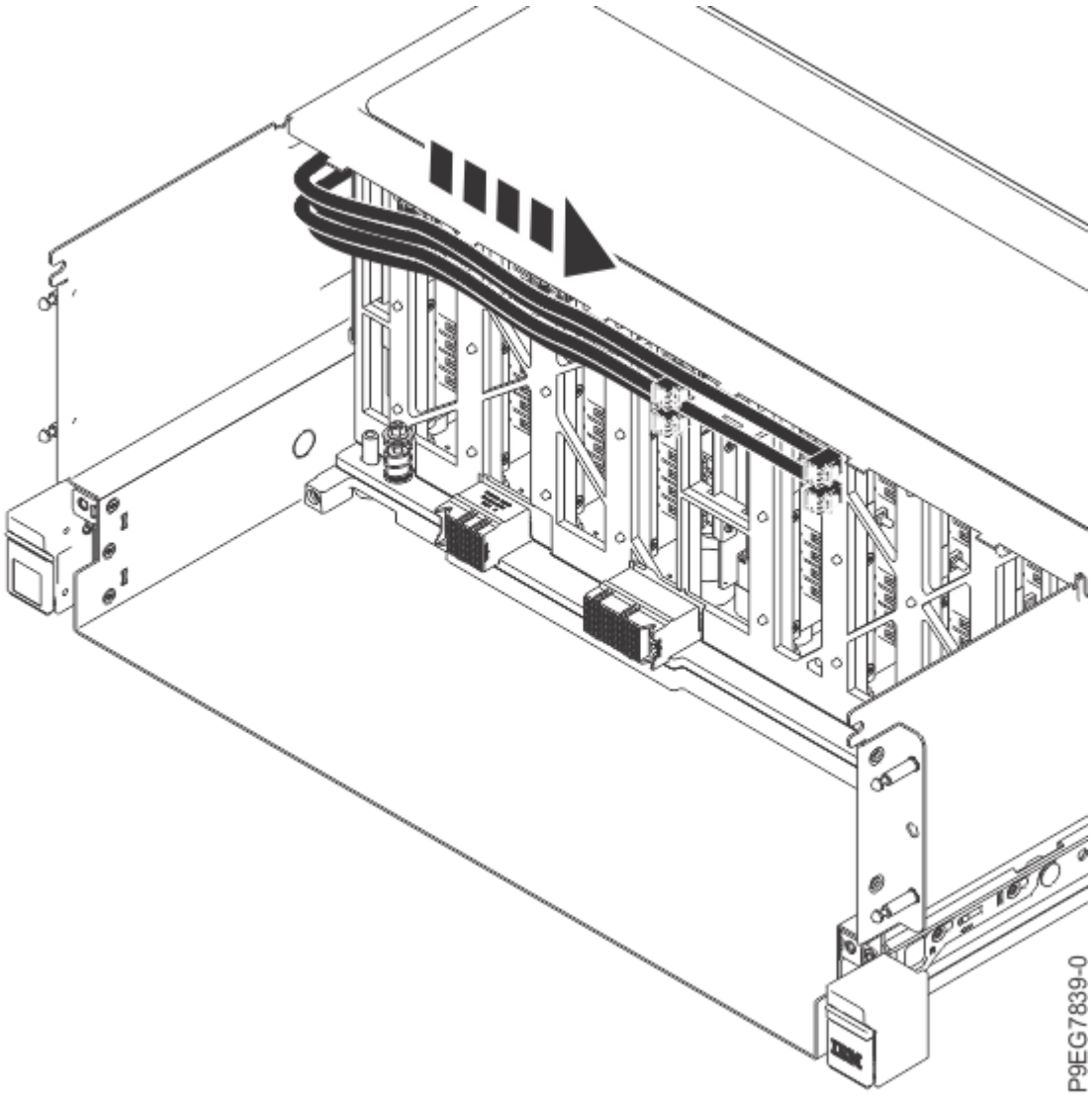

Figure 78. Routing the SAS cables for an expanded function disk drive backplane

56. Complete the following steps to place the system in the operating position.
    a. If needed, unlock the blue rail safety latches **(A)** by pushing them towards the front as shown in the following figure.
    b. Push the system unit back into the rack as shown in the following figure until both release latches of the system unit lock into position. Ensure that any cables do not catch or bind as you push in the system.

    Note: Slide the system unit slowly into the rack to ensure that your fingers do not get caught in the side rails.

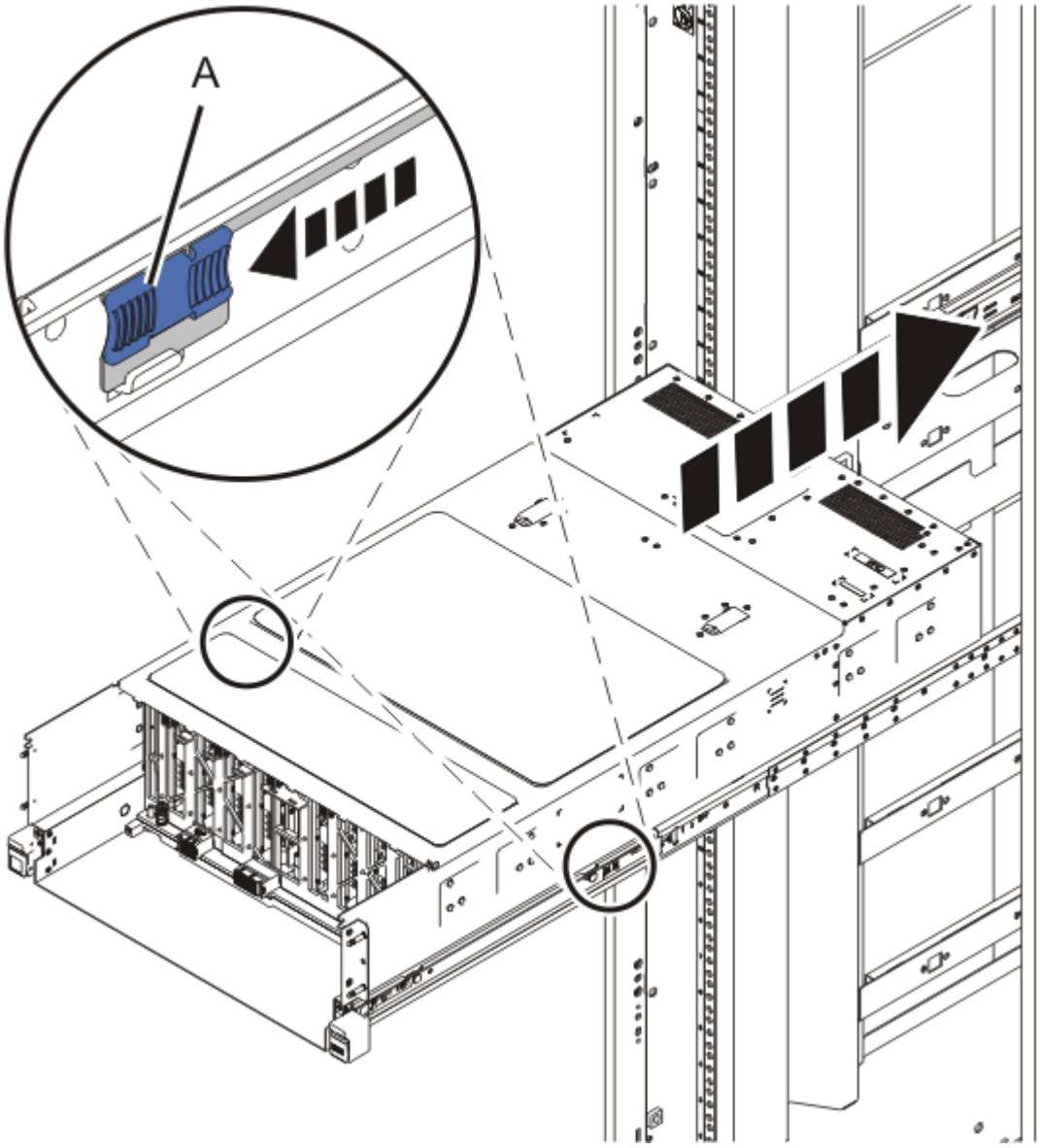

Figure 79. Placing the system into the operating position

57. To replace the disk drive backplane, complete the following steps:

    a) Using two hands, grasp the disk drive backplane where indicated by the blue squares in the following figure. Partially insert the disk drive backplane straight into the front of the system.

    Do not yet fully insert the disk drive backplane; leave about a 2.5 cm (1 in) gap at the rear of the disk drive backplane.

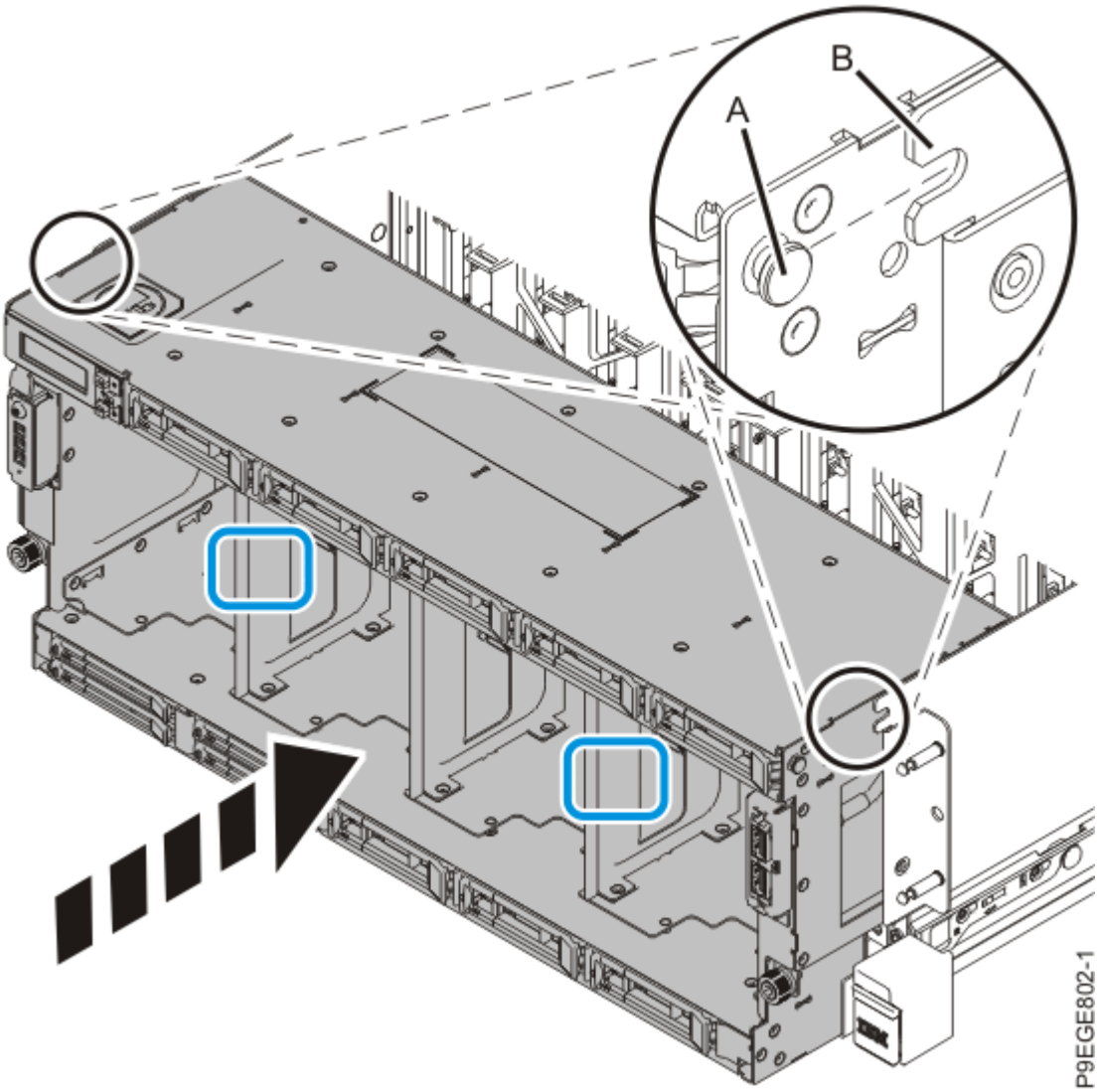

Figure 80. Partially replacing the disk drive backplane

b) Move the system unit **(A)** to be at most 20.3 cm (8 in) from the rack as shown in the following figure. Ensure that any cables do not catch or bind as you move the system.

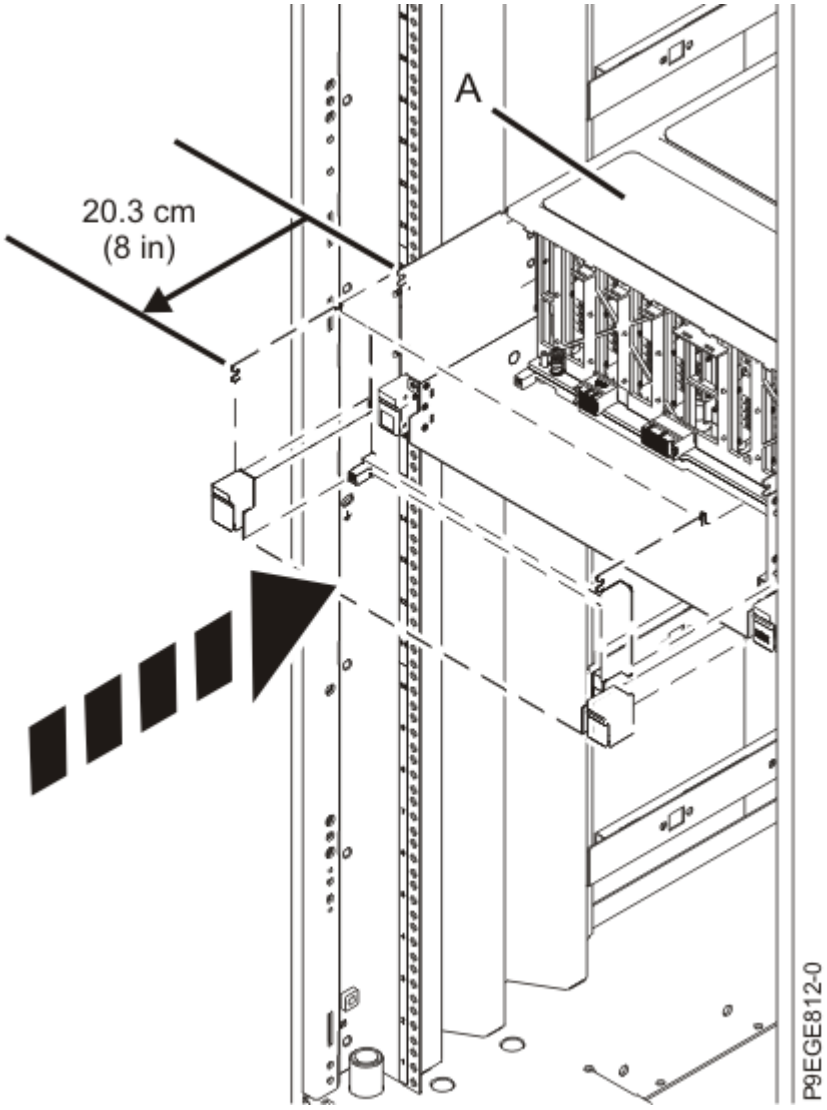

Figure 81. Partially sliding the system into the rack

c) Using the connector labels near the ends of the SAS cables, attach the SAS cables to the rear of the disk drive backplane as shown in the following figure.

Hold the disk drive backplane while you attach the SAS cables to prevent the disk drive backplane from tipping forwards out of the system.

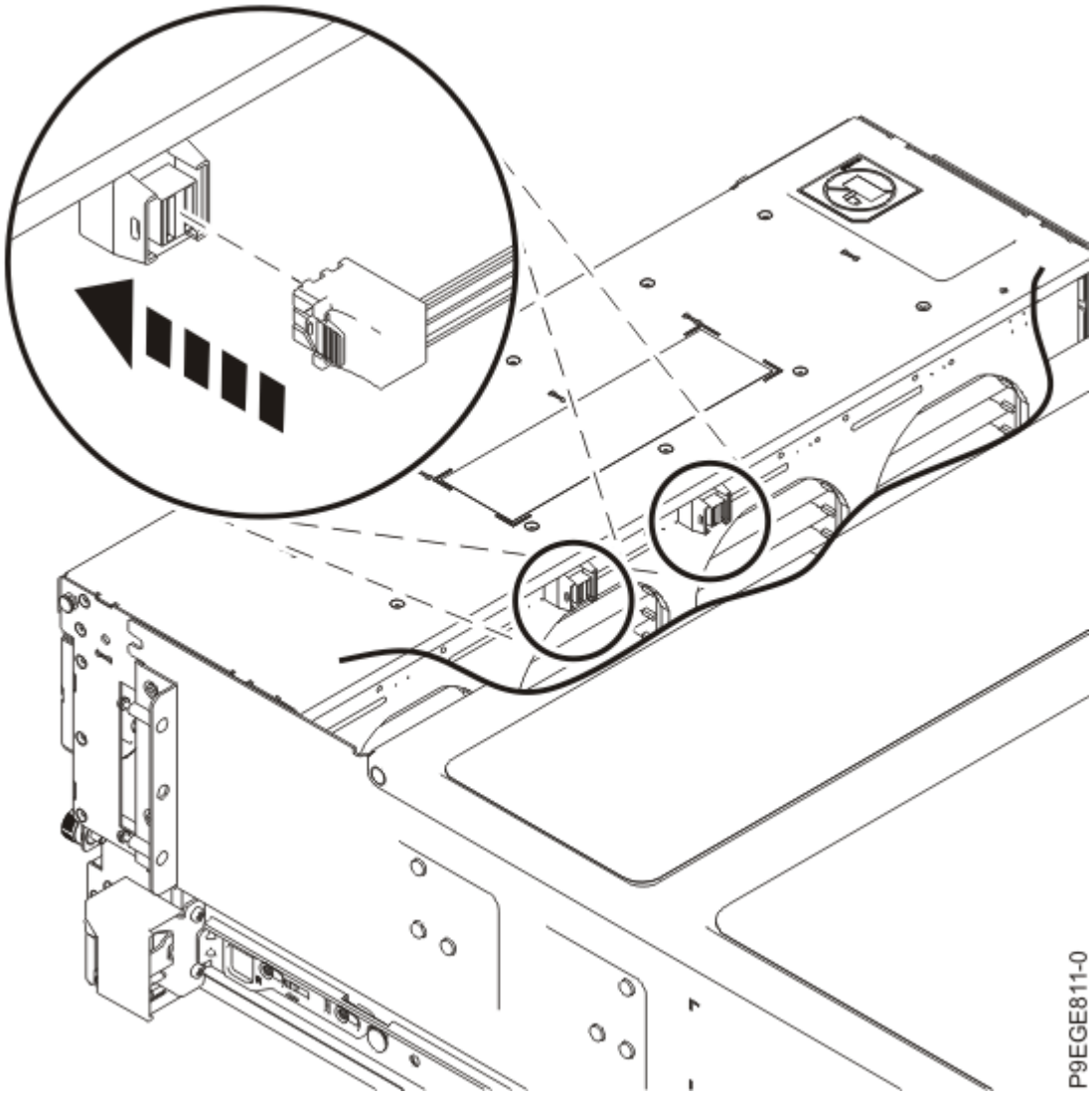

Figure 82. Attaching the SAS cables to the base function disk drive backplane

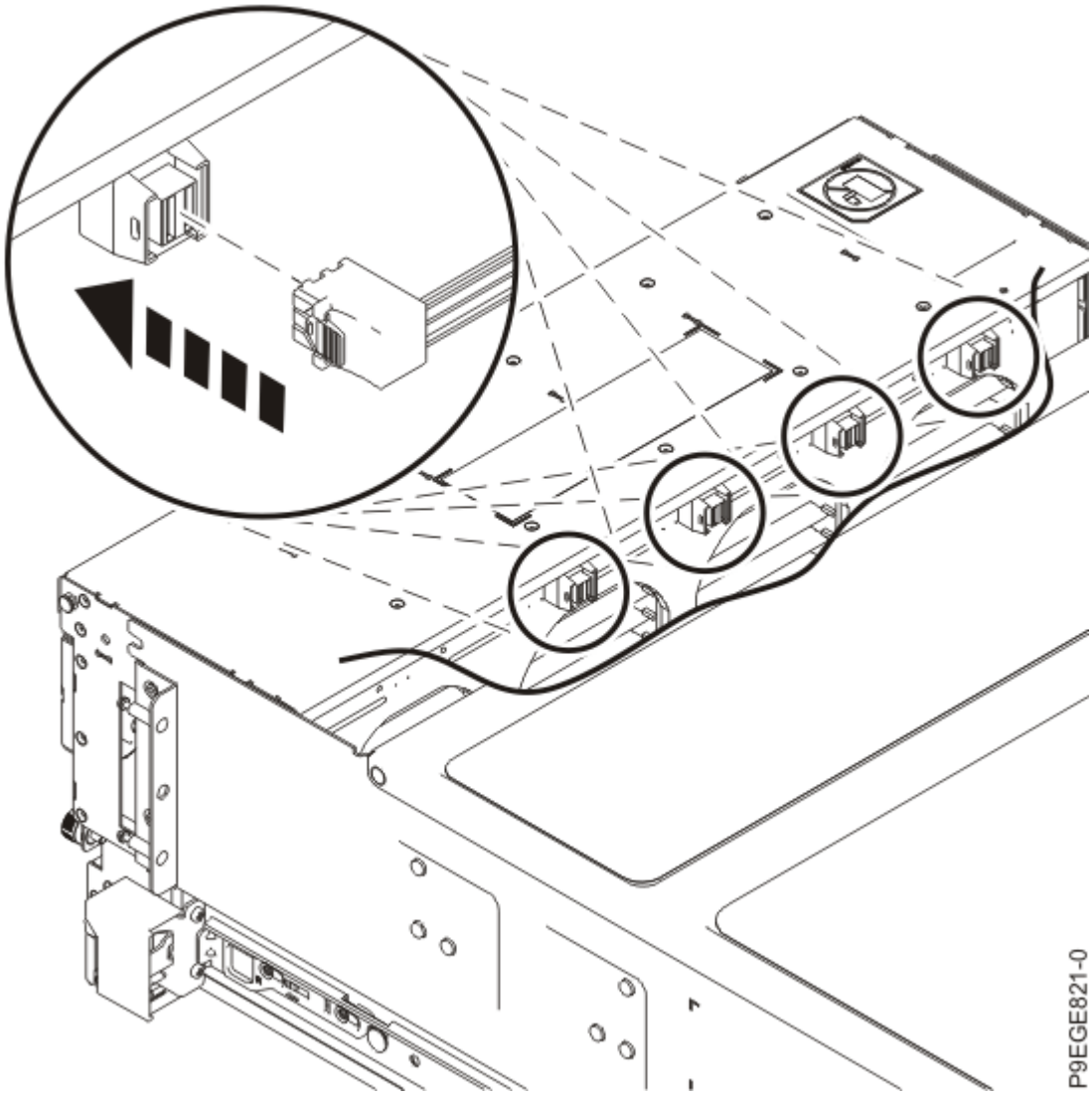

Figure 83. Attaching the SAS cables to the expanded function disk drive backplane

d) Again using two hands, push the disk drive backplane back into place, ensuring that the alignment pins at **(A)** insert into the slots at **(B)**.

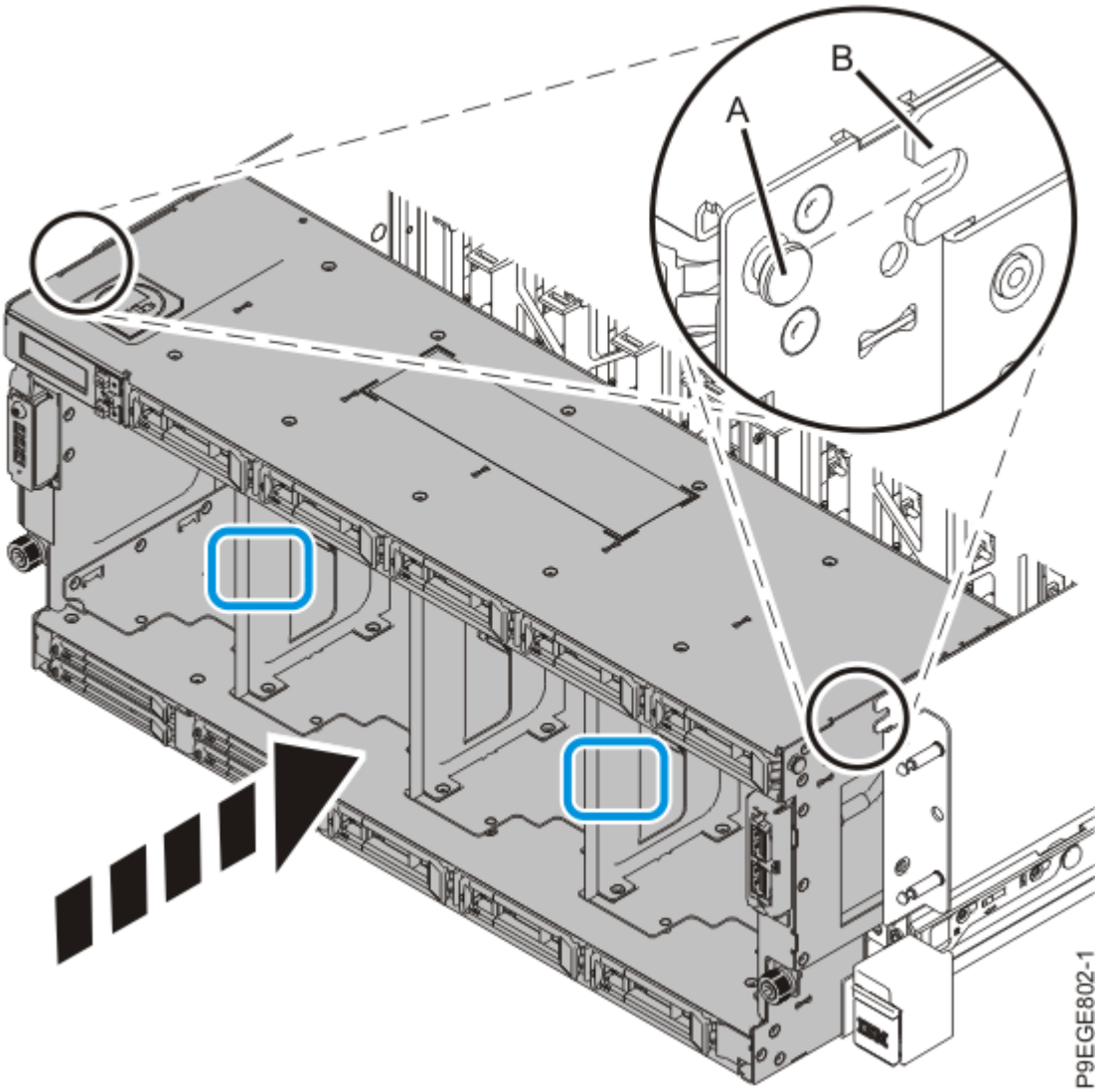

Figure 84. Replacing the disk drive backplane

e) Push the system unit **(A)** back into the rack until both release latches of the system unit lock into position. Ensure that any cables do not catch or bind as you push in the system.

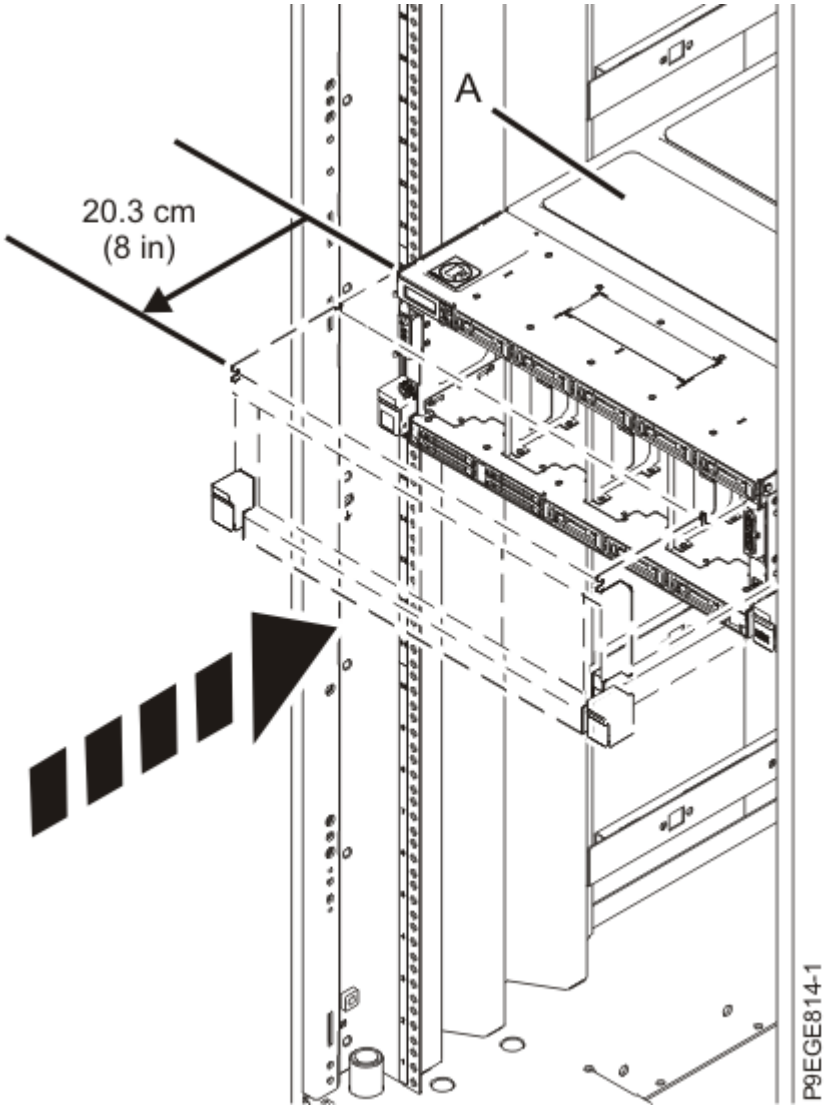

Figure 85. Placing the system into the operating position

f) Secure the disk drive backplane with two recessed screws at **(A)**. Use a 4 mm ball-end hex driver (130 mm long, IBM part number 02EA546) to tighten the screws.

First, set the screw threads on one side, then the other. Then, evenly tighten the screws on both sides until both sides are seated. If you screw in one side of the disk drive backplane completely, the disk drive backplane might twist, preventing the disk drive backplane from properly seating in the chassis.

g) Secure the disk drive backplane with two screws at **(B)**.

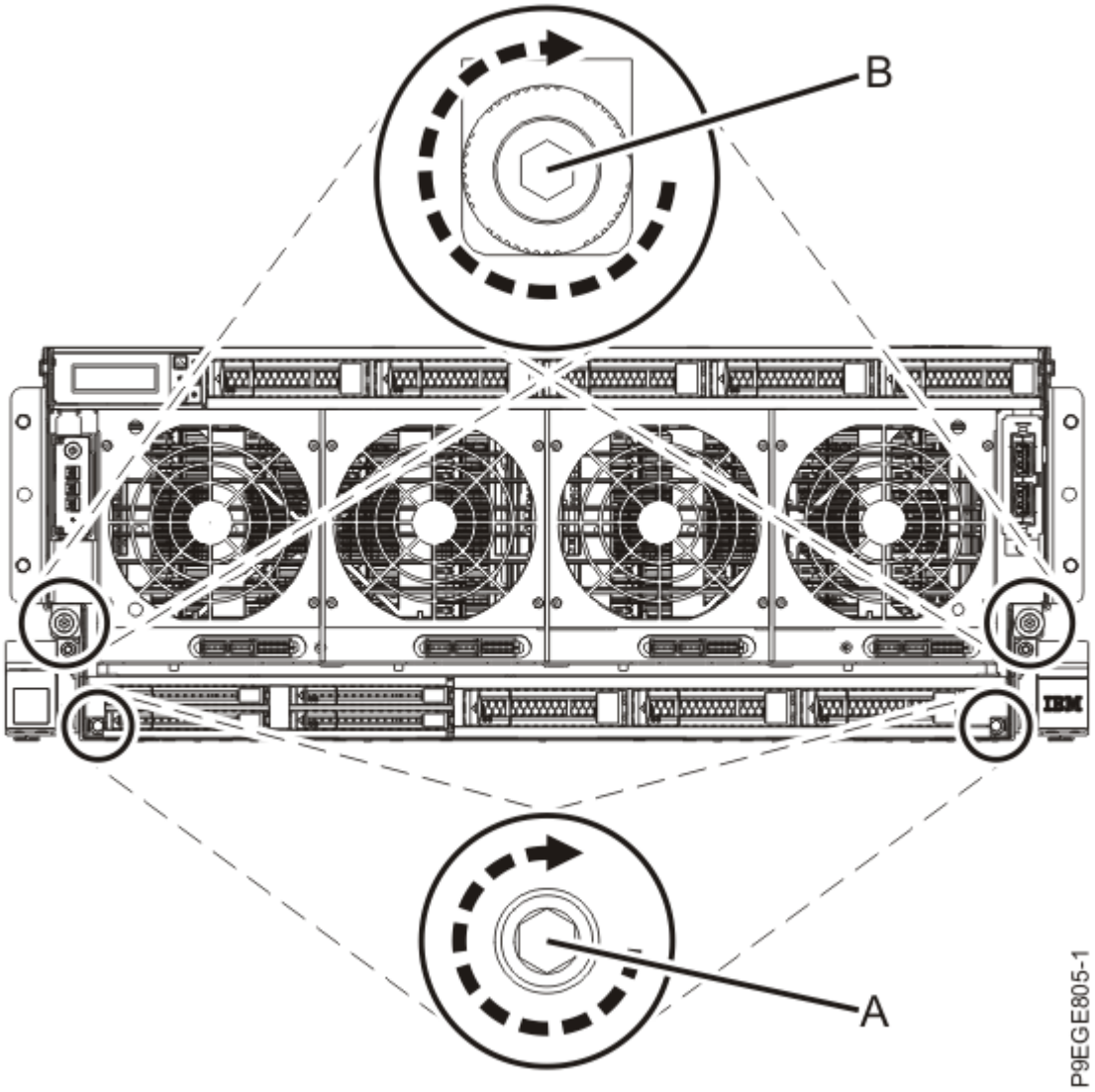

Figure 86. Fastening the screws for the disk drive backplane

58. Replace all the fans in the disk drive backplane.
    a) Ensure that the fan handle **(A)** is open as shown in the following figure.
    b) Hold on to the fan handle and by using your hand to support the bottom of the fan, push the fan into its slot as shown in the following figure.
    c) Push the fan handle in the direction that is shown in the following figure.
    d) Push against the left front of the blue touch point latch **(B)** with your thumb and then slightly pull the latch at **(C)** with your index finger. This action opens the latch.
    e) Continue to push in the lever with your thumb until the latch is fully seated at **(C)**.

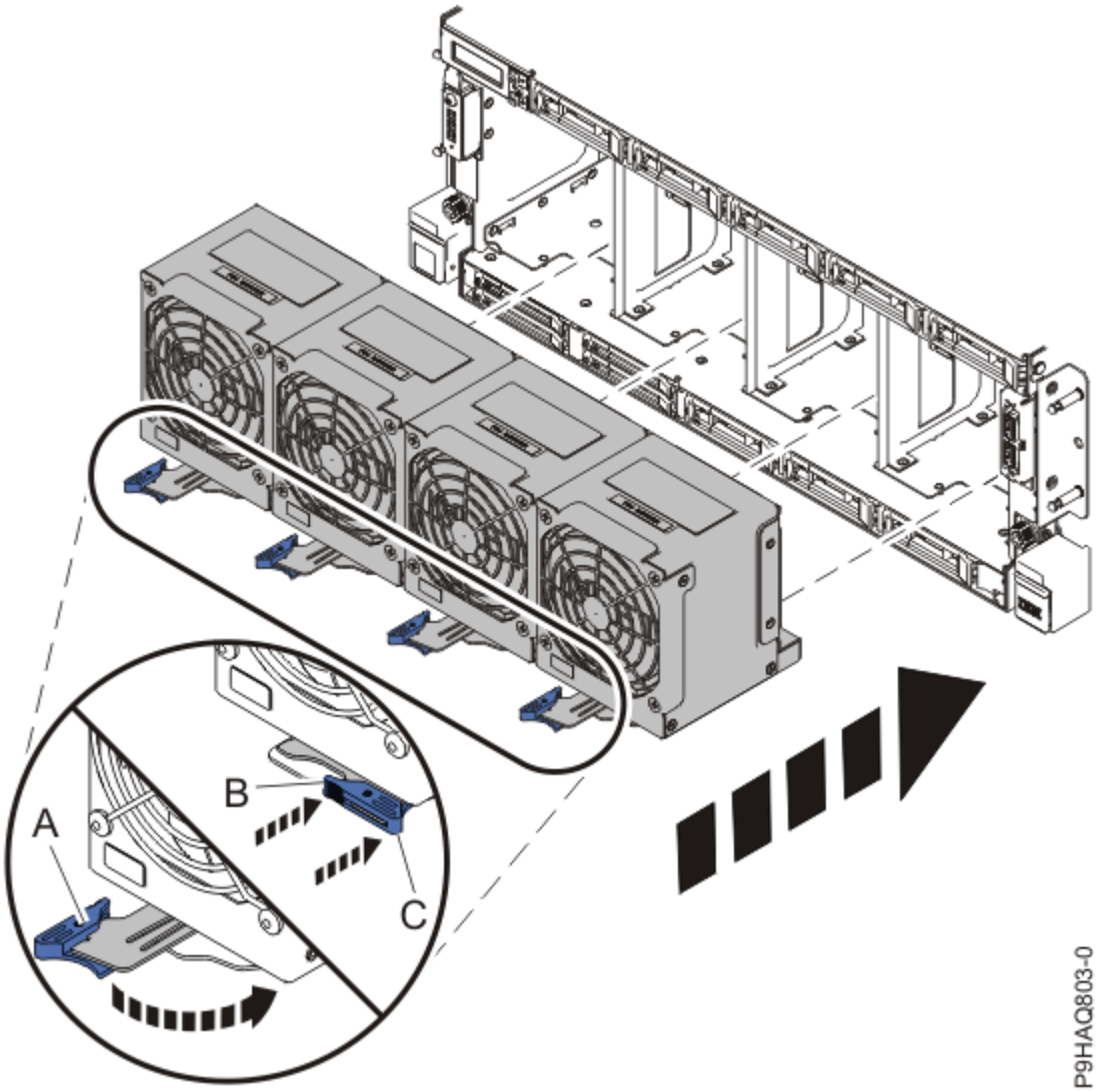

Figure 87. Replacing the fans

59. Position the cover **(A)** on the front of the system unit as shown in the following figure, so that the four pins **(B)** on the system match the four holes at the rear of the cover.

    Press the tabs **(C)** to snap the cover into position.

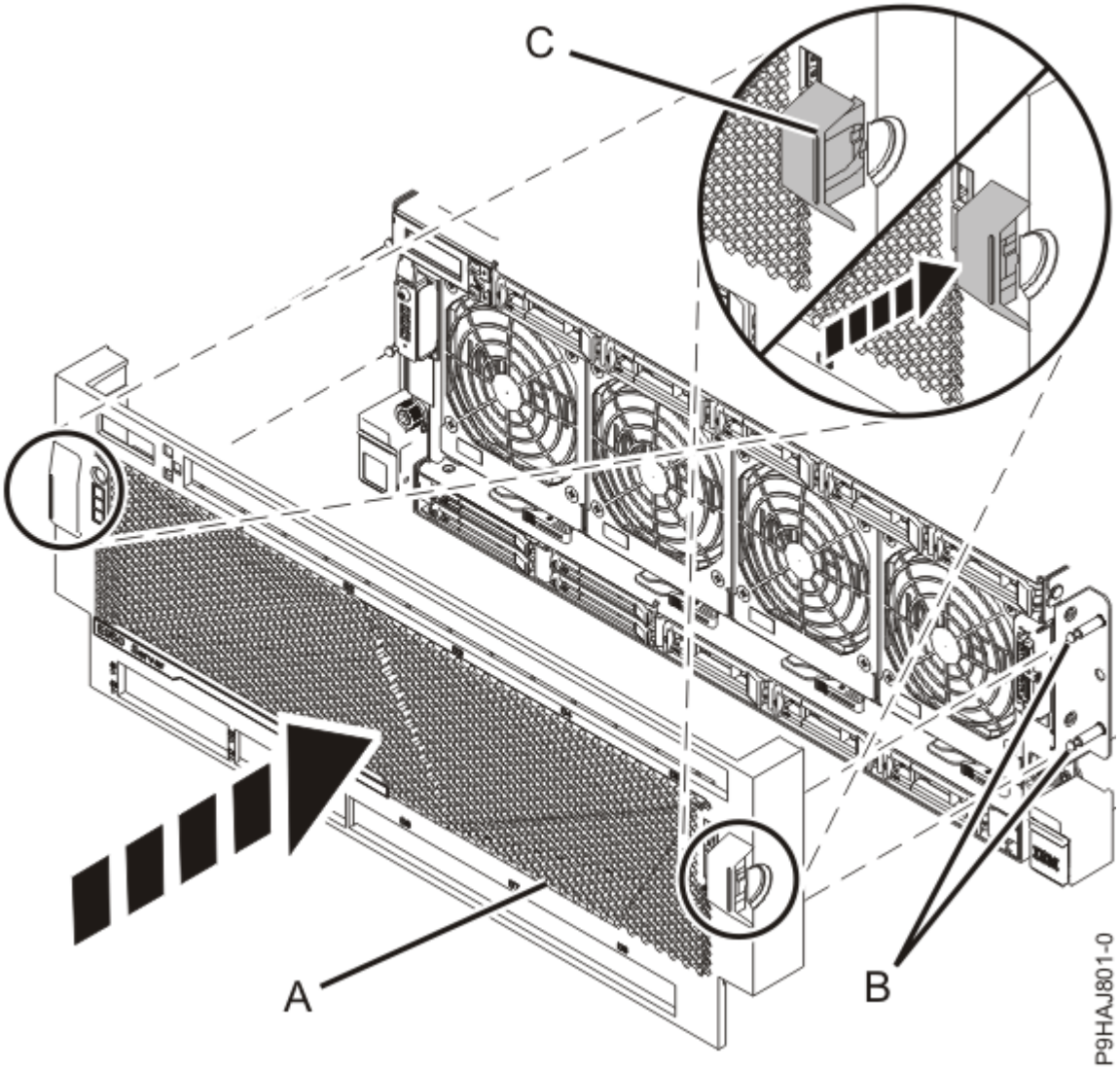

Figure 88. Installing the front cover

60. Replace the power supplies:
    a) Slide the power supply into the system until the latch locks in place.
    b) Repeat step “60.a” on page 87 to replace the remaining power supplies.

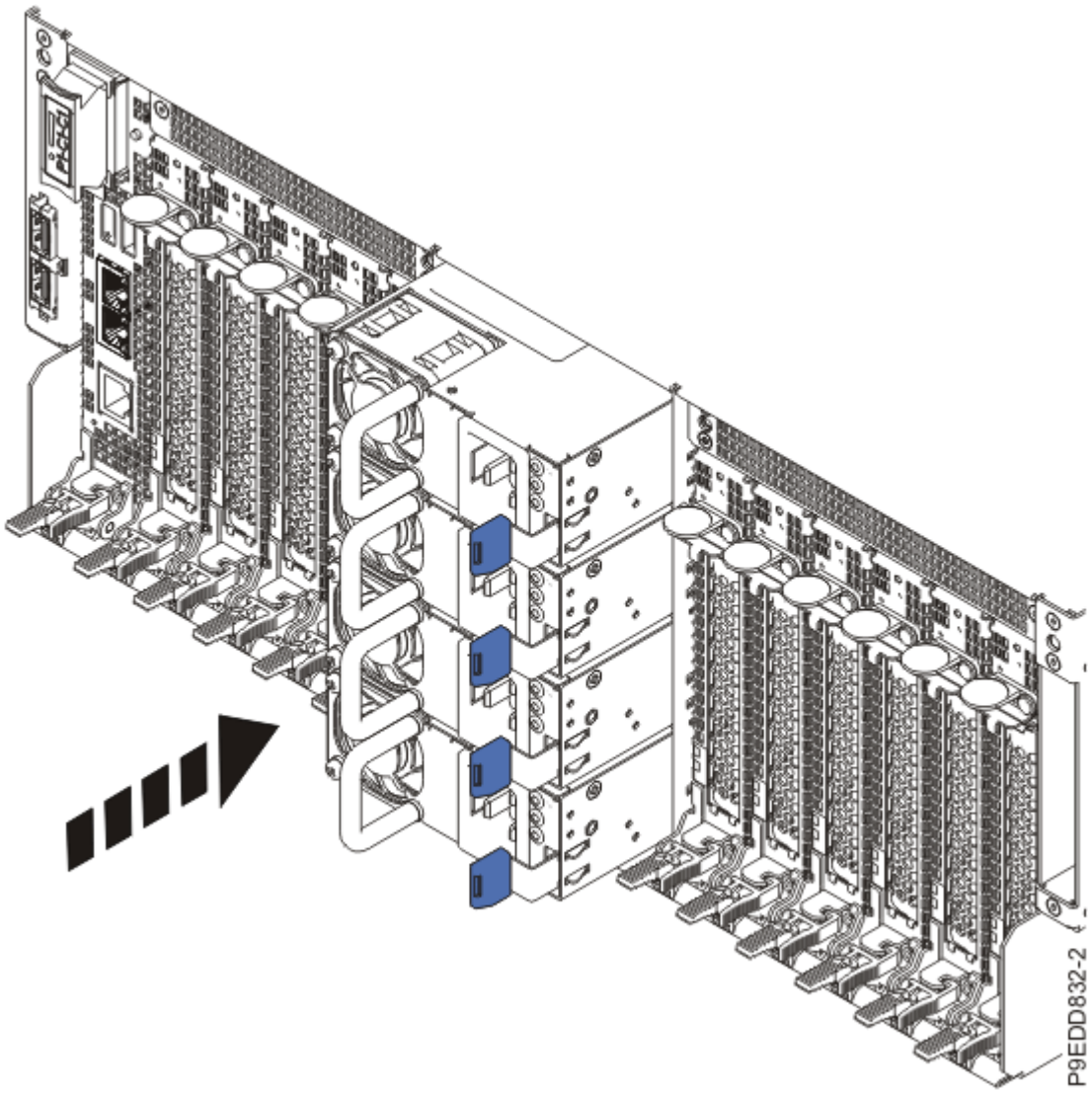

Figure 89. Replacing the power supplies

61. Replace the PCIe adapter cassettes.
    a) Slide the PCIe adapter cassette forward until the cassette is fully seated.
    b) To lock the cassette in its slot, squeeze the latch lever **(A)** toward the latch **(B)** and rotate the latch **(B)** in the direction that is shown.

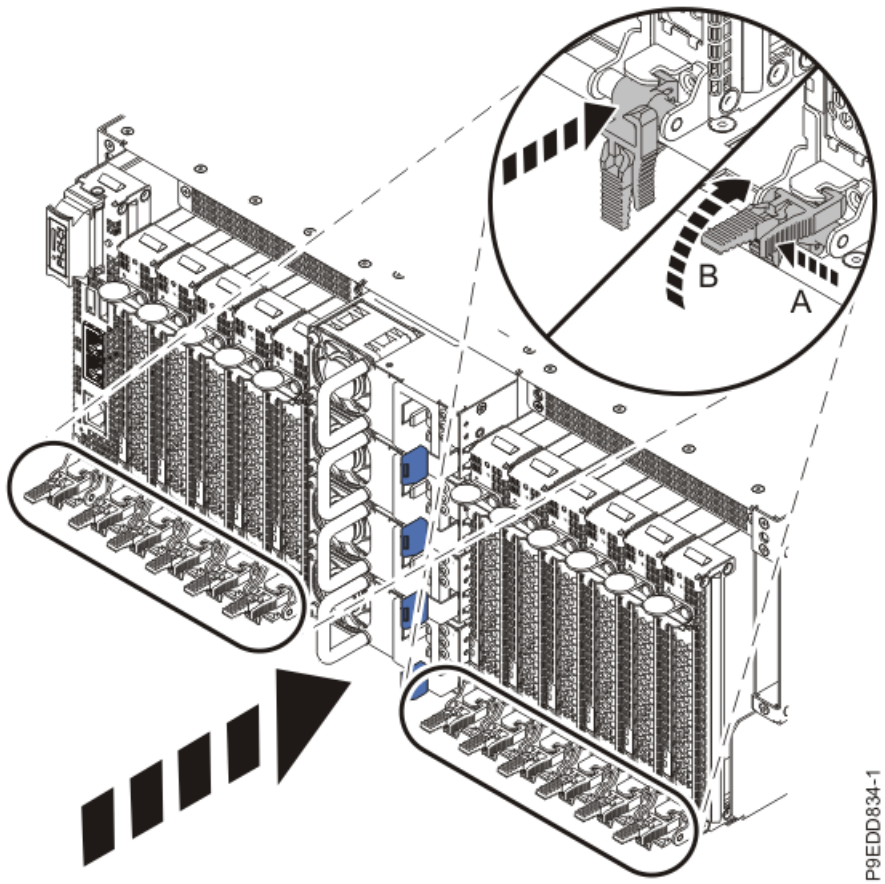

Figure 90. Replacing the PCIe adapter cassettes

c) Repeat steps “61.a” on page 88 through “61.b” on page 88 to replace the remaining PCIe adapter cassettes.

62. Using the labels on the cables, based on your configuration, remove the protective SAS cable covers, and insert the SAS cables into the PCIe cards as shown in the following figure.

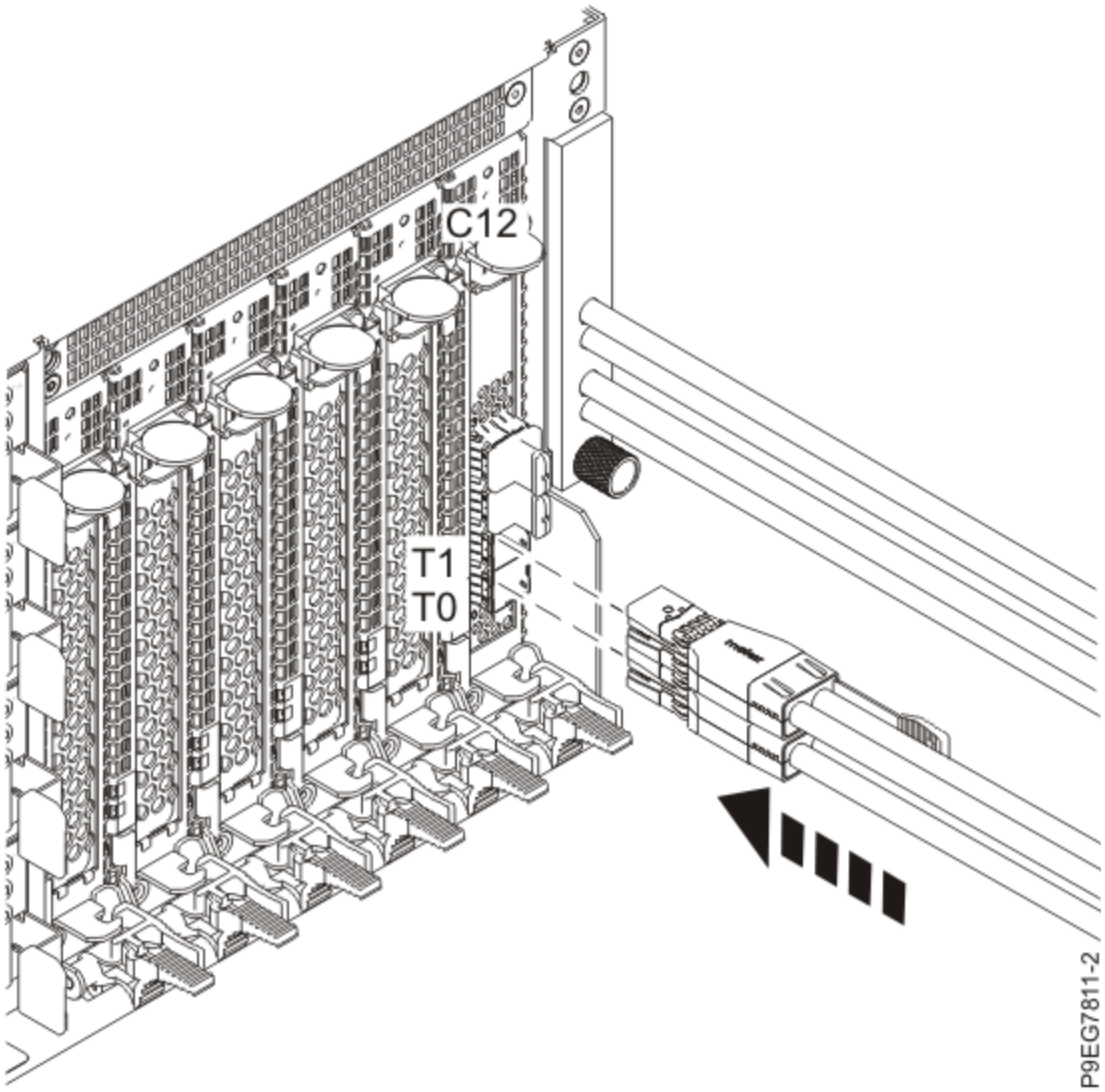

Figure 91. Plugging the SAS cables for the base configuration for a base function disk drive backplane

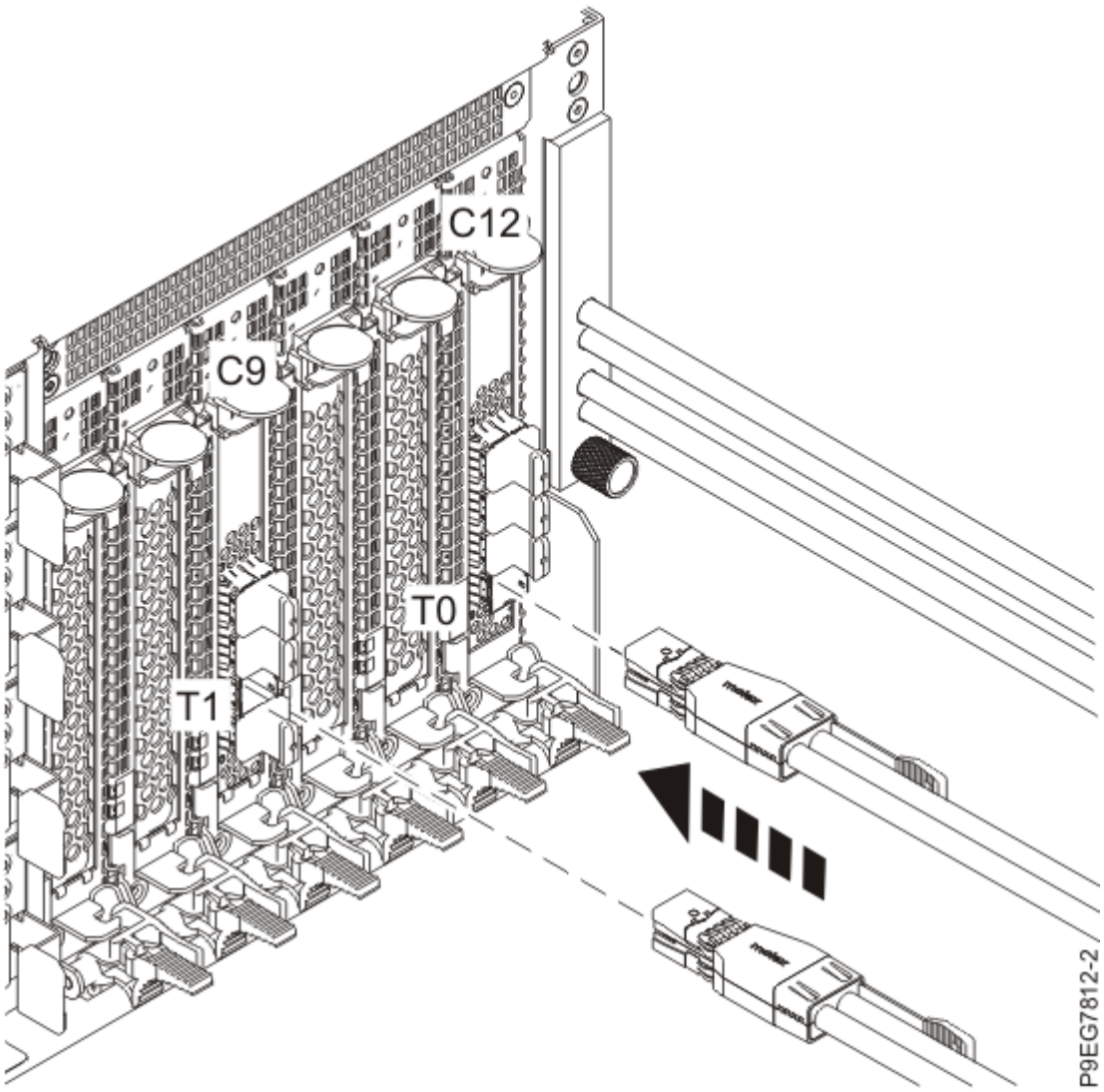

Figure 92. Plugging the SAS cables for the split configuration for a base function disk drive backplane

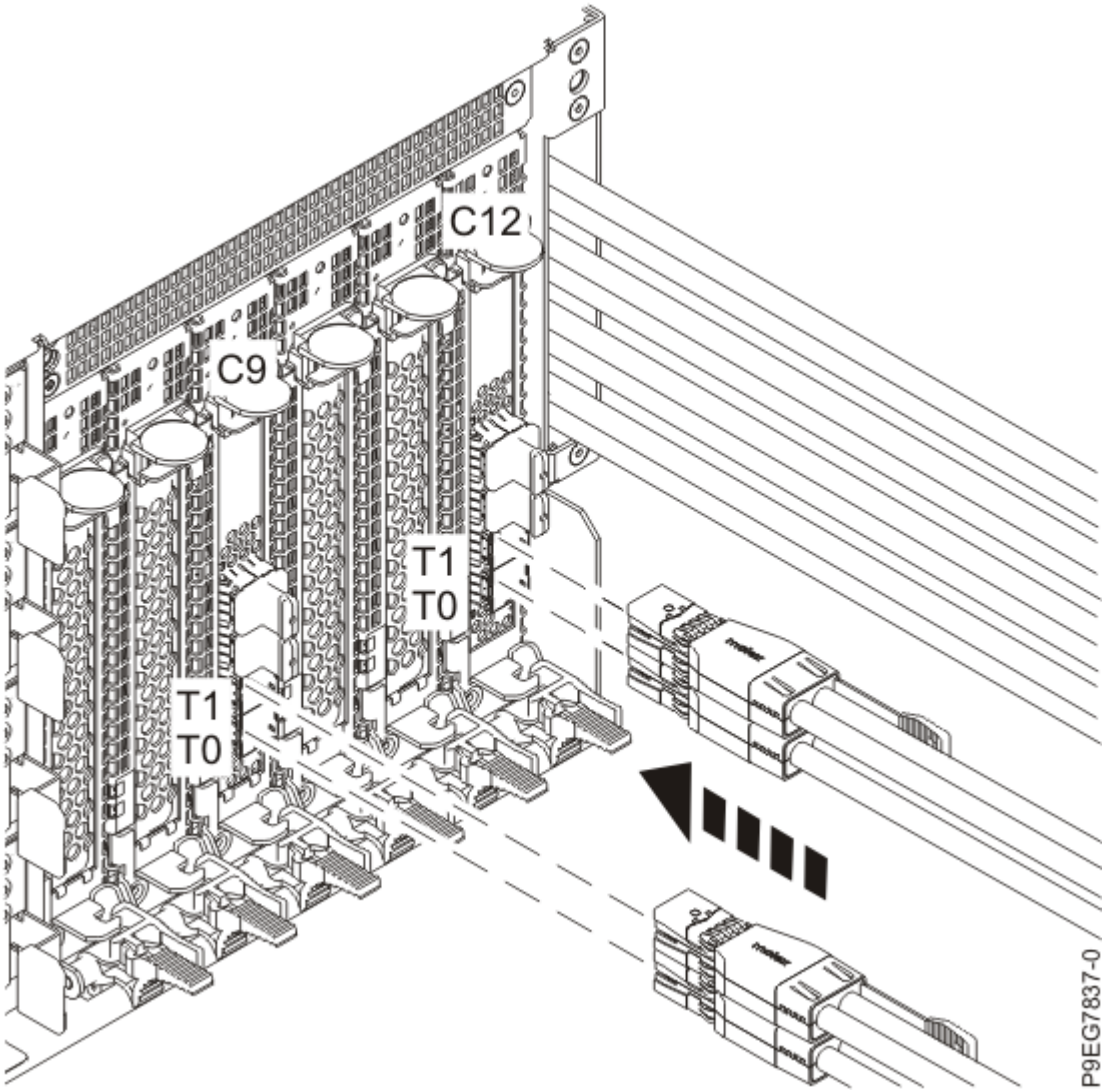

Figure 93. Plugging the SAS cables for an expanded function disk drive backplane

63. Using your labels, reconnect all of the external cables that plug into the PCIe adapters.
64. Using your labels, reconnect the power cords **(A)** to the system unit as shown in the following figure. Fasten the power cords to the system by using the hook-and-loop fasteners **(B)** as shown in the following figure.

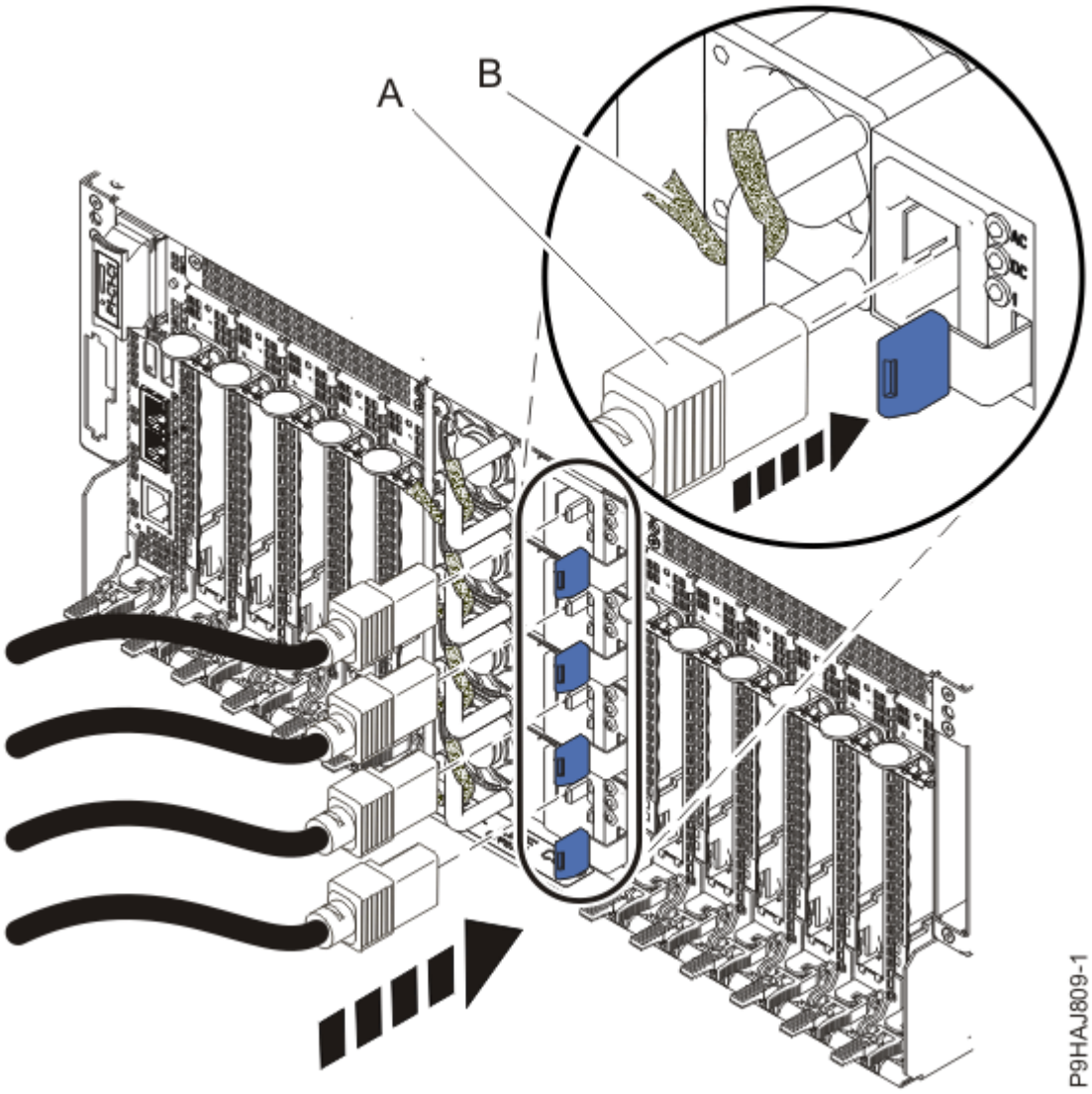

Figure 94. Connecting the power cords

65. Start the system. For instructions, see Starting a system (www.ibm.com/support/knowledgecenter/POWER9/p9haj/crustartsys.htm).
66. Verify the installed part.
    - If you replaced the part because of a service action, verify the installed part. For instructions, see Verifying a repair (www.ibm.com/support/knowledgecenter/POWER9/p9ect/pxect_verifyrepair.htm).
    - If you installed the part for any other reason, verify the installed part. For instructions, see Verifying the installed part (www.ibm.com/support/knowledgecenter/POWER9/p9haj/pxhaj_hsmverify.htm).

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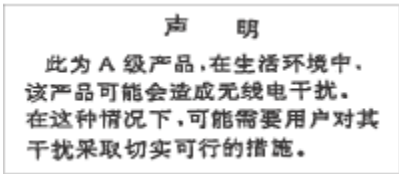

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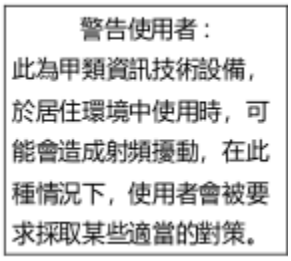
В жилых помещениях оно может создавать
радиопомехи, для снижения которых необходимы
дополнительные меры

Taiwan Notice



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

United States Federal Communications Commission (FCC) Notice

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. Proper cables and connectors are available from IBM-authorized dealers. 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.

Responsible Party:
International Business Machines Corporation
New Orchard Road
Armonk, NY 10504
Contact for FCC compliance information only: fccinfo@us.ibm.com

Class B Notices

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

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

Canada Notice

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

European Community and Morocco Notice

This product is in conformity with the protection requirements of Directive 2014/30/EU of the European Parliament and of the Council on the harmonization 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.

German Notice

Deutschsprachiger EU Hinweis: Hinweis für Geräte der Klasse B EU-Richtlinie zur Elektromagnetischen Verträglichkeit

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

Um dieses sicherzustellen, sind die Geräte wie in den Handbüchern beschrieben zu installieren und zu betreiben. Des Weiteren dürfen auch nur von der IBM empfohlene Kabel angeschlossen werden. IBM übernimmt keine Verantwortung für die Einhaltung der Schutzanforderungen, wenn das Produkt ohne Zustimmung von IBM verändert bzw. wenn Erweiterungskomponenten von Fremdherstellern ohne Empfehlung von IBM gesteckt/eingebaut werden.

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 B

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

Verantwortlich für die Einhaltung der EMV Vorschriften ist der Hersteller:
International Business Machines Corp.
New Orchard Road
Armonk, New York 10504
Tel: 914-499-1900

Der verantwortliche Ansprechpartner des Herstellers in der EU ist:
IBM Deutschland GmbH
Technical 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 55032 Klasse B

Japan Electronics and Information Technology Industries Association (JEITA) Notice

（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 applies to 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 applies to 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、ＰＦＣ回路付）
• 換算係数 ：0

This statement applies to 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、ＰＦＣ回路付）
• 換算係数 ：0

Japan Voluntary Control Council for Interference (VCCI) Notice

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Taiwan Notice

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台北市松仁路7號3樓
電話：0800-016-888

United States Federal Communications Commission (FCC) Notice

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 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.

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