Power Systems

Servicing the IBM Power System S822LC for Big Data (8001-22C) or the IBM CS822 (8005-22N)

IBM

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Servicing the IBM Power System S822LC for Big Data (8001-22C) or the IBM CS822 (8005-22N)

IBM

This edition applies to IBM Power Systems™ servers that contain the POWER8® 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.
- To avoid hazardous conditions due to uneven mechanical loading, always install the heaviest devices in the bottom of the rack cabinet. Always install servers and optional devices starting from the bottom of the rack cabinet.
- Rack-mounted devices are not to be used as shelves or work spaces. Do not place objects on top of rack-mounted devices. In addition, do not lean on rack mounted devices and do not use them to stabilize your body position (for example, when working from a ladder).

- Each rack cabinet might have more than one power cord.
  - For AC powered racks, be sure to disconnect all power cords in the rack cabinet when directed to disconnect power during servicing.
  - For racks with a DC power distribution panel (PDP), turn off the circuit breaker that controls the power to the system unit(s), or disconnect the customer's DC power source, when directed to disconnect power during servicing.
- Connect all devices installed in a rack cabinet to power devices installed in the same rack cabinet. Do not plug a power cord from a device installed in one rack cabinet into a power device installed in a different rack cabinet.
- An electrical outlet that is not correctly wired could place hazardous voltage on the metal parts of the system or the devices that attach to the system. It is the responsibility of the customer to ensure that the outlet is correctly wired and grounded to prevent an electrical shock.

(R001 part 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. 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.

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

- Reduce the weight of the rack cabinet by removing equipment starting at the top of the rack cabinet. When possible, restore the rack cabinet to the configuration of the rack cabinet as you received it. If this configuration is not known, you must observe the following precautions:
  - Remove all devices in the 32U position (compliance ID RACK-001 or 22U (compliance ID RR001) and above.
  - Ensure that the heaviest devices are installed in the bottom of the rack cabinet.
  - Ensure that there are little-to-no empty U-levels between devices installed in the rack cabinet below the 32U (compliance ID RACK-001 or 22U (compliance ID RR001) level, unless the received configuration specifically allowed it.
- If the rack cabinet you are relocating is part of a suite of rack cabinets, detach the rack cabinet from the suite.
- If the rack cabinet you are relocating was supplied with removable outriggers they must be reinstalled before the cabinet is relocated.
- Inspect the route that you plan to take to eliminate potential hazards.
- Verify that the route that you choose can support the weight of the loaded rack cabinet. Refer to the documentation that comes with your rack cabinet for the weight of a loaded rack cabinet.
- Verify that all door openings are at least 760 x 230 mm (30 x 80 in.).
- Ensure that all devices, shelves, drawers, doors, and cables are secure.
- Ensure that the four leveling pads are raised to their highest position.
- Ensure that there is no stabilizer bracket installed on the rack cabinet during movement.
- Do not use a ramp inclined at more than 10 degrees.
- When the rack cabinet is in the new location, complete the following steps:
  - Lower the four leveling pads.
  - Install stabilizer brackets on the rack cabinet.
  - 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. (L002)

(L003)
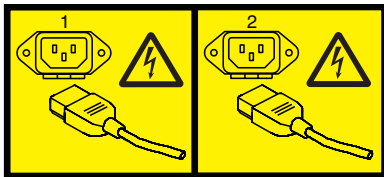
or

or

or

or

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

(L007)

CAUTION: A hot surface nearby. (L007)

(L008)

CAUTION: Hazardous moving parts nearby. (L008)

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

CAUTION:
This product might contain one or more of the following devices: CD-ROM drive, DVD-ROM drive, DVD-RAM drive, or laser module, which are Class 1 laser products. Note the following information:
- **Do not remove the covers. Removing the covers of the laser product could result in exposure to hazardous laser radiation. There are no serviceable parts inside the device.**
- **Use of the controls or adjustments or performance of procedures other than those specified herein might result in hazardous radiation exposure.**

(C026)

CAUTION:
Data processing environments can contain equipment transmitting on system links with laser modules that operate at greater than Class 1 power levels. For this reason, never look into the end of an optical fiber cable or open receptacle. Although shining light into one end and looking into the other end of a disconnected optical fiber to verify the continuity of optic fibers many 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)
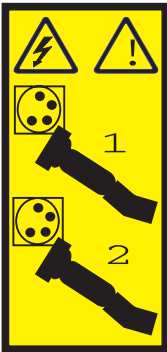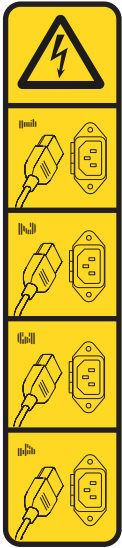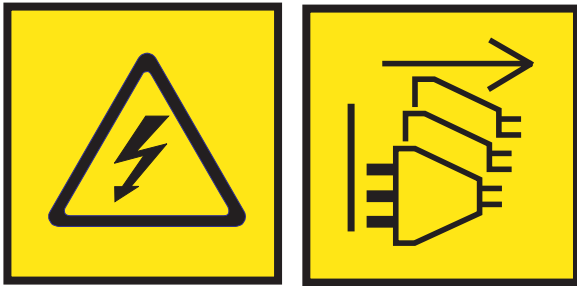
CAUTION:
Some laser products contain an embedded Class 3A or Class 3B laser diode. Note the following information: laser radiation when open. Do not stare into the beam, do not view directly with optical instruments, and avoid direct exposure to the beam. (C030)

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

Do Not:
- **___ Throw or immerse into water**
- **___ Heat to more than 100°C (212°F)**
- **___ Repair or disassemble**

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

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 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 platform tilt riser accessory option. Secure platform riser tilt option to main shelf in all four (4x) 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 option flat at all times except for final minor 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.
- 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. (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 and replacing parts

Use these procedures to remove and replace failing parts. These parts are referred to as field replaceable units (FRUs).

Note: See the International Information Bulletin for Customers - Installation of IBM Machines (http://www.ibm.com/e-business/linkweb/publications/servlet/pbi.wss). This bulletin (Publication number SC27-6601-00) provides a list of the key IBM system installation activities and those activities that might be billable activities.

Before you begin a replacement, complete these tasks:

1. If you are completing a replacement procedure that might put your data at risk, ensure, if possible, that you have a current backup of your system or logical partition (including operating systems, licensed programs, and data).
2. Review the installation or replacement procedure for the feature or part.
3. Note the significance of color on your system.
   - The color **terracotta** on the part indicates you might not need to power off the system to complete service. This determination depends on your system configuration, and you might need to complete steps to prepare the system before a service action can be completed on the system with the system power turned on.
   - The color **blue** on the part indicates that the procedure might require the system to be shut down before servicing. Check your service procedure before you attempt the repair.
4. Ensure that you have access to a medium, flat-blade screwdriver, and a Phillips screwdriver.
5. If parts are incorrect, missing, or visibly damaged, contact the provider of the part or your next level of support.

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)

Attention:

Failure to follow the step-by-step sequence for FRU removal or installation might result in FRU or system damage.

For safety, airflow purposes and thermal performance, the service access cover must be installed and fully seated before you power the system on.

For safety and airflow purposes and thermal performance, if you remove parts from the system, you must ensure that PCIe tail-stock fillers are present.

Use the following precautions whenever you handle electronic components or cables.
- The electrostatic discharge (ESD) kit and the ESD wrist strap must be used when you handle logic cards, single chip modules (SCM), multichip modules (MCM), electronic boards, and disk drives.
- Keep all electronic components in the shipping container or envelope until you are ready to install them.
- If you remove and then reinstall an electronic component, temporarily place the component on an ESD pad or blanket.

Removing and replacing a storage drive in the 8001-22C or 8005-22N

Learn how to remove and replace a storage drive in the IBM Power® System S822LC for Big Data (8001-22C) or the IBM CS822 (8005-22N) system.

About this task

The storage drive might be a hard disk drive (HDD) or a solid-state drive (SSD).

Removing a disk drive from the 8001-12C, 8001-22C, 8005-12N, or 8005-22N system

Learn how to remove a disk drive in the IBM Power System S821LC (8001-12C), the IBM Power System S822LC for Big Data (8001-22C), the IBM CS821 (8005-12N), or the IBM CS822 (8005-22N) systems.

Before you begin

You can remove and replace SATA and SAS front drives with the system powered on and running.

When removing and replacing NVMe drives, the system needs to be powered down; for instructions, see "Stopping the 8001-12C, 8001-22C, 8005-12N, or 8005-22N system" on page 83.

Procedure

1. Attach the electrostatic discharge (ESD) wrist strap.

   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.

2. Locate the drive. Ensure that the media device is unmounted from the Linux system and if needed, remove the media from the device. Ensure that the media device is unmounted from the Linux system and if needed, remove the media from the device.

   Based on how the drive is connected, use the following table to identify the drive, and to enable the drive to be safely removed from the system.

Drive type	Use these commands
SATA drives connected to system backplane	"mvCLI commands" on page 83
SATA or SAS drives connected to Low Profile 12Gb/s 8-port SAS Internal RAID Adapter (FC EKAA)	"StorCLI commands" on page 84
SATA or SAS drives connected to 12Gb/s 8-Port SAS Internal RAID Adapter (FC EKAB)	"sas3ircu commands" on page 85
NVMe drives connected to Dual-port Internal NVMe Host Bus Adapter (FC EKAE)	"NVMe commands" on page 85

3. Unlock the drive bay handle **(B)** by pushing in the handle release **(A)** as shown in Figure 1 on page 4. The handle **(B)** snaps out towards you. If the handle does not snap out all the way, the drive does not slide out of the system. If the drive does not match the serial number you wrote down in the previous step, reinstall the drive in the bay you removed it from, and check the other drive bays.

Figure 1. Removing a drive

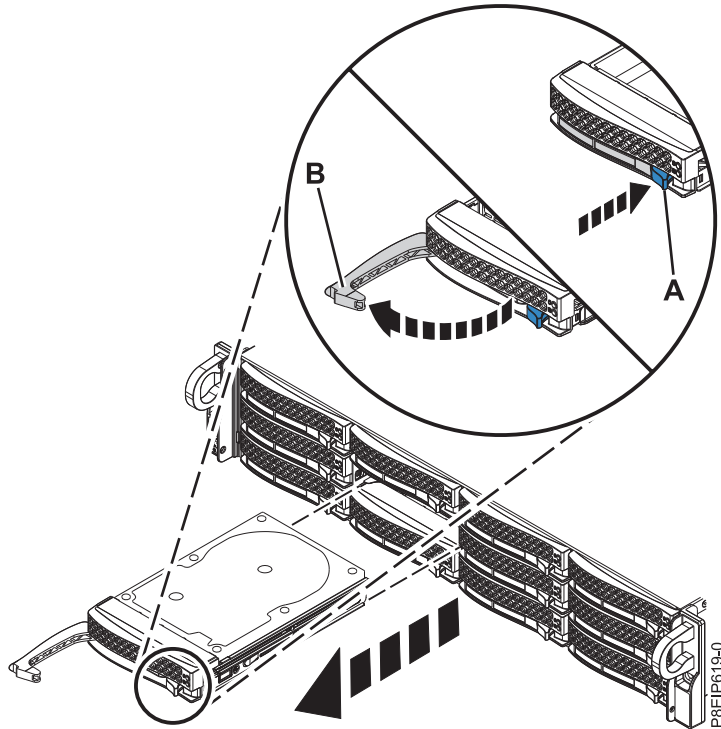4. Support the bottom of the drive as you slide it out of the system. Do not hold the drive by the handle.

5. If you are removing more than one drive, repeat the steps in this procedure until all drives are removed.

6. Remove a drive from the tray.

   • For a 3.5-inch drive, unfasten the drive from the sides of the tray by removing four screws (2 on each side), as shown in Figure 2 on page 5.

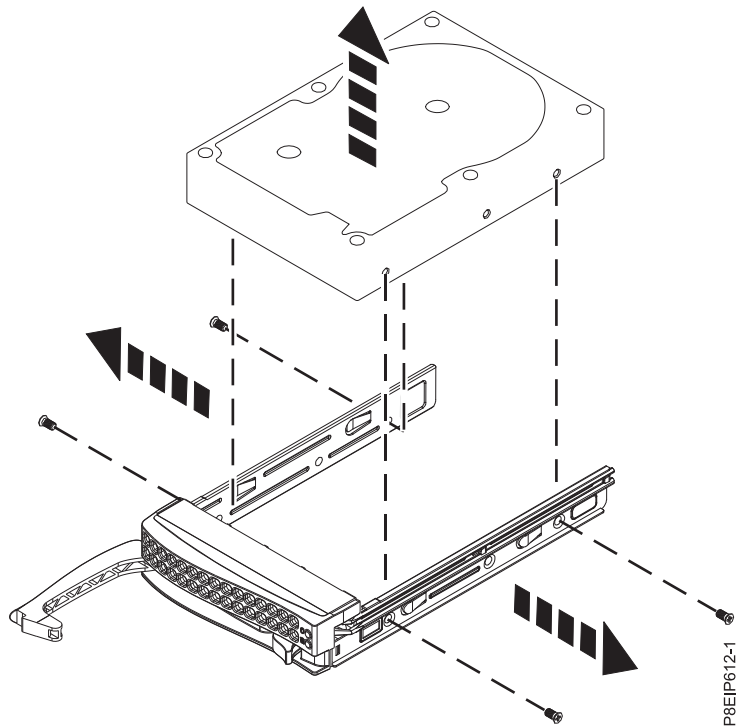*Figure 2. Removing the 3.5-inch drive from the tray*

- A 2.5-inch drive slides out of the tray.
  a. Turn the tray upside down as shown in Figure 3.
  b. Open the retention spring **(A)**.
  c. Lift the 2.5-inch drive **(B)** out of the tray as shown in Figure 4 on page 6.
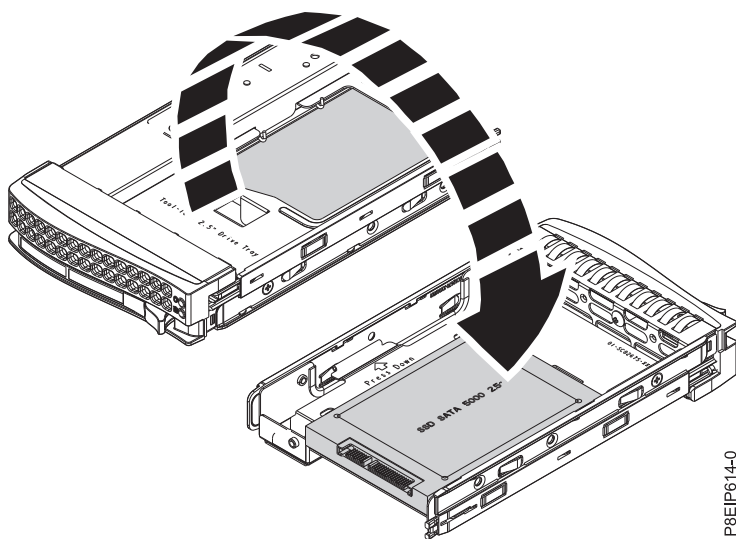 d. Close the retention spring.
  e. Turn the tray right side up.

Figure 3. Turning the 2.5-inch tray upside-down
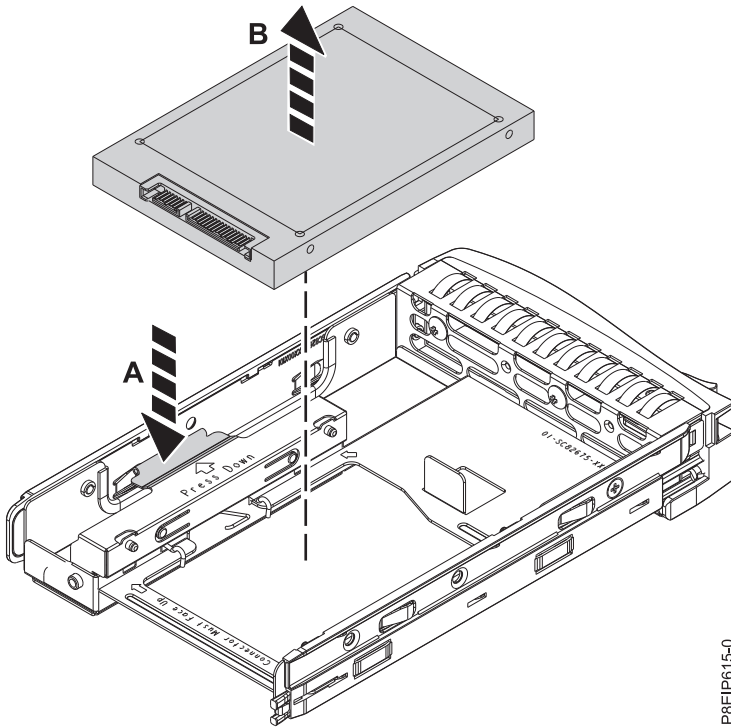
Figure 4. Removing the 2.5-inch drive from the tray

Replacing a disk drive in the 8001-12C, 8001-22C, 8005-12N, or 8005-22N system

Learn how to replace a disk drive in the IBM Power System S821LC (8001-12C), the IBM Power System S822LC for Big Data (8001-22C), the IBM CS821 (8005-12N), or the IBM CS822 (8005-22N) systems.

Procedure

1. Ensure that you have the electrostatic discharge (ESD) wrist strap attached. If not, attach it now.
2. Install a drive into the tray. Orient the drive such that the connectors are pointing to the rear of the drive.
   - A 3.5-inch drive fills the tray, as shown in Figure 5 on page 7. Fasten the drive to the sides of the tray with four screws (two screws on each side).
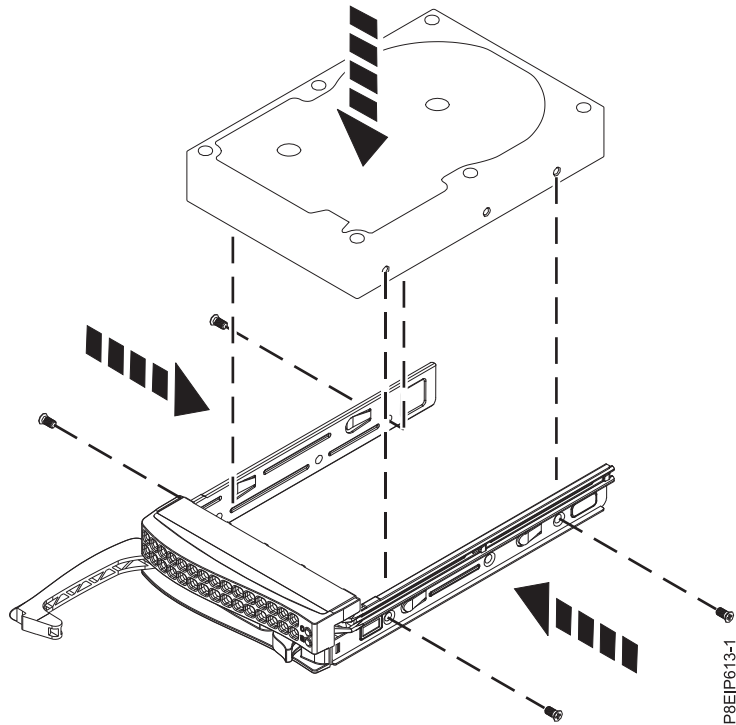
Figure 5. Mounting the 3.5-inch drive in the tray

- A 2.5-inch drive slides into the rear of the tool-less drive carrier.
    a. Turn the tray upside down as shown in Figure 6.
    b. Open the retention spring **(B)** as shown in Figure 7 on page 8.
    c. Place the 2.5-inch drive **(A)** into the tray, aligning the pins with the screw holes in the drive.
    d. When the pins are aligned, close the retention spring, allowing the pins to secure the drive in the tray.
    e. Turn the tray right side up.

Figure 6. Turning the 2.5-inch tray upside-down

Figure 7. Mounting the 2.5-inch drive in the tray

3. Support the drive by the bottom as you position the drive, and insert it into the drive slot.

   Important: Ensure that the drive is fully seated and is all the way into the system.
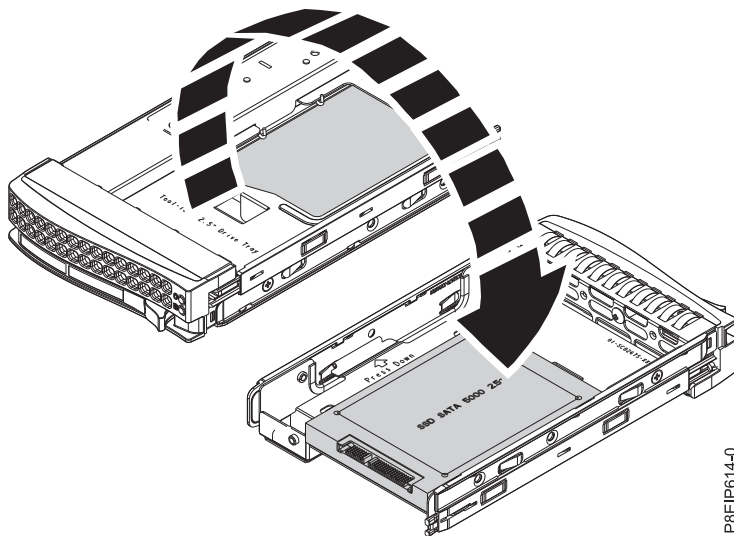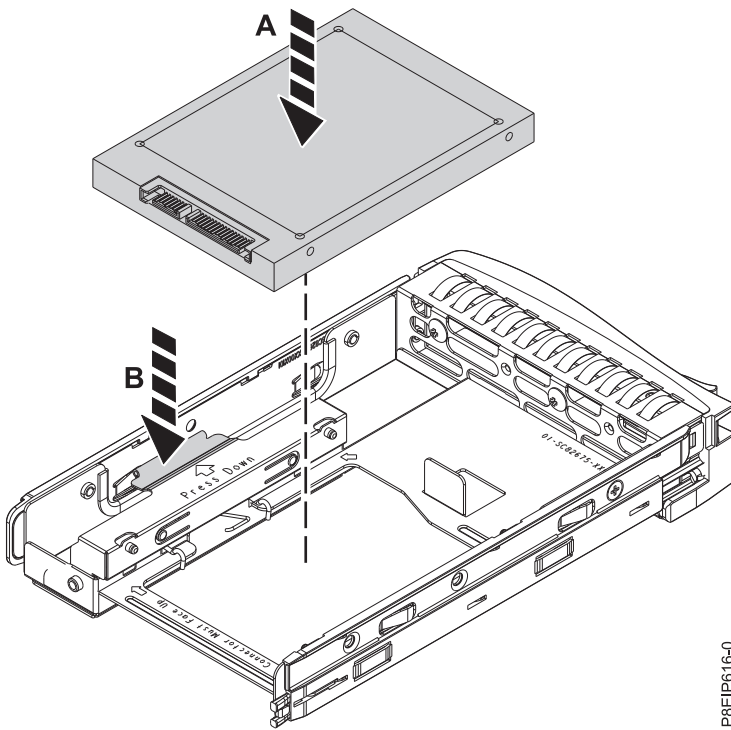4. Lock the drive bay handle **(A)** by pushing in the handle release until it locks at **(B)** as shown in Figure 8 on page 9.
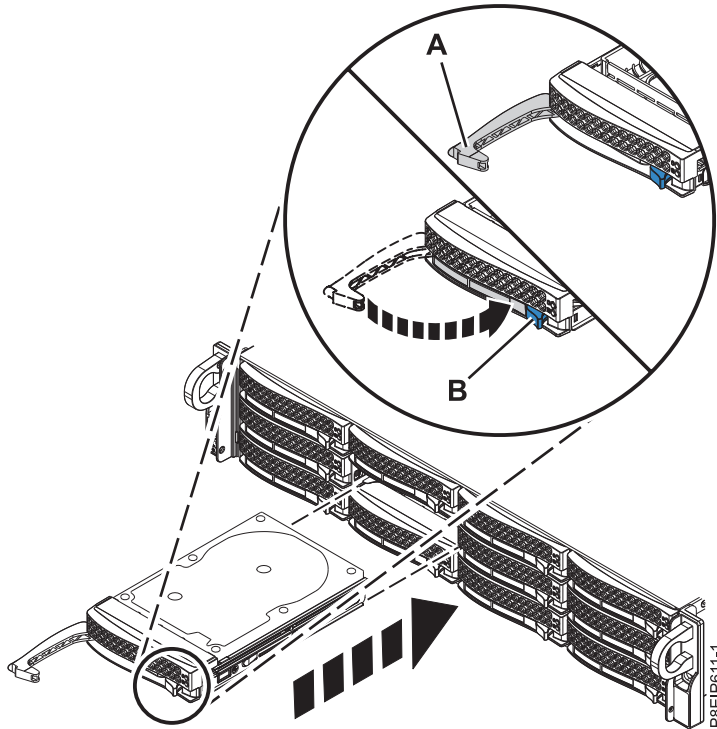
Figure 8. Disk drive lock detail

5. If you replaced an NVMe drive, power the system back on. For instructions, see "Starting the 8001-12C, 8001-22C, 8005-12N, or 8005-22N system" on page 81.

6. Configure the installed drive for your environment.

   After you insert the new drive, you need to rescan for the device.

   Ubuntu Linux operating system

   To run the **rescan-scsi-bus** command in the Ubuntu Linux operating system, log in to the system as the root user, and run the following command:

   ```
   rescan-scsi-bus
   ```

   The **rescan-scsi-bus** tool is available in the scsitools package; install the package by using the following command:

   ```
   sudo apt-get install scsitools
   ```

   Red Hat Enterprise Linux (RHEL) version 7.2

   To run the rescan command in the REHL version 7.2 operating system, log in to the system as the root user, and run the command:

   ```
   rescan-scsi-bus.sh -a
   ```

   The **rescan-scsi-bus** tool is available in the *sg3_utils* package; install the package by using the following command:

   ```
   yum install sg3_utils
   ```

   You can also want to refer to: Adding a Storage Device or Path (https://access.redhat.com/documentation/en-US/Red_Hat_Enterprise_Linux/7/html/Storage_Administration_Guide/logical-unit-add-remove.html).

7. Load or restore data from your backup media.

Removing a drive on module from the 8001-22C or 8005-22N system

Learn how to remove a drive on module (DOM) from the IBM Power System S822LC for Big Data (8001-22C) or the IBM CS822 (8005-22N) system.

Before you begin

Power off the system and place it in the service position. For instructions, see "Preparing the 8001-22C or 8005-22N system to remove and replace internal parts" on page 78.

Procedure

1. Attach the electrostatic discharge (ESD) wrist strap.

   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.

2. Remove the DOM from the system backplane as shown in Figure 9.
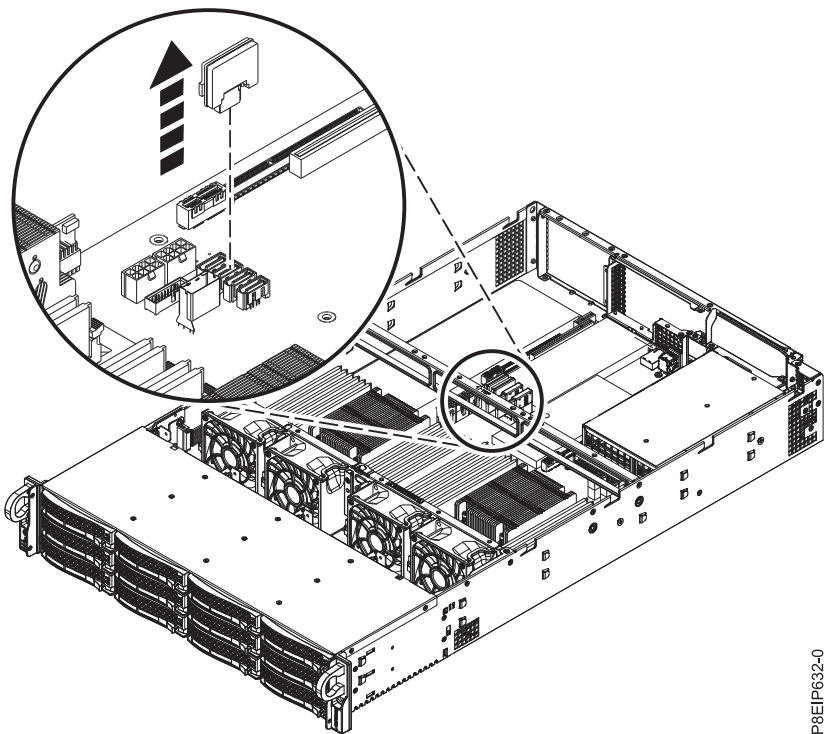

P8EIP632-0

Figure 9. Removing a DOM

Replacing a drive on module in the 8001-22C or 8005-22N system

Learn how to replace a drive on module (DOM) in the IBM Power System S822LC for Big Data (8001-22C) or the IBM CS822 (8005-22N) system.

Before you begin

Power off the system and place it in the service position. For instructions, see "Preparing the 8001-22C or 8005-22N system to remove and replace internal parts" on page 78.

Procedure

1. Attach the electrostatic discharge (ESD) wrist strap.

   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.

2. Install the DOM into the system backplane, in positions **(A)**, as shown in Figure 10. Depending on the DOM model, you may also have to plug in a small power cord for the DOM. Ensure you plug the connectors in properly.
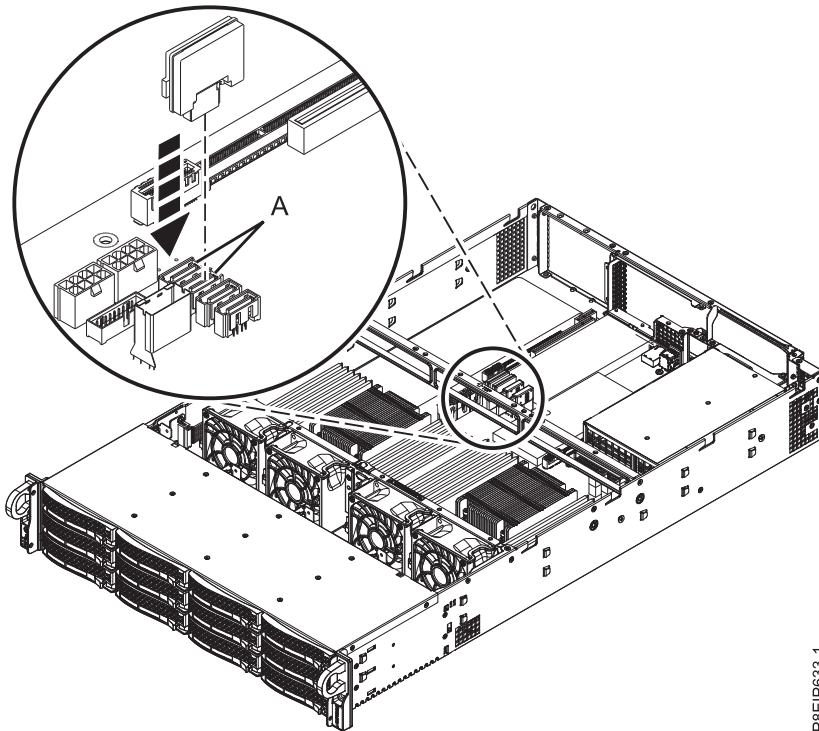
Figure 10. Installing a DOM

3. Prepare the system for operation. For instructions, see "Preparing the 8001-22C system for operation after you remove and replace internal parts" on page 80.

4. Configure the installed drive for your environment.

   After you insert the new drive, you need to rescan for the device.

Ubuntu Linux operating system

> To run the **rescan-scsi-bus** command in the Ubuntu Linux operating system, log in to the system as the root user, and run the following command:
>
> ```
> rescan-scsi-bus
> ```
>
> The **rescan-scsi-bus** tool is available in the `scsitools` package; install the package by using the following command:
>
> ```
> sudo apt-get install scsitools
> ```

Red Hat Enterprise Linux (RHEL) version 7.2

> To run the rescan command in the REHL version 7.2 operating system, log in to the system as the root user, and run the command:
>
> ```
> rescan-scsi-bus.sh -a
> ```
>
> The **rescan-scsi-bus** tool is available in the *sg3_utils* package; install the package by using the following command:
>
> ```
> yum install sg3_utils
> ```
>
> You can also want to refer to: Adding a Storage Device or Path (https://access.redhat.com/documentation/en-US/Red_Hat_Enterprise_Linux/7/html/Storage_Administration_Guide/logical-unit-add-remove.html).

5. Load or restore data from your backup media.

Removing and replacing the disk drive backplane in the 8001-22C or 8005-22N

Learn how to remove and replace the disk drive backplane in the IBM Power System S822LC for Big Data (8001-22C) or the IBM CS822 (8005-22N) system.

About this task

You can use a commercially available magnetic tip screwdriver to remove and replace the screws.

Removing the disk drive backplane from the 8001-22C or 8005-22N

Learn how to remove the disk drive backplane in the IBM Power System S822LC for Big Data (8001-22C) or the IBM CS822 (8005-22N) system.

Before you begin

Power off the system and place it in the service position. For instructions, see "Preparing the 8001-22C or 8005-22N system to remove and replace internal parts" on page 78.

About this task

You can use a commercially available magnetic tip screwdriver to remove and replace the screws.

Procedure

1. Attach the electrostatic discharge (ESD) wrist strap.

   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.

2. Remove the fans. For instructions, see "Removing a system fan from the 8001-22C or 8005-22N" on page 18.

3. As appropriate, label and remove the drive signal cables **(A)** and **(D)** as shown in Figure 11. Label and remove the drive power cables **(C)** from the system backplane . Using your thumb, press the release latch on the connector to remove the cable.
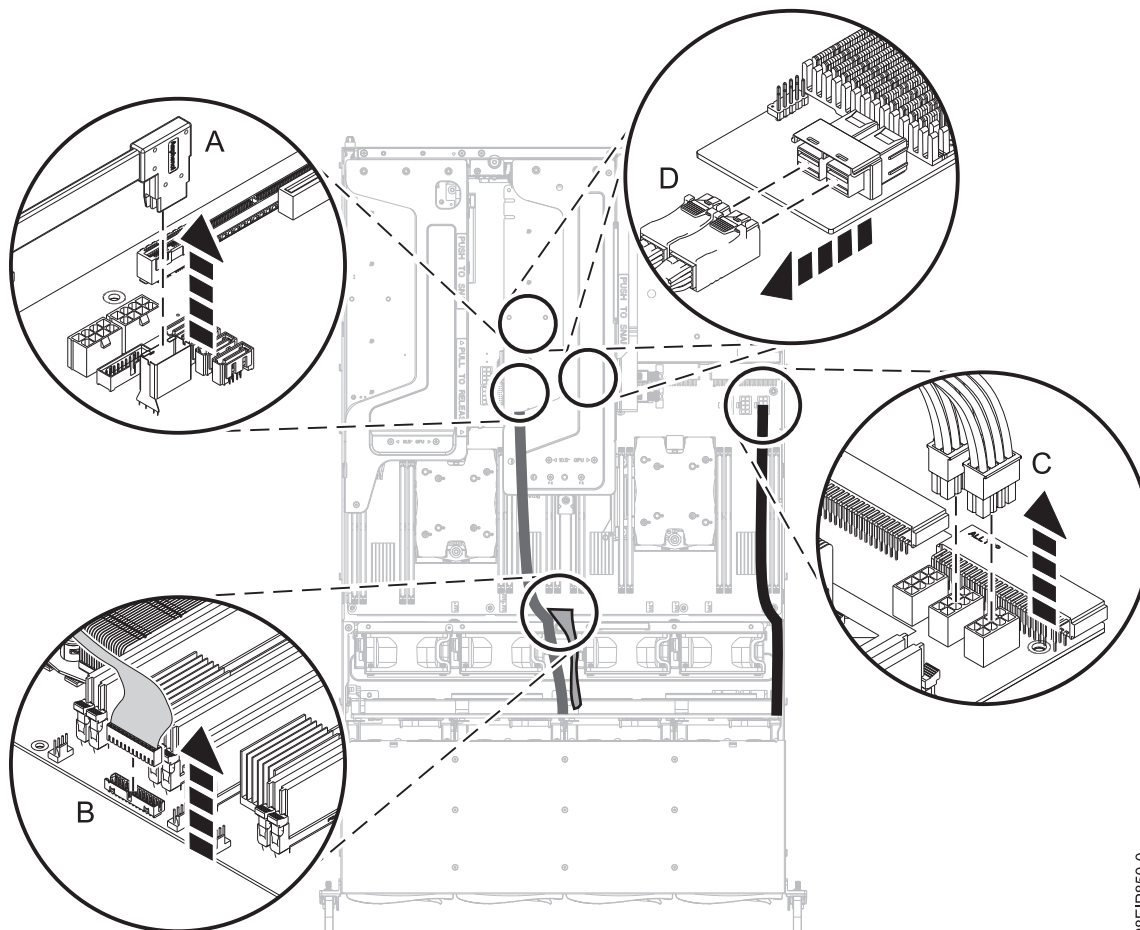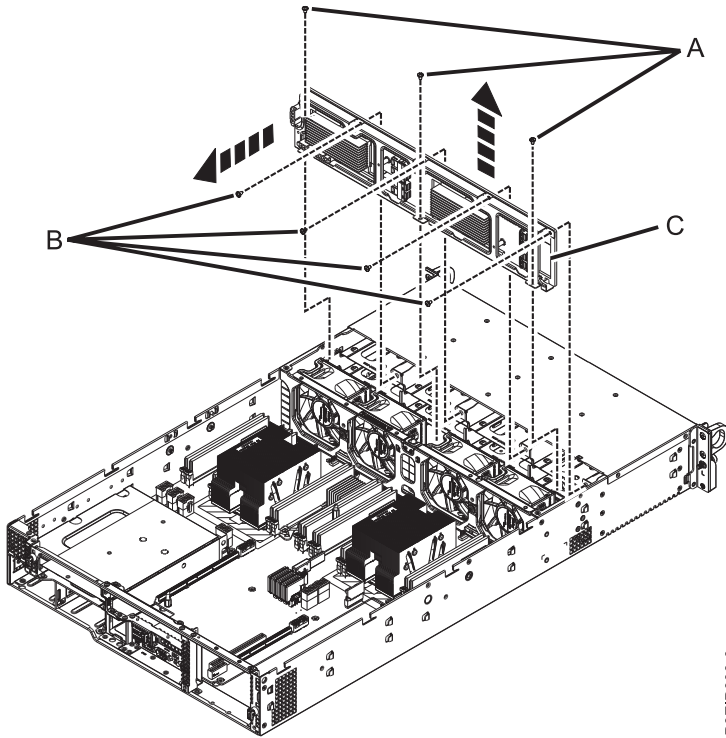

Figure 11. Disconnecting the drive signal cables the drive power cables

4. Ensure that the front drives are removed or partially removed. You do not need to completely remove the drives; pull them out about 2 cm (1 in). For instructions, see "Removing a disk drive from the 8001-12C, 8001-22C, 8005-12N, or 8005-22N system" on page 3.

5. Label and remove the seven screws **(A, B)** and the disk drive backplane **(C)** as shown in Figure 12.
   a. **(A)** indicates the three bottom screws. If the disk drive backplane has a power connector that covers a lower screw, unplug one or more power cables as needed to access that screw.
   b. **(B)** indicates the four top screws.
   c. Lift the disk drive backplane straight out from the chassis as shown in Figure 12.

Figure 12. Removing the disk drive backplane and screws

6. Carefully pass the drive signal cables and drive power cables through the chassis to remove them as shown in Figure 13 on page 15.
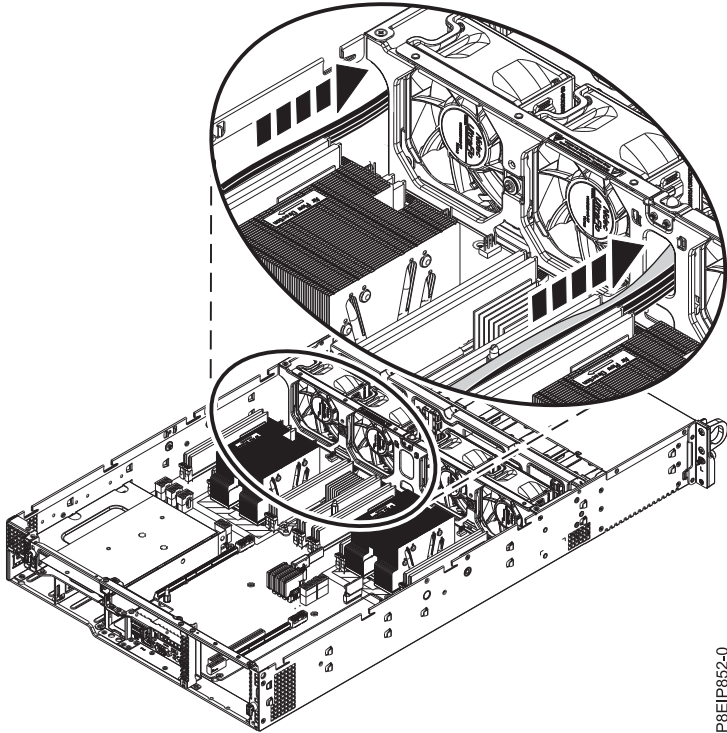
Figure 13. Removing the disk drive backplane cables

7. Place the disk drive backplane and cables on the table.

Replacing the disk drive backplane in the 8001-22C or 8005-22N

Learn how to replace the disk drive backplane in the IBM Power System S822LC for Big Data (8001-22C) or the IBM CS822 (8005-22N) system.

Procedure

1. Ensure that you have the electrostatic discharge (ESD) wrist strap attached. If not, attach it now.
2. Remove the replacement disk drive backplane and cables from the protective plastic envelope.
3. Move the drive cables from to old disk drive backplane to the new disk drive backplane.
4. Carefully pass the drive power cables and drive signal cables through the chassis to install them as shown in Figure 14 on page 16.
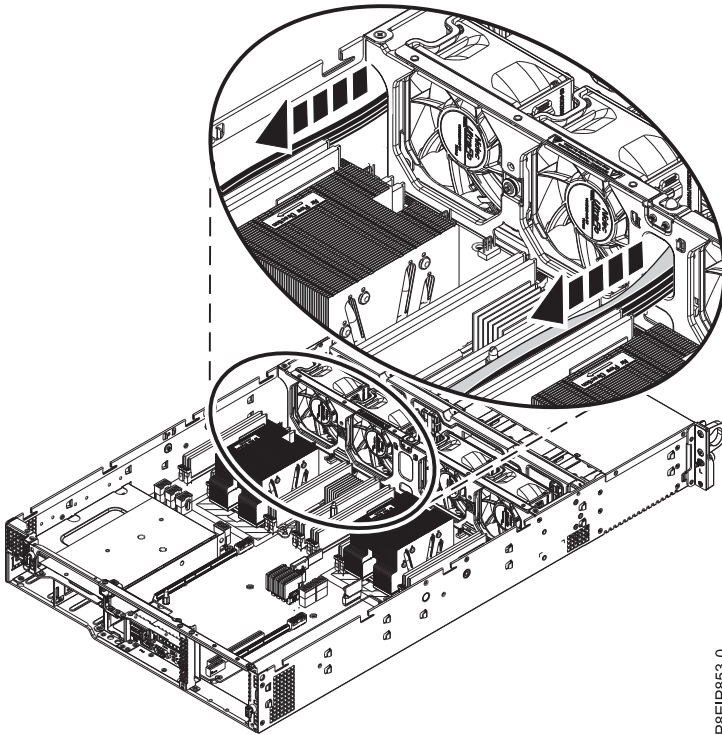
Figure 14. Installing the drive cables

5. Carefully lower the disk drive backplane **(A)** straight into the chassis, as shown in Figure 15, so that the screw holes align.
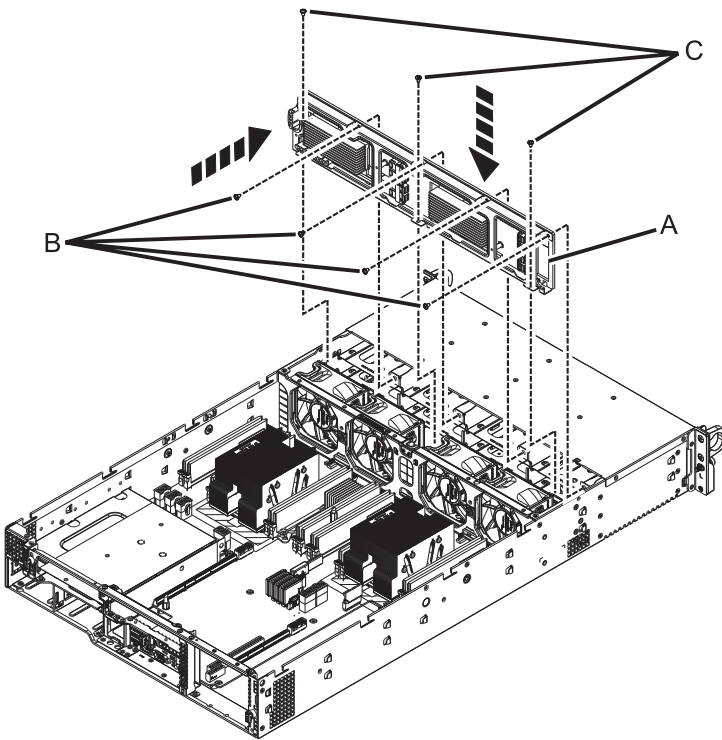
Figure 15. Installing the disk drive backplane and screws

6. Using your labels, replace the seven screws **(A, B)** that secure the disk drive backplane to the chassis as shown in Figure 15 on page 16.

   a. **(B)** indicates the four top screws. These screws are slightly longer.

   b. **(C)** indicates the three bottom screws. If the disk drive backplane has a power connector that covers a lower screw, unplug one or more power cables as needed to access that screw.

7. Fully insert the front drive trays. For instructions, see "Replacing a disk drive in the 8001-12C, 8001-22C, 8005-12N, or 8005-22N system" on page 6.

8. Using your labels, replace the drive signal cables **(A)** and **(D)** as shown in Figure 16. Using your labels, replace, the drive power cables **(C)**, into the system backplane .
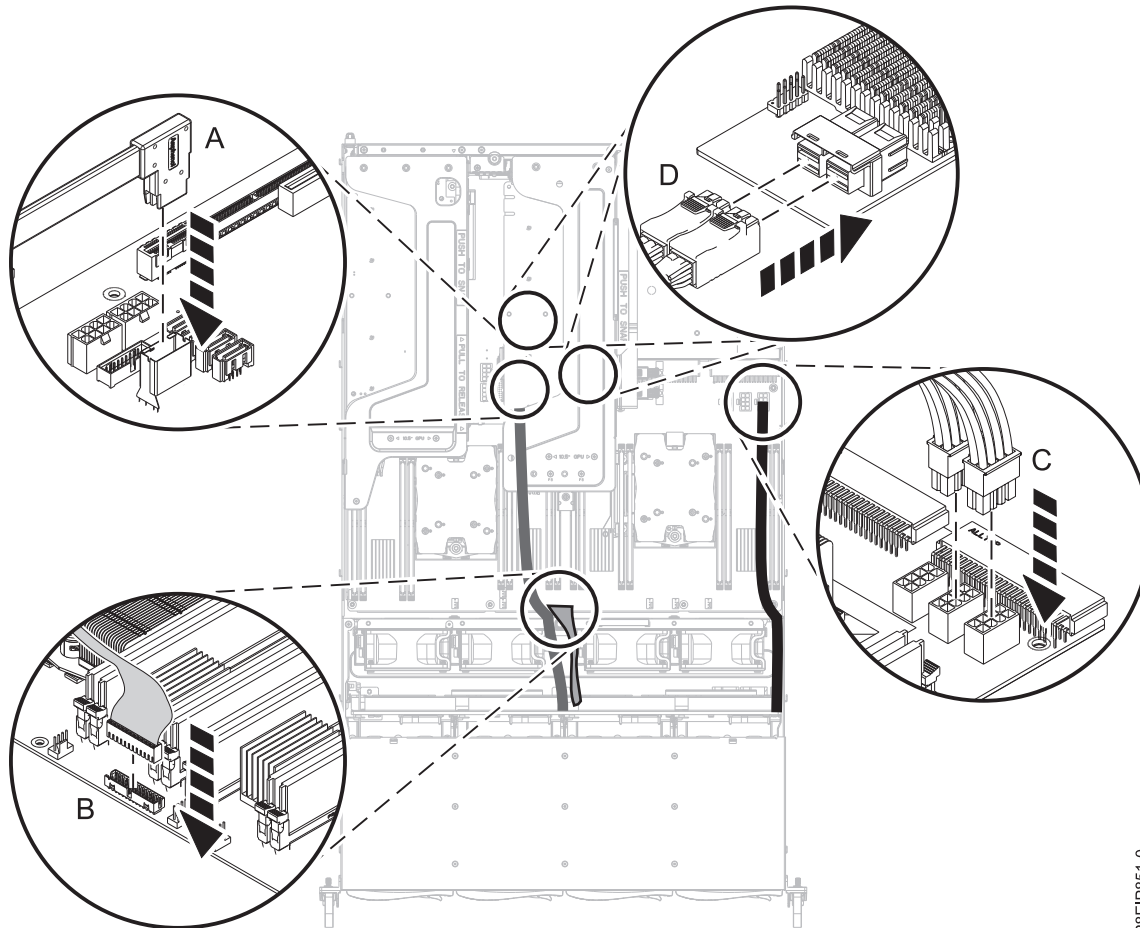
Figure 16. Connecting the drive signal cables and the drive power cables

9. Replace the fans. For instructions, see "Replacing a system fan in the 8001-22C or 8005-22N" on page 19.

What to do next

Prepare the system for operation. For instructions, see "Preparing the 8001-22C system for operation after you remove and replace internal parts" on page 80.

Removing and replacing fans in the 8001-22C or 8005-22N

Learn how to remove and replace the fans in the IBM Power System S822LC for Big Data (8001-22C) or the IBM CS822 (8005-22N) system.

Removing a system fan from the 8001-22C or 8005-22N

Learn how to remove the fans in the IBM Power System S822LC for Big Data (8001-22C) or the IBM CS822 (8005-22N) system.

Before you begin

(L008)

**CAUTION:** Hazardous moving parts nearby. (L008)

Power off the system and place it in the service position. For instructions, see "Preparing the 8001-22C or 8005-22N system to remove and replace internal parts" on page 78.

Procedure

1. Attach the electrostatic discharge (ESD) wrist strap.

   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.

2. Press in the latch at **(A)**, grasp the fan at **(B)**, and lift the fan from the system as shown in Figure 17 on page 19.
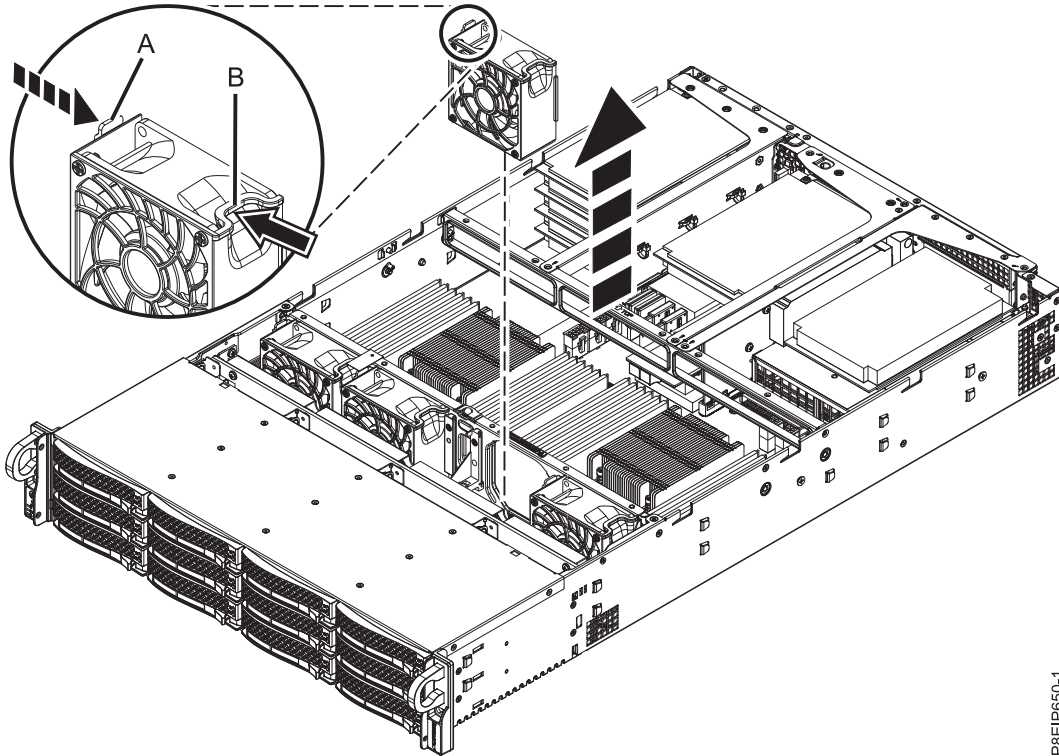
Figure 17. Removing a fan

Replacing a system fan in the 8001-22C or 8005-22N

Learn how to replace the fans in the IBM Power System S822LC for Big Data (8001-22C) or the IBM CS822 (8005-22N) system.

Procedure

1. Ensure that you have the electrostatic discharge (ESD) wrist strap attached. If not, attach it now.
2. Lower the fan into the system and align the fan with the slots in the fan holder as shown in Figure 18 on page 20. Press the fan down until it snaps into place.
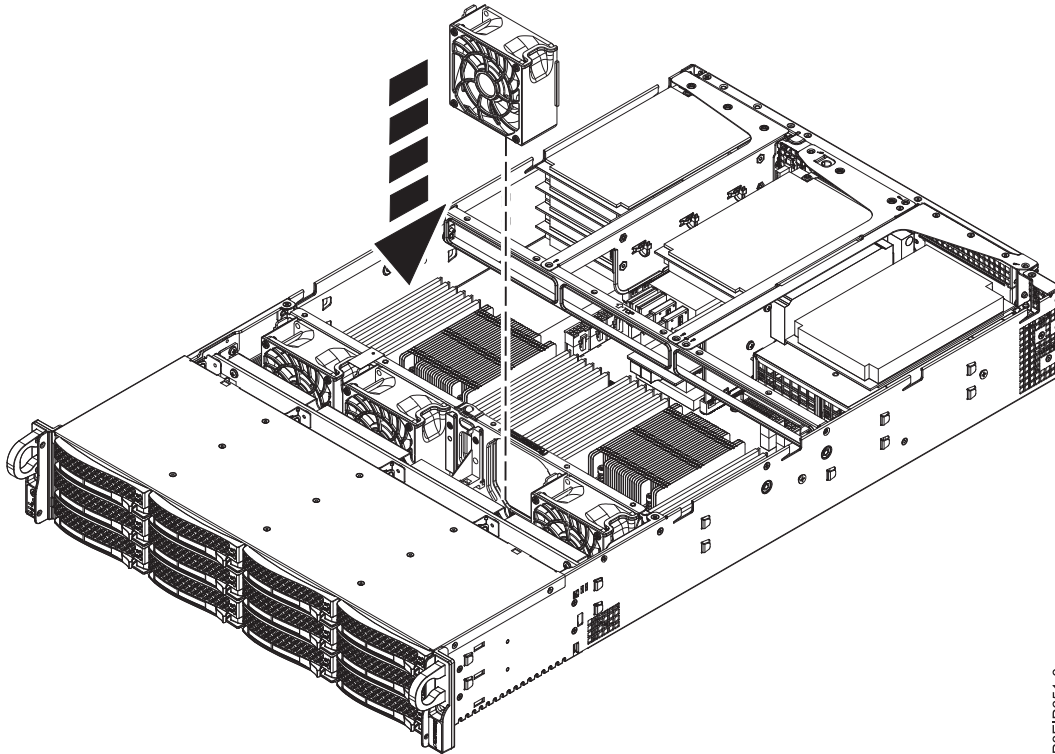
Figure 18. Replacing the fan

What to do next

Prepare the system for operation. For instructions, see "Preparing the 8001-22C system for operation after you remove and replace internal parts" on page 80.

Removing and replacing a graphics processing unit in the 8001-22C or 8005-22N

Learn how to remove and replace a graphics processing unit in the IBM Power System S822LC for Big Data (8001-22C) or the IBM CS822 (8005-22N) system.

Removing the graphics processing unit from the 8001-22C or 8005-22N system

Learn how to remove the graphics processing unit from the IBM Power System S822LC for Big Data (8001-22C) or the IBM CS822 (8005-22N) system.

Before you begin

Power off the system and place it in the service position. For instructions, see "Preparing the 8001-22C or 8005-22N system to remove and replace internal parts" on page 78.

Procedure

1. Attach the electrostatic discharge (ESD) wrist strap.

   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.

2. A GPU adapter can share a PCIe riser card with other adapters. The GPUs can be in positions 3 and 5; position 3 is preferred for optimal cooling. Label and remove any cables and plugs that extend out of the adapters. See Figure 19.
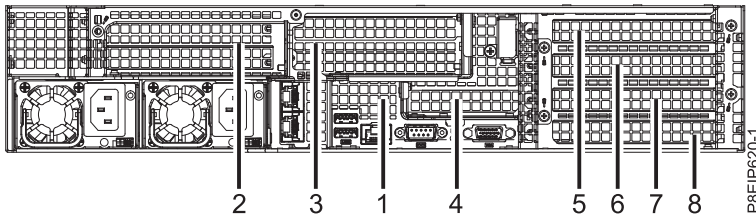
Figure 19. 8001-22C PCIe adapter positions

3. For a GPU in position 3, complete the following steps:

   a. Unplug the GPU power cable **(A)** from the system backplane as shown in Figure 20 on page 22. Using your thumb, press the release latch on the connector to remove the cable.
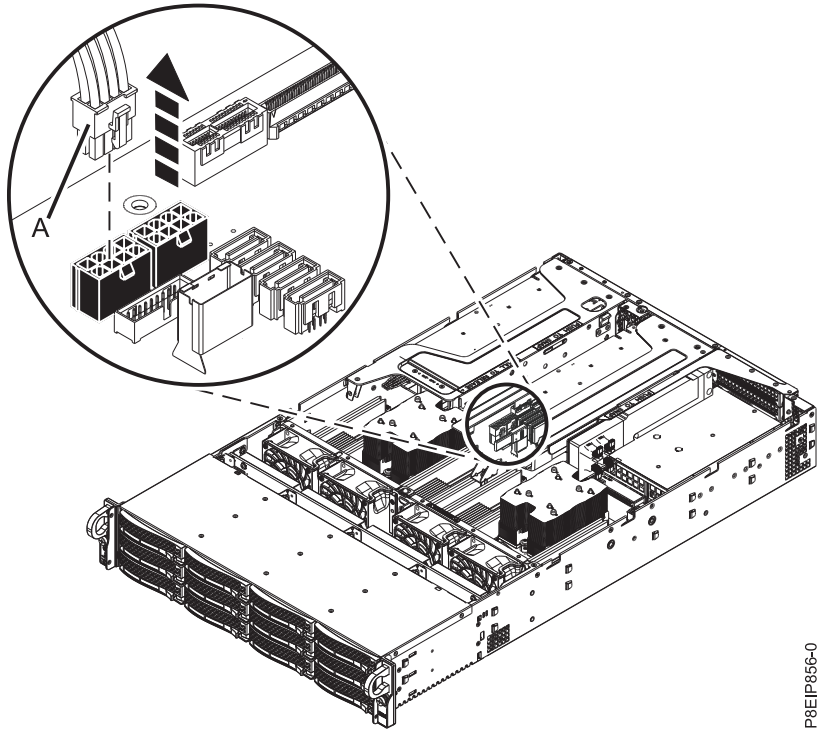
P8EIP856-0

Figure 20. Unplugging the GPU power cable

b. Retract the retaining pin **(A)** as shown in Figure 21.

c. Lift the GPU and PCIe riser as shown in Figure 21.
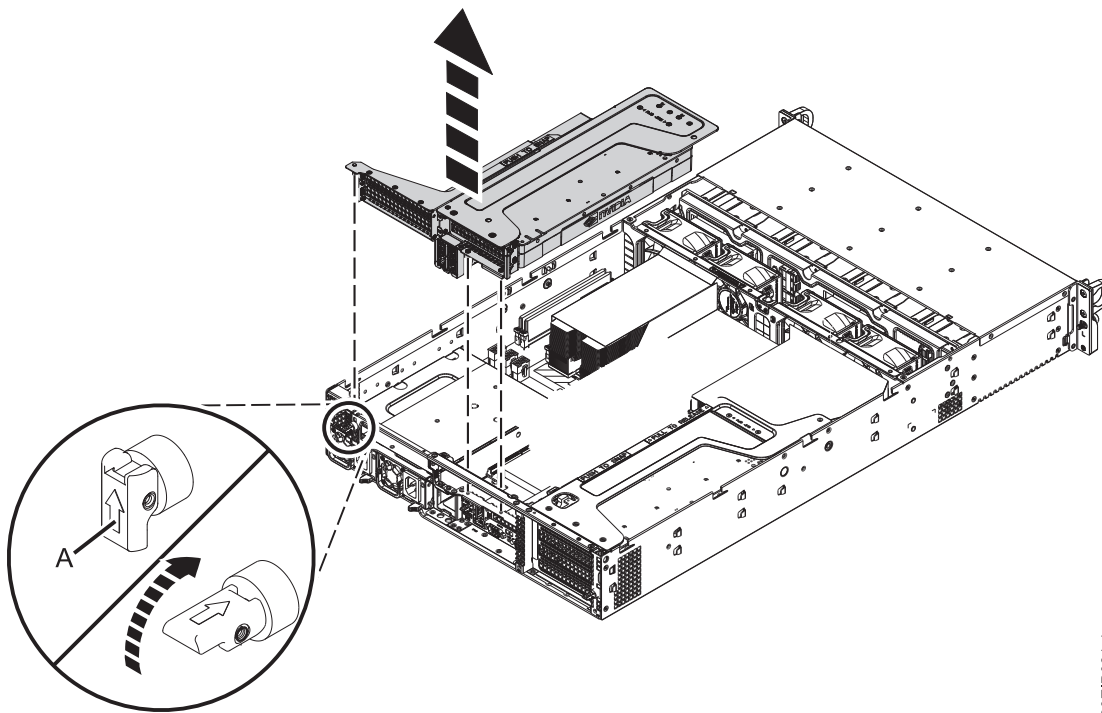
P8EIP621-1

Figure 21. Removing the riser

d. Place the PCIe adapter riser and cards on an ESD surface, with the riser up and the GPU extending sideways.

e. Remove the screw that holds the tail-stock.

f. Unplug the GPU **(A)** from the PCIe adapter riser **(B)** as shown in Figure 22.
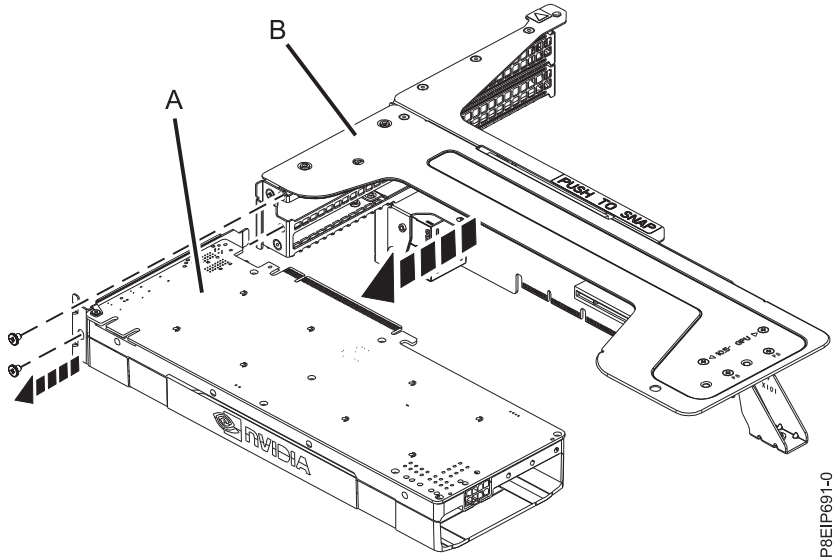
Figure 22. Removing the GPU from the riser

Go to step 5 on page 24.

4. For a GPU in position 5, remove the riser as shown in Figure 23.
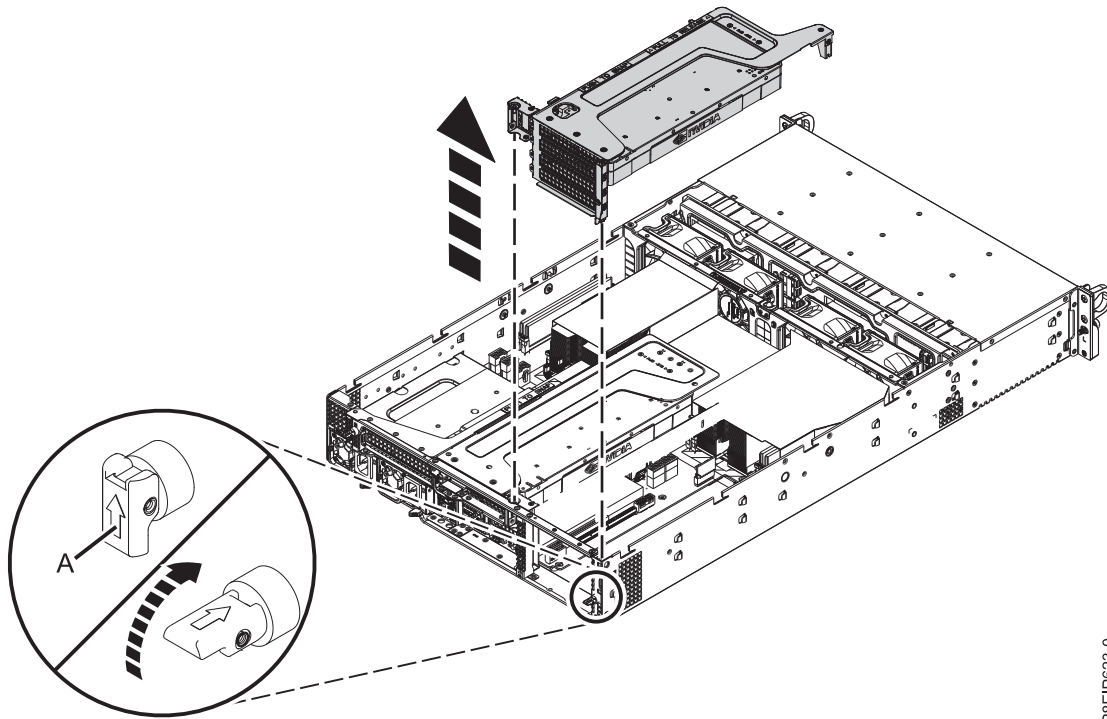
Figure 23. Removing the PCIe riser

a. Retract the retaining pin **(A)** as shown in Figure 23.

b. Lift the GPU and PCIe riser from the system.

c. Unplug the GPU power cable **(A)** from the system backplane as shown in Figure 24. Using your thumb, press the release latch on the connector to remove the cable.
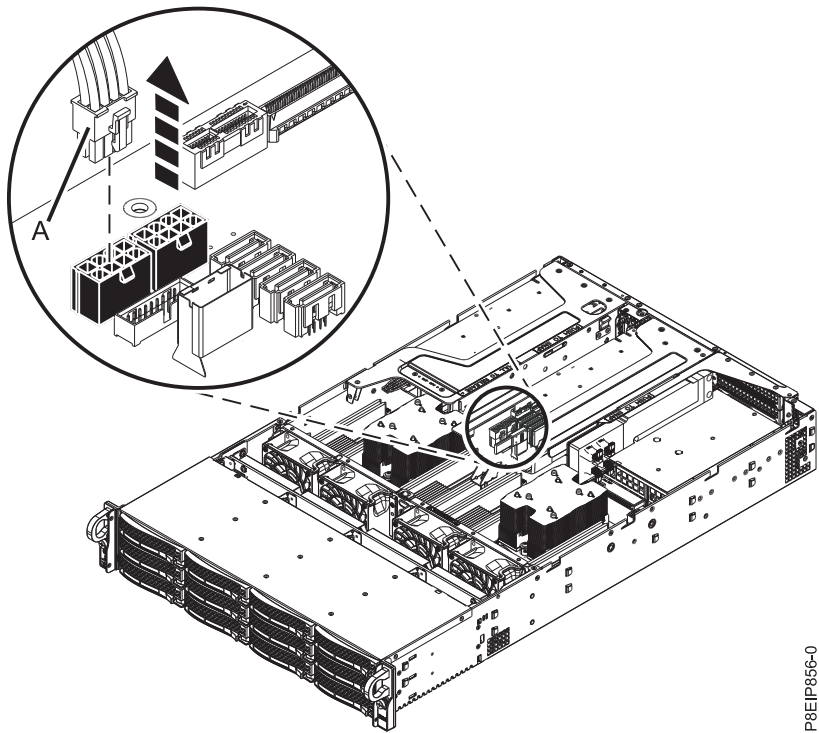
Figure 24. Unplugging the GPU power cable

d. Place the PCIe adapter riser and cards on an ESD surface, with the riser up and the GPU extending sideways.

e. Remove the screw that holds the tail-stock.

f. Unplug the GPU **(A)** from the PCIe adapter riser **(B)** as shown in Figure 25.
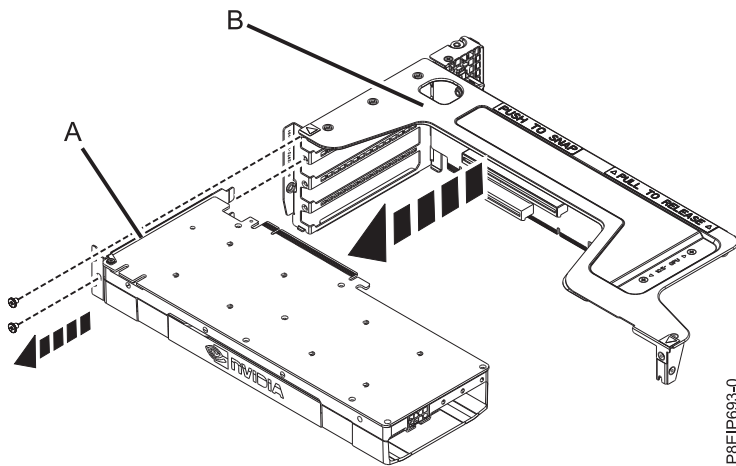
Figure 25. Removing the GPU from the riser

5. Place the GPU on an ESD surface.

Replacing the graphics processing unit in the 8001-22C or 8005-22N system

Learn how to replace a graphics processing unit in the IBM Power System S822LC for Big Data (8001-22C) or the IBM CS822 (8005-22N) system.

Procedure

1. Ensure that you have the electrostatic discharge (ESD) wrist strap attached. If not, attach it now.
2. A GPU adapter can share a PCIe riser card with other adapters. The GPUs can be in positions 3 and 5. See Figure 26.
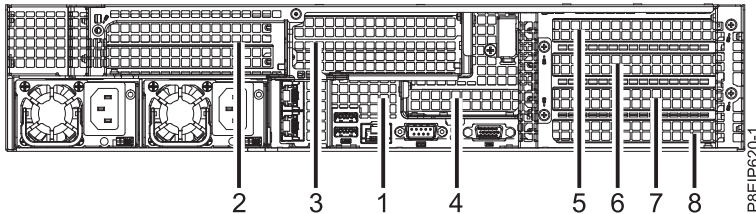
Figure 26. 8001-22C PCIe adapter positions

3. For a GPU in position 3, complete the following steps:

   a. Insert the GPU **(A)** into the PCIe adapter riser **(B)** as shown in Figure 27.
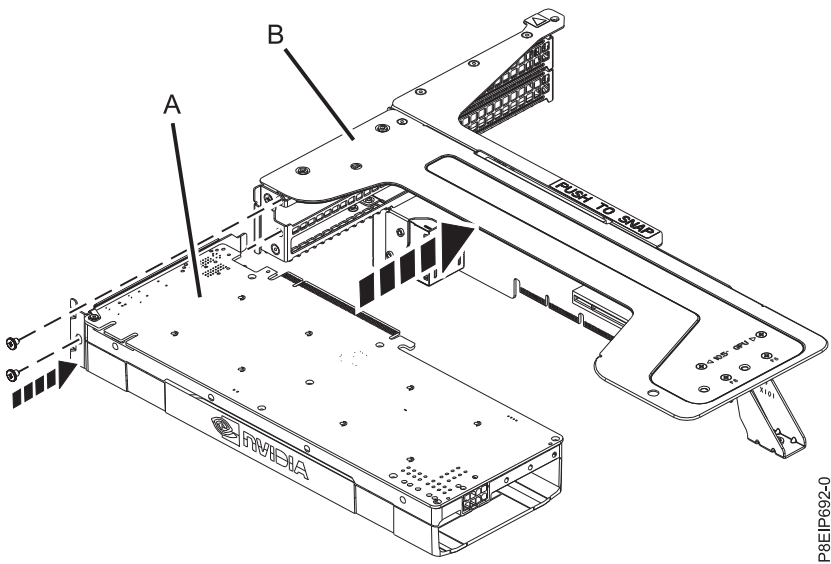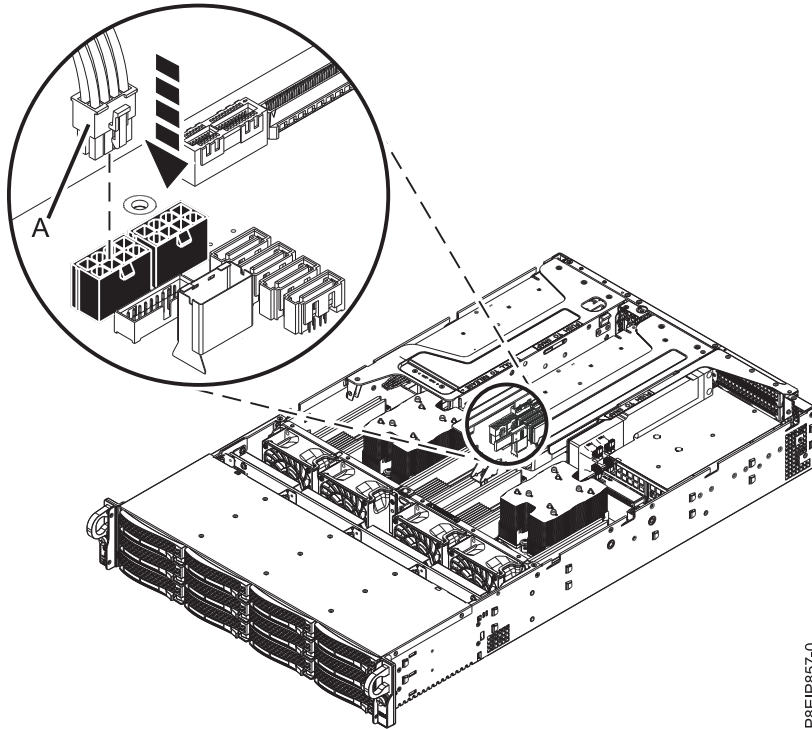
Figure 27. Inserting the GPU into the riser

   b. Replace the screw to secure the tail-stock.
   c. Plug the GPU power cable **(A)** into the system backplane as shown in Figure 28 on page 26. Using your thumb, press the release latch on the connector to remove the cable.

Figure 28. Plugging in the GPU power cable

    d. Insert the GPU and PCIe riser card into the chassis as shown in Figure 29 on page 27.

        1) Retract the retaining pin **(B)** so the arrow points to the system.

        2) Insert the riser, using the slots and alignment pins **(A)** to properly insert the riser. Push the riser firmly into the system backplane.

        3) Set the retaining pin **(B)** to secure the riser.
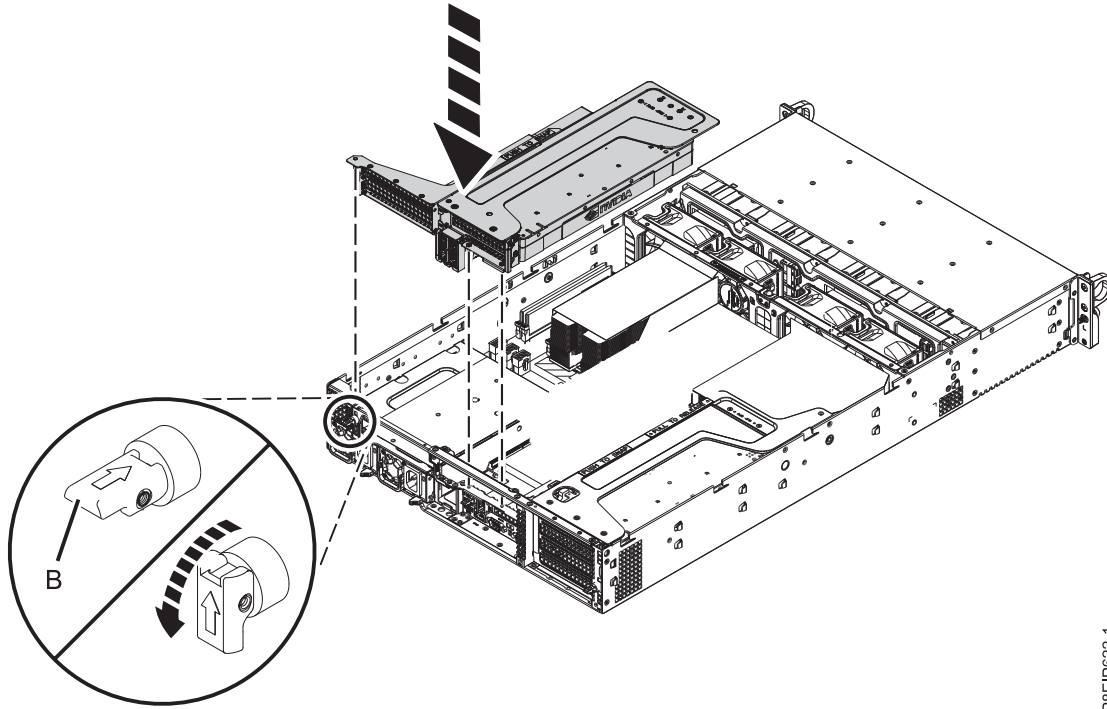
Figure 29. Inserting the GPU and PCIe riser

4. For a GPU in position 5, complete the following steps:

   a. Plug the GPU **(A)** into the PCIe adapter riser **(B)** as shown in Figure 30.
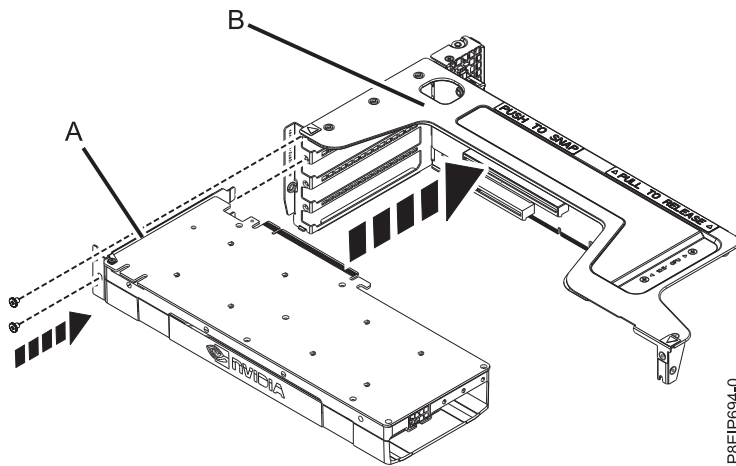
Figure 30. Inserting the GPU into the PCIe adapter riser

   b. Replace the screw to secure the tail-stock.

   c. Plug the GPU power cable **(A)** into the system backplane as shown in Figure 31 on page 28. Using your thumb, press the release latch on the connector to remove the cable.

Figure 31. Plugging in the GPU power cable

   d. Insert the GPU and PCIe riser as shown in Figure 32 on page 29.

      1) Retract the retaining pin **(B)** so the arrow points to the system.

      2) Insert the riser, using the slots and alignment pins **(A)** to properly insert the riser. Push the riser firmly into the system backplane.

      3) Set the retaining pin **(B)** to secure the riser.
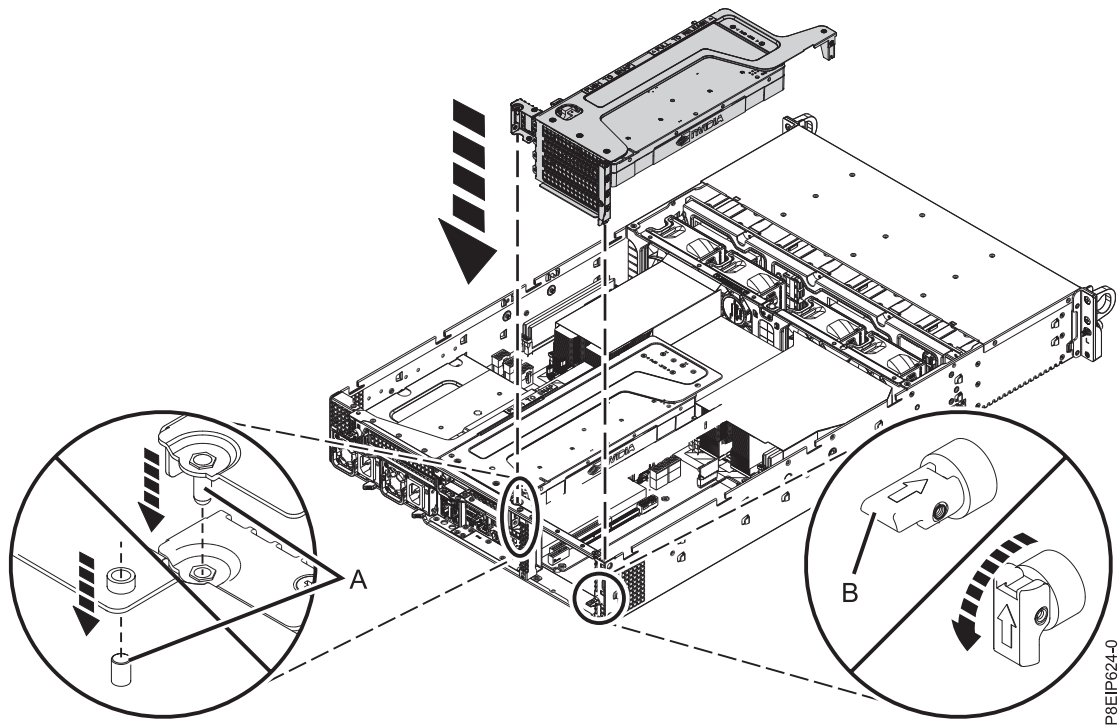
Figure 32. Inserting the GPU and riser

5. The GPU is replaced.

What to do next

Prepare the system for operation. For instructions, see "Preparing the 8001-22C system for operation after you remove and replace internal parts" on page 80.

Removing and replacing memory in the 8001-22C or 8005-22N

Learn how to remove and replace memory in the IBM Power System S822LC for Big Data (8001-22C) or the IBM CS822 (8005-22N) system.

Before you begin

Power off the system and place it in the service position. For instructions, see "Preparing the 8001-22C or 8005-22N system to remove and replace internal parts" on page 78.

Procedure

1. Attach the electrostatic discharge (ESD) wrist strap.

   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.

2. Depending on the memory location, you might need to remove the system processor air baffle. Carefully unsnap and lift the processor air baffle from the system.
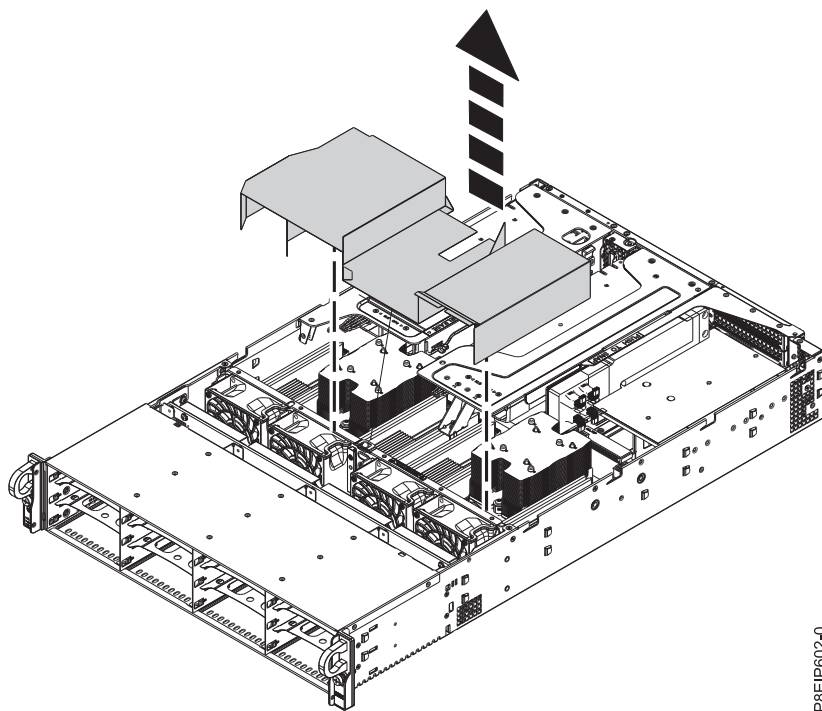
Figure 33. Removing the processor air baffle

3. Remove the memory DIMM.

   a. Locate the memory DIMM that you want to remove.

   b. Unlock the memory DIMM by simultaneously pushing the locking tabs away from the memory DIMM, in the direction that is shown in Figure 34 on page 31. Be sure to unlock both tabs at the same time. The lever action of opening the tabs pushes the memory DIMM out of the slot.

   c. Hold the memory DIMM by the edges and pull it out of the slot.
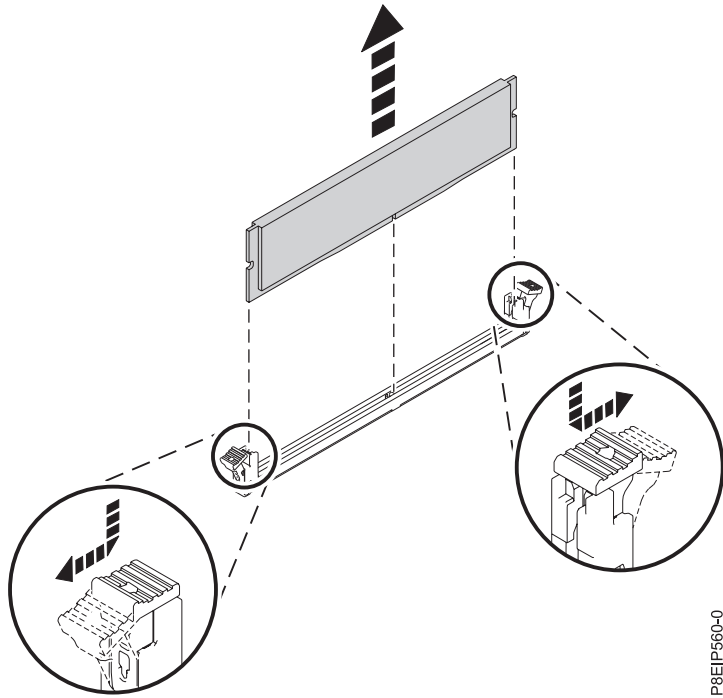
Figure 34. Removing the memory DIMM

4. Insert the memory DIMM.

    a. Grasp the memory DIMM along its edges and align it with the slot on the system backplane.

       Attention: Memory is keyed to prevent it from being installed incorrectly. Note the location of the key tab within the memory connector before you attempt to install it.

    b. Press firmly on each side of the memory DIMM until the locking tab locks in place with an audible click.
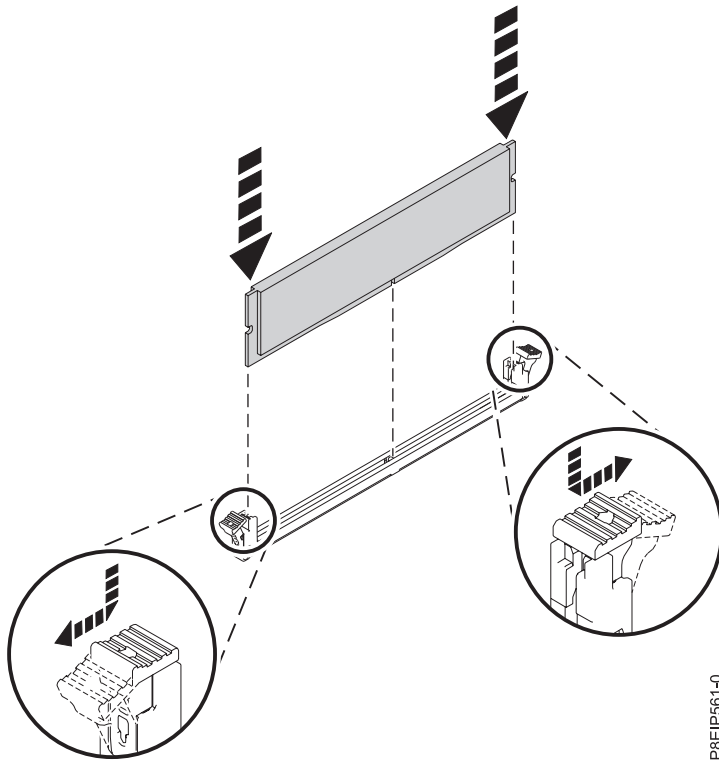
Figure 35. Inserting the memory DIMM

5. If you removed the system processor air baffle, replace it. Insert the edge of the baffle into the fan support as shown in Figure 36. Then, carefully press the baffle down into place.
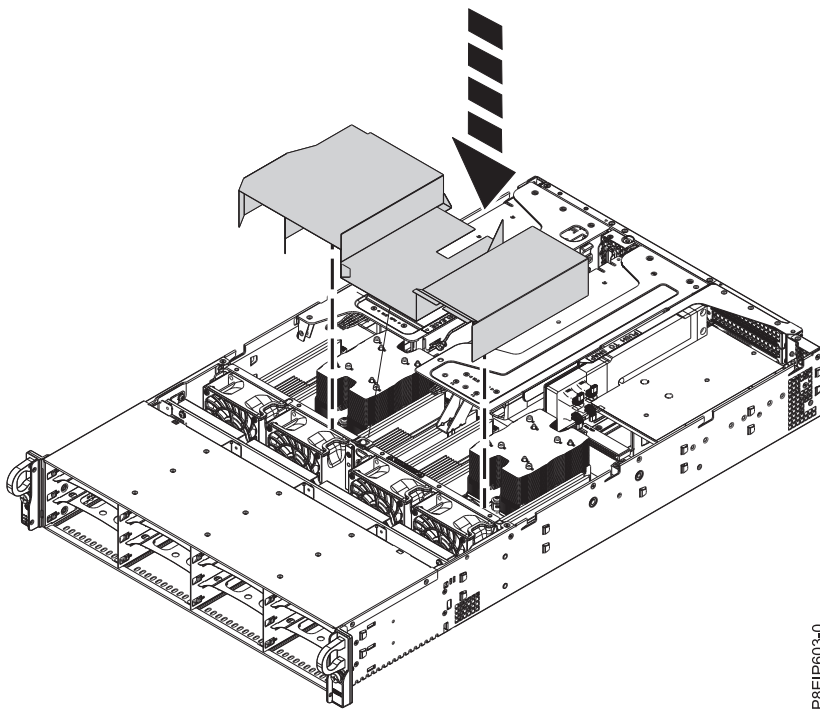
Figure 36. Installing the processor air baffle

What to do next

Prepare the system for operation. For instructions, see "Preparing the 8001-22C system for operation after you remove and replace internal parts" on page 80.

Removing and replacing PCIe adapters in the 8001-22C or 8005-22N

Learn how to remove and replace Peripheral Component Interconnect (PCI) Express (PCIe) adapters in the IBM Power System S822LC for Big Data (8001-22C) or the IBM CS822 (8005-22N) system.

Removing a PCIe adapter from the 8001-22C or 8005-22N system

Learn how to remove a PCIe adapter from the IBM Power System S822LC for Big Data (8001-22C) or the IBM CS822 (8005-22N) system.

Before you begin

Power off the system and place it in the service position. For instructions, see "Preparing the 8001-22C or 8005-22N system to remove and replace internal parts" on page 78.

Procedure

1. Attach the electrostatic discharge (ESD) wrist strap.

   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.

2. An adapter can share a PCIe riser card with other adapters. Label and remove any cables and plugs that extend out of the adapters. See Figure 37.
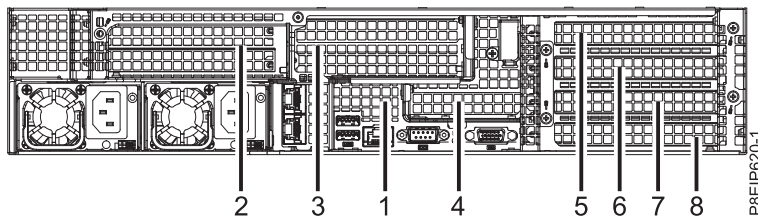
Figure 37. 8001-22C PCIe adapter positions

Position	Step
1, 2, 3 (UIO Network, UIO Slot2, UIO Slot1)	3
4 (PLX Slot1)	4 on page 36
5, 6, 7, 8 (WIO Slot1, WIO Slot2, WIO Slot3)	5 on page 37

3. For an adapter in position 1 or 3, remove the PCIe riser as shown in Figure 38 on page 34.
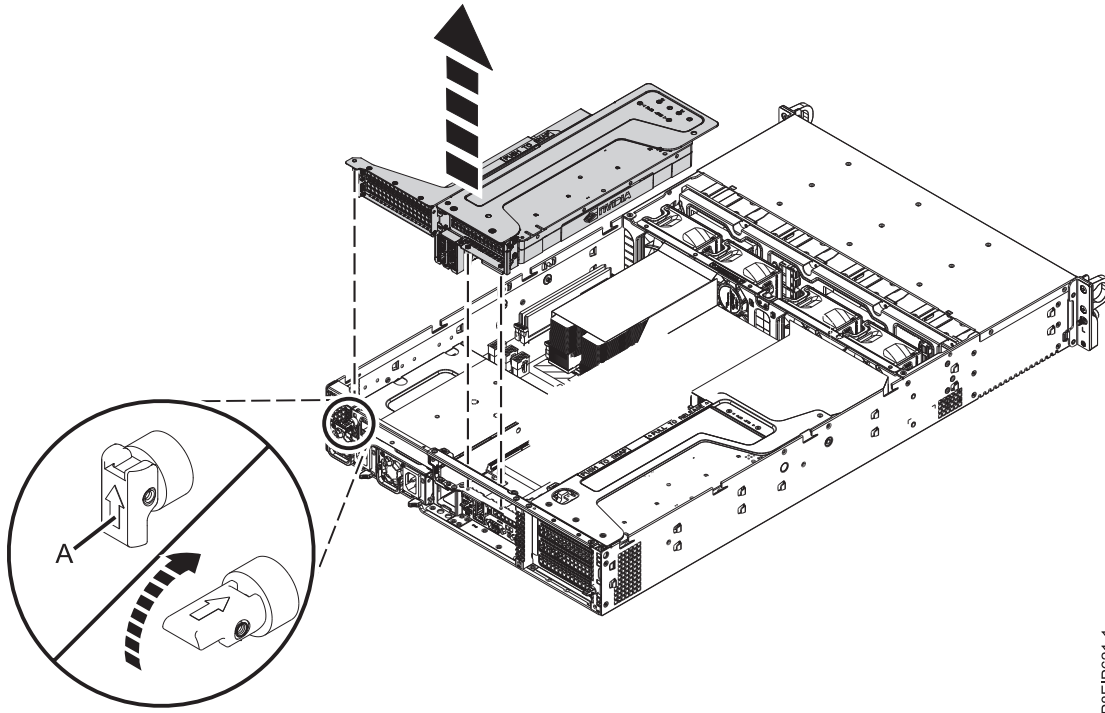
Figure 38. Removing the PCIe riser

  a. Retract the retaining pin **(A)** so the arrow is pointing to the system.

  b. Lift the PCIe riser from the system.

  c. If you are removing a storage drive adapter, label and disconnect the signal cables from the adapter.

  d. If the riser contains a GPU, unplug the GPU power cable **(A)** from the system backplane as shown in Figure 39 on page 35. Using your thumb, press the release latch on the connector to remove the cable.

Figure 39. Unplugging the GPU power cable

    e. Place the PCIe adapter riser and cards on an ESD surface, with the riser facing up.

    f. For an adapter in position 3, remove the screw that holds the tail-stock.

    g. Unplug an adapter **(A)** in position 3 from the PCIe adapter riser **(B)** as shown in Figure 40.

Figure 40. Removing a position 3 adapter from the riser

    h. For an adapter in position 2, remove the screw that holds the tail-stock.

    i. Unplug an adapter **(A)** in position 2 from the PCIe adapter riser **(B)** as shown in Figure 41 on page 36.

Figure 41. Removing a position 2 adapter from the riser

    j. If the riser card in position 1 needs replacing, remove it from the riser support. Remove the five screws that secure the riser card to the riser support as shown in Figure 42.

Figure 42. Removing position 1 riser card

    Go to step 6 on page 40.

4. For an adapter in position 4, complete the following steps:

    a. Retract the retaining pin and slide the retaining door open to release the tail-stock as shown in Figure 43 on page 37.
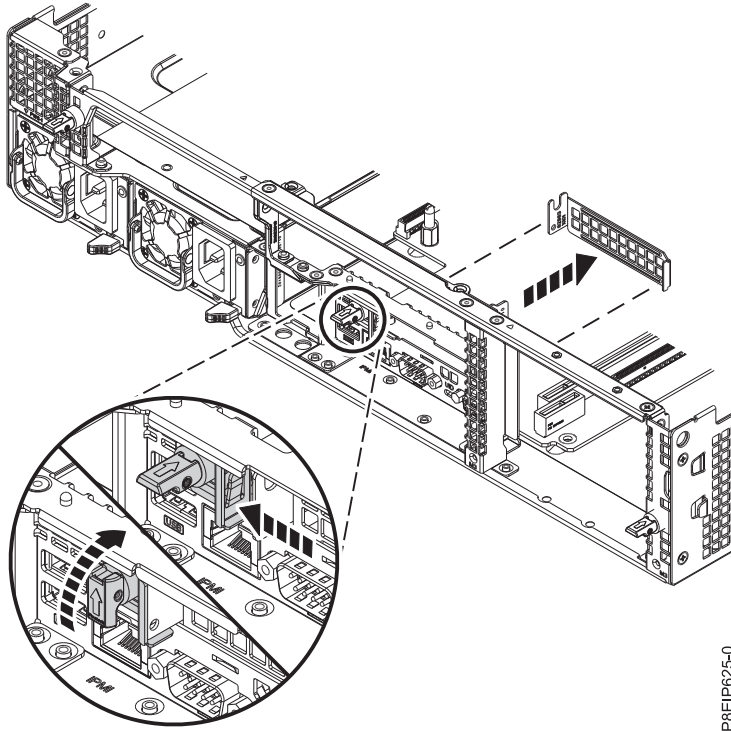
Figure 43. Releasing the tail-stock

    b. Remove the adapter from the riser.

    c. If you are removing a storage drive adapter, label and disconnect the signal cables from the adapter.

    d. Place the adapter on an ESD surface.

    e. If you need to remove the small riser for position 4, you will need to remove the riser for positions 5, 6, 7, and 8. For instructions, see step 5.

    Go to step 6 on page 40.

5. For an adapter in position 5, 6, 7, or 8, remove the riser as shown in Figure 44 on page 38.
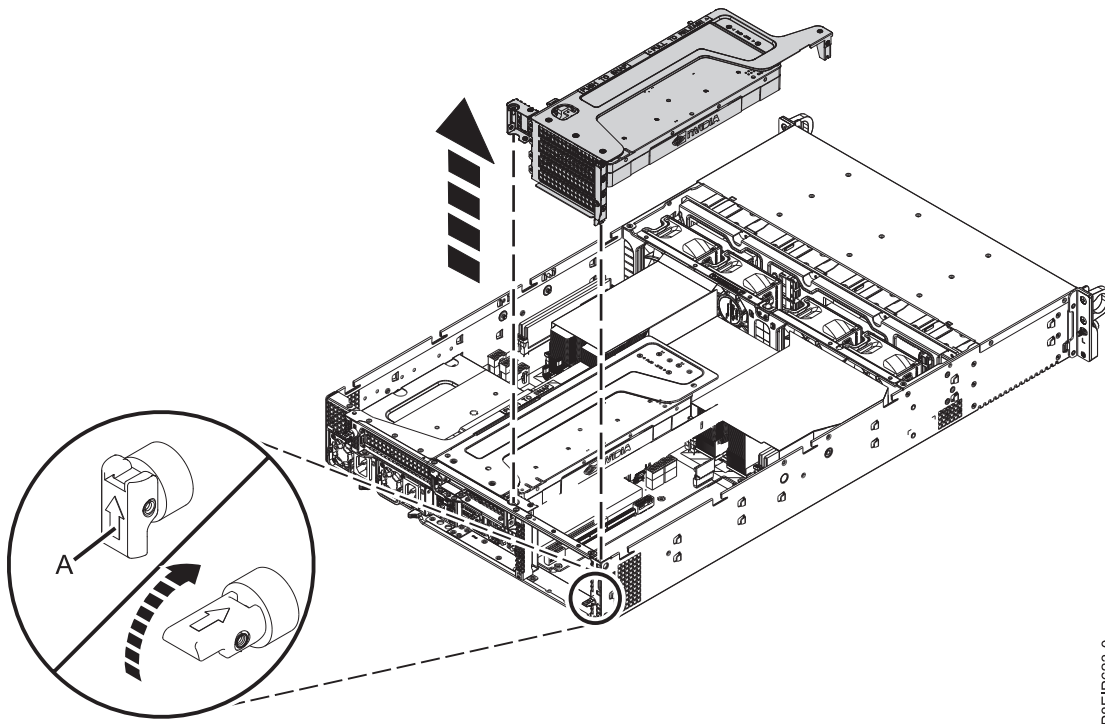
Figure 44. Removing the PCIe riser

a. Retract the retaining pin **(A)**.

b. Lift the PCIe riser from the system.

c. If you are removing a storage drive adapter, label and disconnect the signal cables from the adapter.

d. If the riser contains a GPU, unplug the GPU power cable **(A)** from the system backplane as shown in Figure 45 on page 39. Using your thumb, press the release latch on the connector to remove the cable.
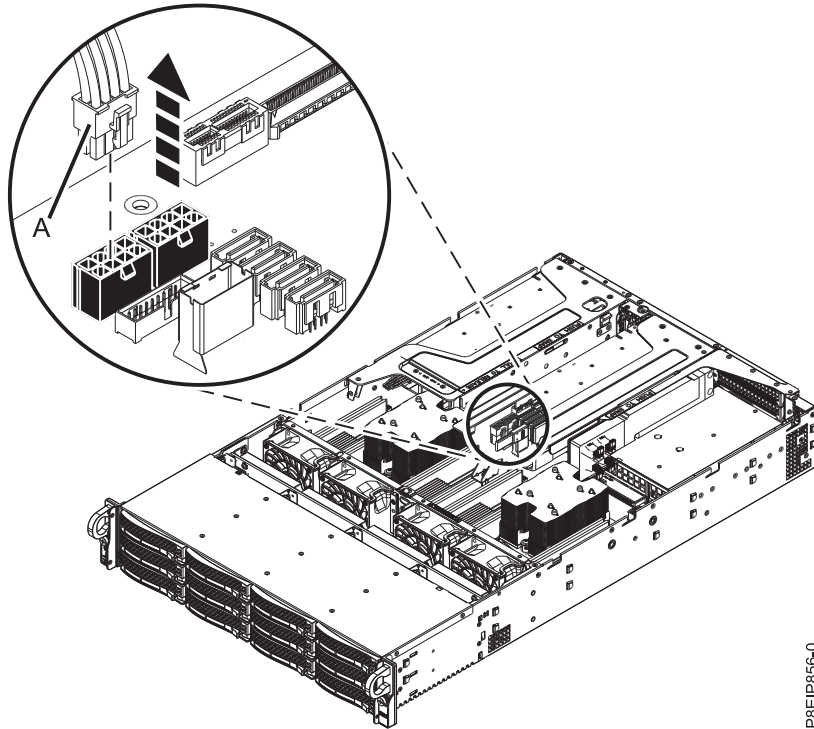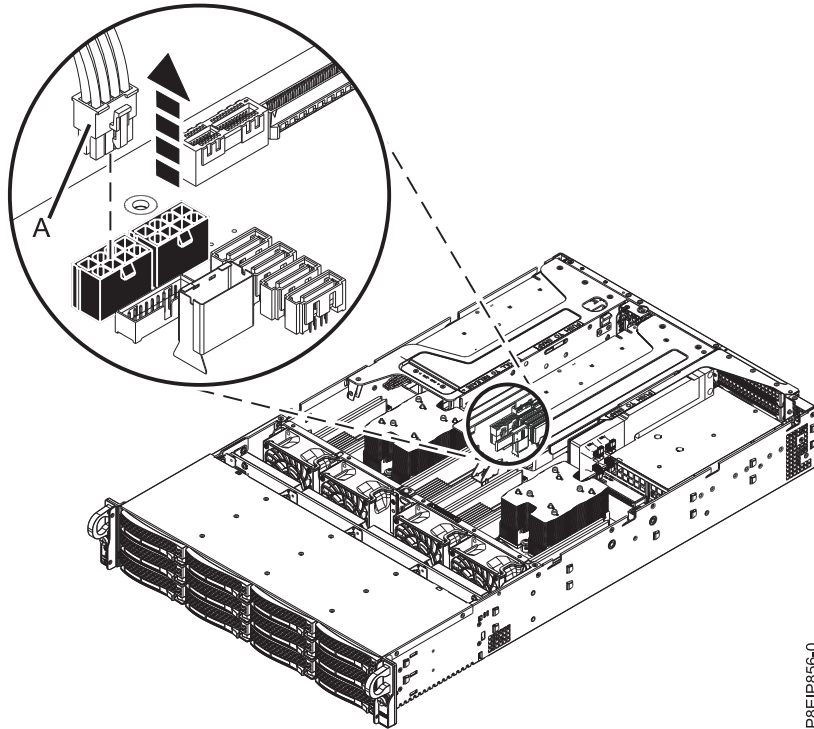
Figure 45. Unplugging the GPU power cable

    e. Place the PCIe adapter riser and cards on an ESD surface, with the riser up and the adapters sideways.

    f. Remove the screw that holds the tail-stock.

    g. Unplug an adapter **(A)** from the PCIe adapter riser **(B)** as shown in Figure 46.
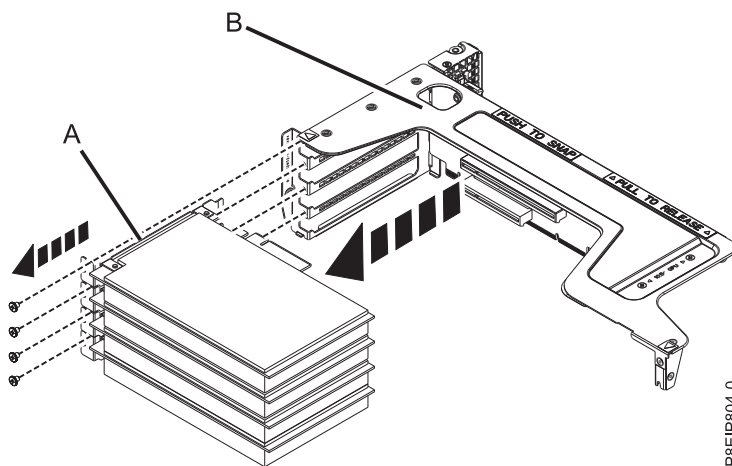
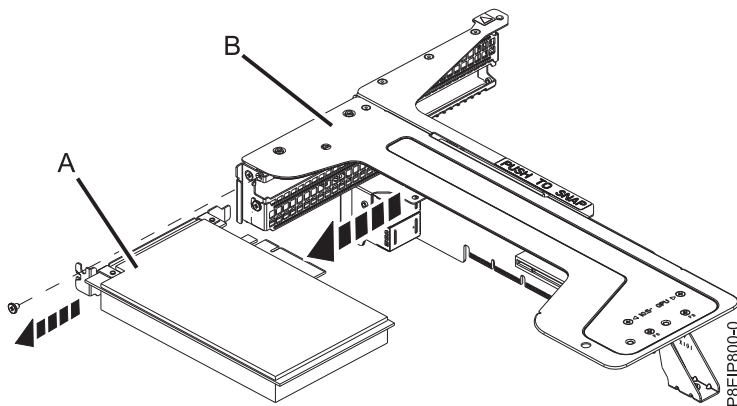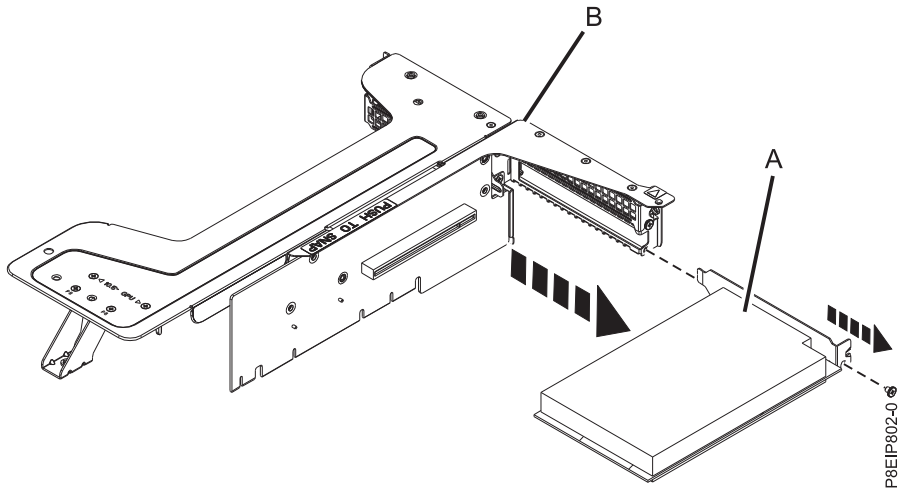*Figure 46. Removing an adapter from the riser*

    h. If the riser card for positions 5, 6, 7, and 8 needs replacing, remove it from the riser support. Remove the two screws that secure the riser card to the riser support as shown in Figure 47 on page 40.
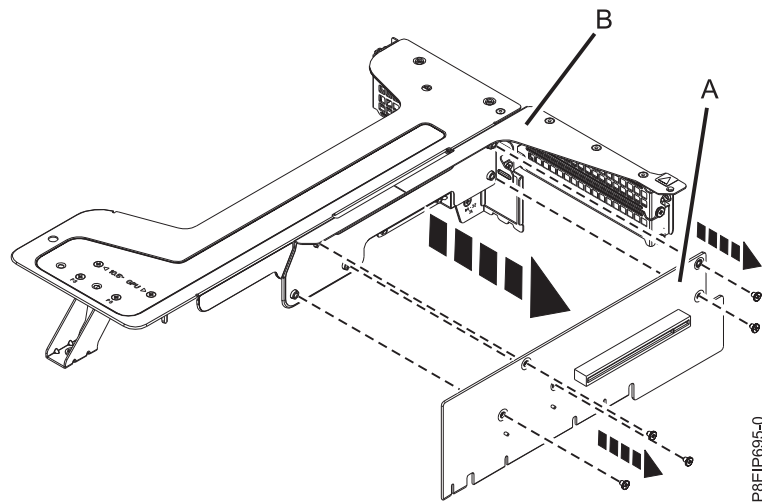
Figure 47. Removing position 5, 6, 7, and 8 riser card

6. Place the adapter on an ESD surface.

Replacing a PCIe adapter in the 8001-22C or 8005-22N system

Learn how to replace a PCIe adapter in the IBM Power System S822LC for Big Data (8001-22C) or the IBM CS822 (8005-22N) system.

Procedure

1. Ensure that you have the electrostatic discharge (ESD) wrist strap attached. If not, attach it now.
2. An adapter can share a PCIe riser with other adapters. See Figure 48.
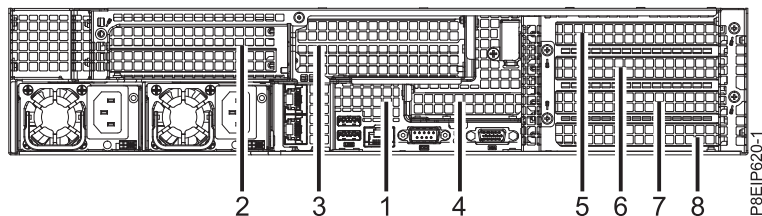
Figure 48. 8001-22C PCIe adapter positions

Position	Step
1, 2, 3 (UIO Network, UIO Slot2, UIO Slot1)	3
4 (PLX Slot1)	4 on page 43
5, 6, 7, 8 (WIO Slot1, WIO Slot2, WIO Slot3)	5 on page 44

3. For an adapter in position 1, 2, or 3, complete the following steps:
   a. If the riser card in position 1 needs replacing, replace it in the riser support. Replace the five screws to secure the adapter to the frame as shown in Figure 49 on page 41.
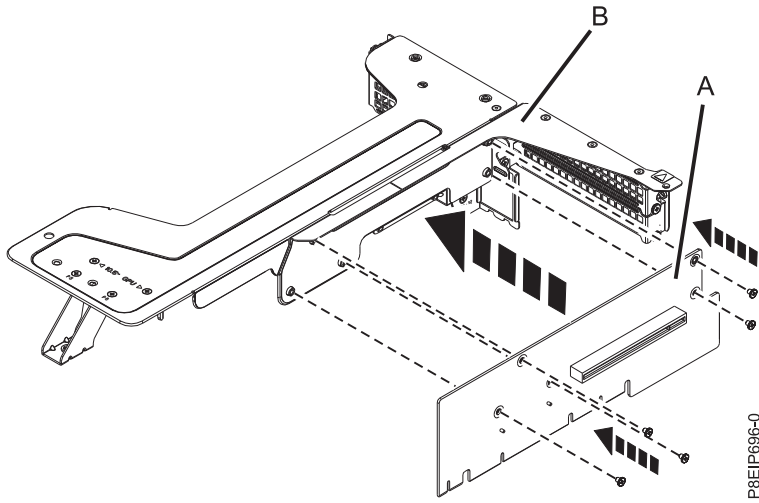
Figure 49. Replacing position 1 adapter

   b. Insert the PCIe adapter **(A)** that is located in position 3 into the PCIe adapter riser **(B)** as shown in Figure 50.
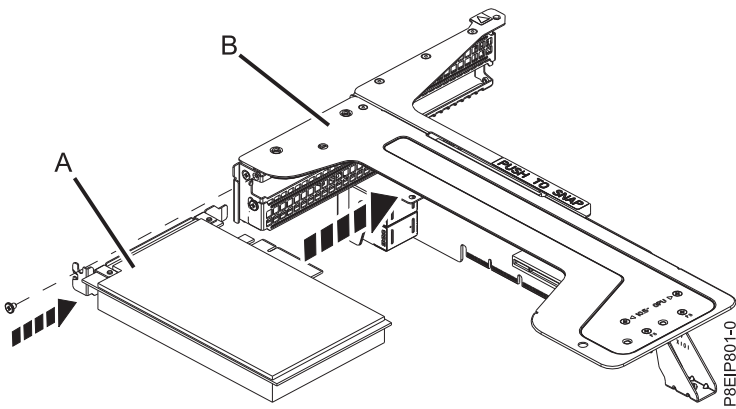
Figure 50. Inserting an adapter into position 3 of the PCIe riser

   c. Replace the screw to secure the tail-stock.

   d. If the riser contains a GPU, plug the GPU power cable **(A)** into the system backplane as shown in Figure 51 on page 42.
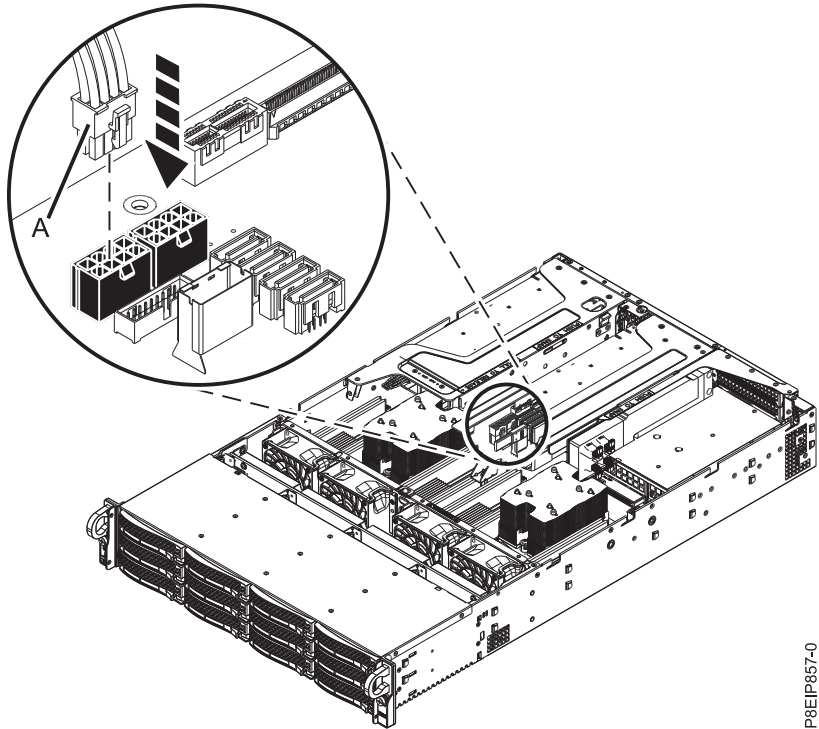
Figure 51. Replacing the GPU power cable

    e. If you have a SAS super capacitor carrier, insert that carrier **(A)** in position 2 of the PCIe adapter riser **(B)** as shown in Figure 52.
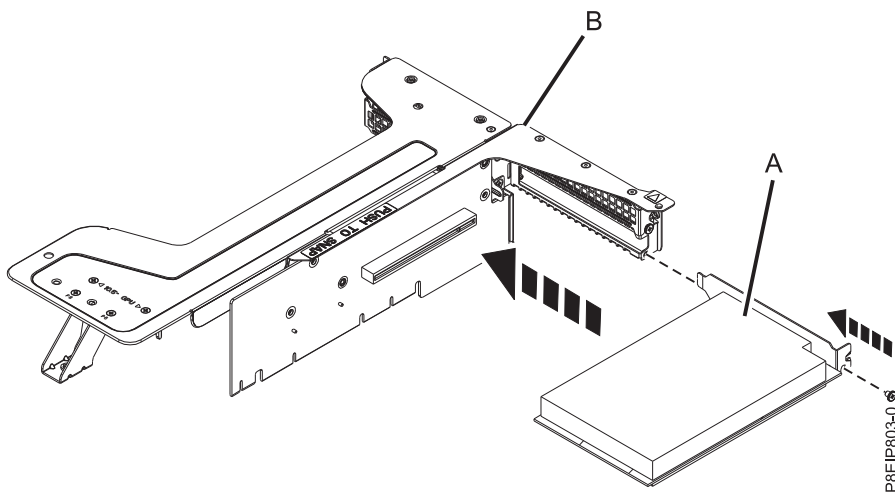
Figure 52. Inserting a SAS super capacitor carrier into position 2 of the riser

    f. If you are inserting a storage drive adapter, using your labels, connect the signal cables to the adapter before inserting the adapter.

    g. Insert the PCIe riser into the chassis as shown in Figure 53 on page 43.

        1) Retract the retaining pin **(B)** so the arrow points to the system.

        2) Insert the riser, using the slots and alignment pins **(A)** to properly insert the riser. Push the riser firmly into the system backplane.

        3) Set the retaining pin **(B)** to secure the riser.
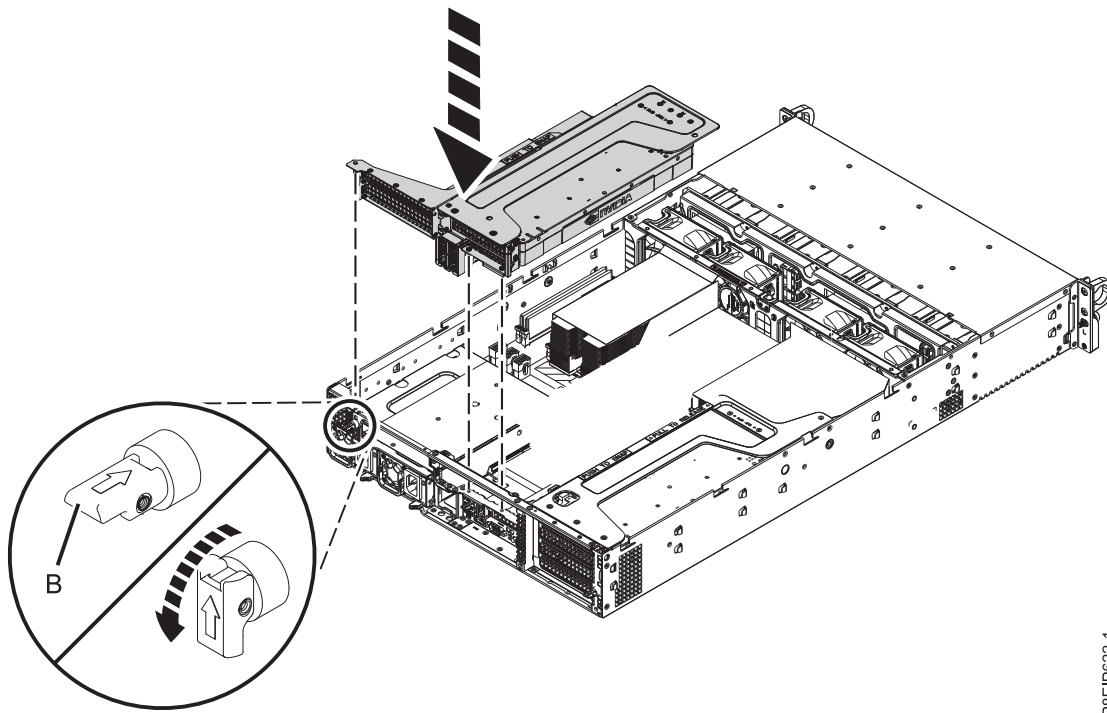
Figure 53. Inserting the position 1 and 3 riser

Go to 7 on page 46.

4. For an adapter in position 4, complete the following steps:

   a. If you need to replace the small riser for position 4, you will need to remove the riser for positions 5, 6, 7, and 8. For instructions, see step 5 on page 37. Then insert the small riser. Replace the riser for positions 5, 6, 7, and 8.

   b. If you are inserting a storage drive adapter, using your labels, connect the signal cables to the adapter before inserting the adapter.

   c. Insert the adapter into the riser.

   d. Close the retaining door by sliding it against the tail stock as shown in Figure 54 on page 44, then reset the retaining pin.
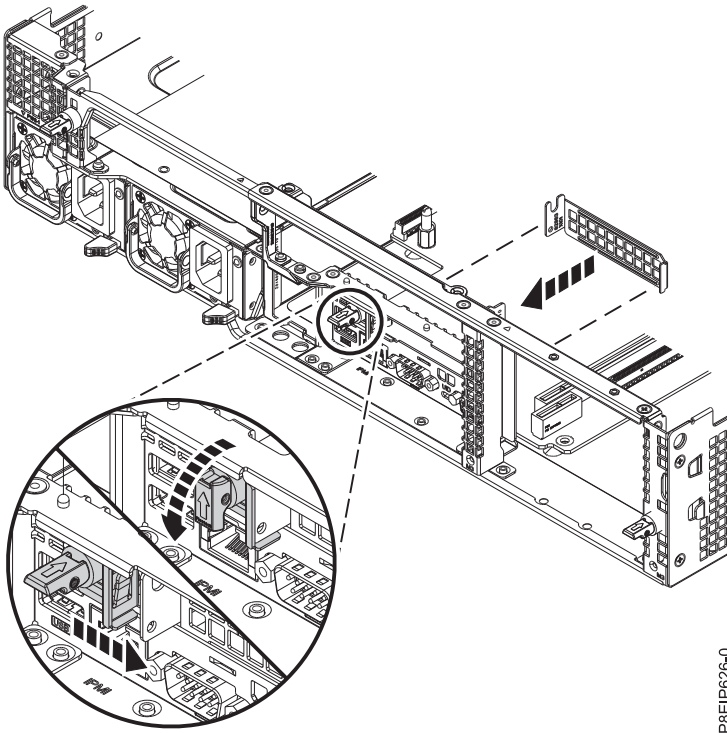
Figure 54. Sliding the tail-stock retainer to the closed position

Go to 7 on page 46.

5. If the riser card for positions 5, 6, 7, and 8 needs replacing, replace it into the riser support. Replace the two screws that secure the riser card to the riser support as shown in Figure 55.
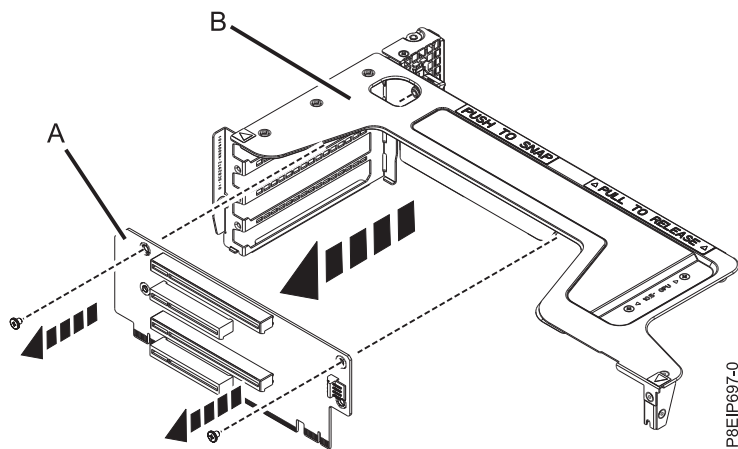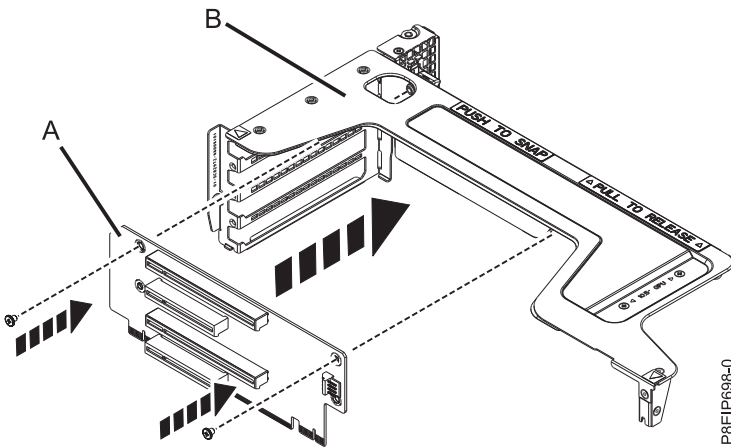

Figure 55. Replacing position 5, 6, 7, and 8 riser card

6. For an adapter in position 5, 6, 7, or 8, complete the following steps:

   a. If you are inserting a storage drive adapter, using your labels, connect the signal cables to the adapter before inserting the adapter.

   b. Plug the adapter **(A)** into the proper slot in the PCIe adapter riser **(B)** as shown in Figure 56 on page 45.
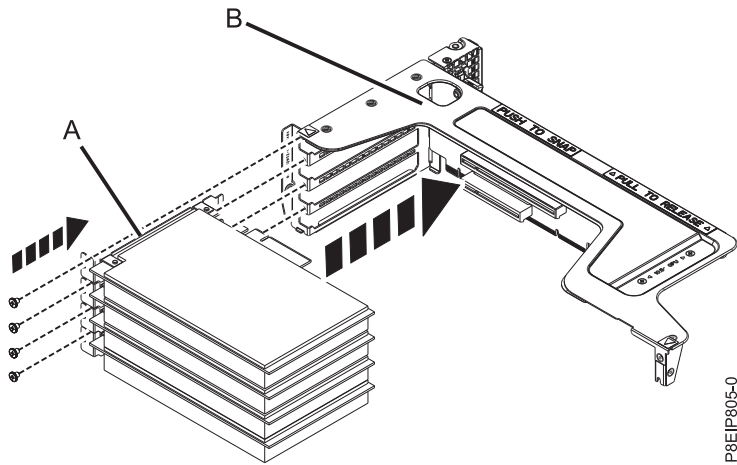
Figure 56. Inserting a PCIe adapter into the riser

    c. Replace the screw to secure the tail-stock.

    d. If position 5 contains a GPU, plug the GPU power cable **(A)** into the system backplane as shown in Figure 57.
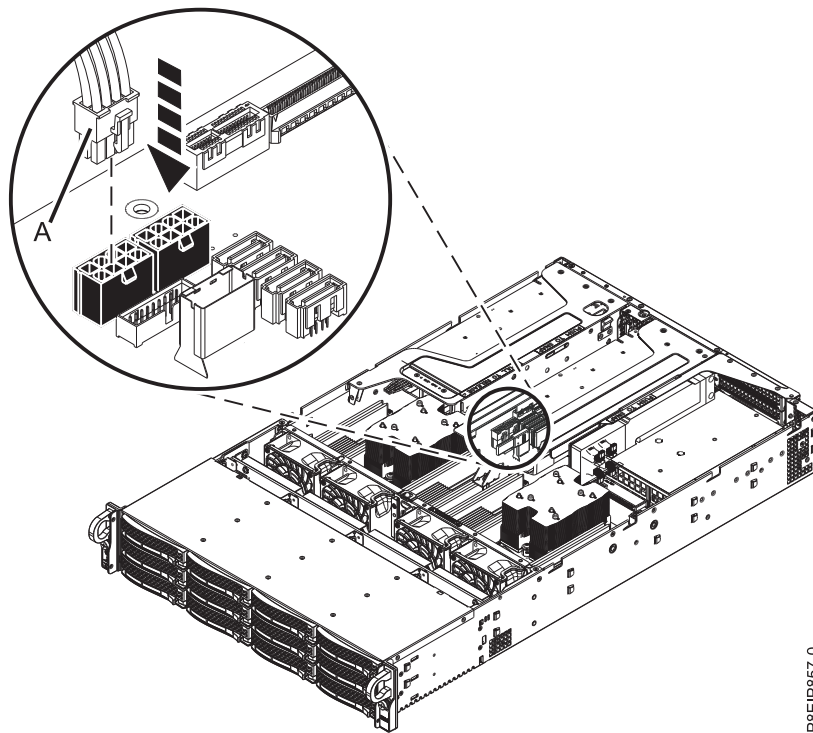
Figure 57. Plugging in the GPU power cable

    e. If you are inserting a storage drive adapter, using your labels, connect the signal cables to the adapter before inserting the adapter.

    f. Insert the PCIe riser as shown in Figure 58 on page 46.

        1) Retract the retaining pin **(B)** so the arrow points to the system.

        2) Insert the riser, using the slots and alignment pins **(A)** to properly insert the riser. Push the riser firmly into the system backplane.

        3) Set the retaining pin **(B)** to secure the riser.
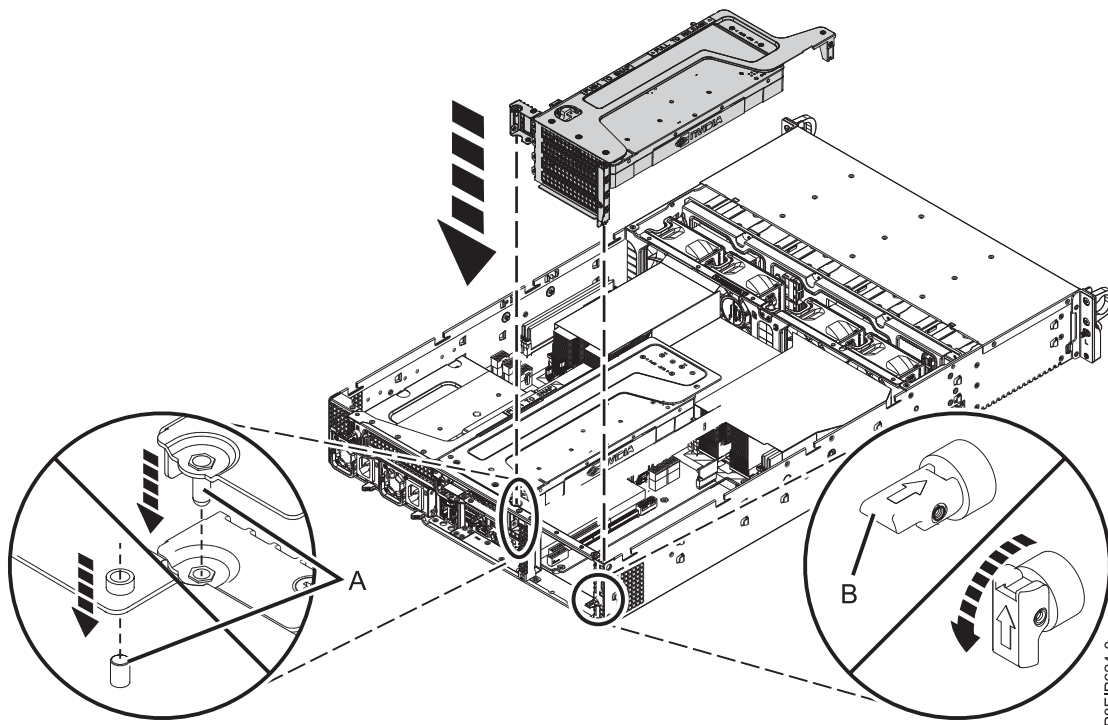
Figure 58. Inserting the PCIe adapter riser

7. The adapter is replaced.

What to do next

Prepare the system for operation. For instructions, see "Preparing the 8001-22C system for operation after you remove and replace internal parts" on page 80.

Removing and replacing the system backplane in the 8001-22C or 8005-22N

Learn how to remove and replace the system backplane in the IBM Power System S822LC for Big Data (8001-22C) or the IBM CS822 (8005-22N) system.

Before you begin

Before you begin replacing the system backplane, record the system serial number and machine model type. After you replace the system backplane, you must set the system serial number and machine model type in the system backplane.

About this task

You can use a commercially available magnetic tip screwdriver to remove and replace the screws.

Removing the system backplane in the 8001-22C or 8005-22N

Learn how to remove the system backplane in the IBM Power System S822LC for Big Data (8001-22C) or the IBM CS822 (8005-22N) system.

Before you begin

Before you begin replacing the system backplane, record the system serial number and machine model type. After you replace the system backplane, you must set the system serial number and machine model type in the system backplane.

Power off the system and place it in the service position. For instructions, see "Preparing the 8001-22C or 8005-22N system to remove and replace internal parts" on page 78.

About this task

As part of the system backplane replacement, the system processor modules are moved from the old system backplane to the new system backplane.

As part of the system processor module replacement, the heat sink is removed. When the heat sink is removed from the system processor module, the thermal interface material (TIM) is typically adhered to the heat sink. Unless damaged, the TIM that is adhered to the heat sink can be reused. If the TIM is damaged, do not reuse the removed heat sink. Before you begin the processor removal and replacement procedure, ensure that you have a spare TIM and heat sink on hand.

Procedure

1. Attach the electrostatic discharge (ESD) wrist strap.

   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.

2. Remove the processor air baffle as shown in Figure 59 on page 48. Carefully unsnap and lift the processor air baffle from the system.
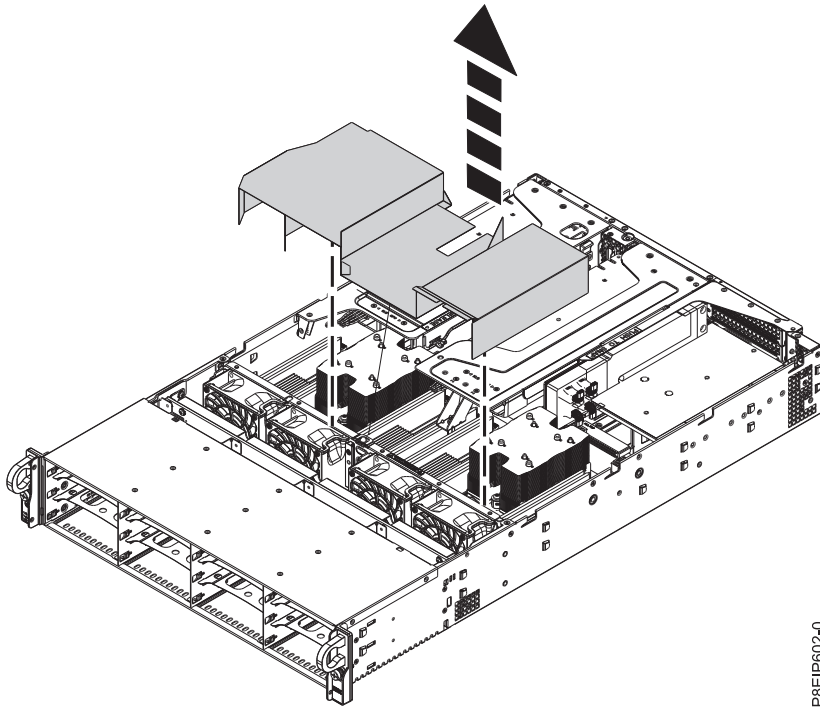
Figure 59. Removing the processor air baffle

3. Label and remove the memory DIMMs, recording their slot locations. For instructions, see "Removing and replacing memory in the 8001-22C or 8005-22N" on page 29.

4. Unplug the four fan power cables from the system backplane as shown in Figure 60 on page 49. Release the connector clip **(B)** and carefully pull up the connector **(A)** from the system backplane. Do not pull on the wires.
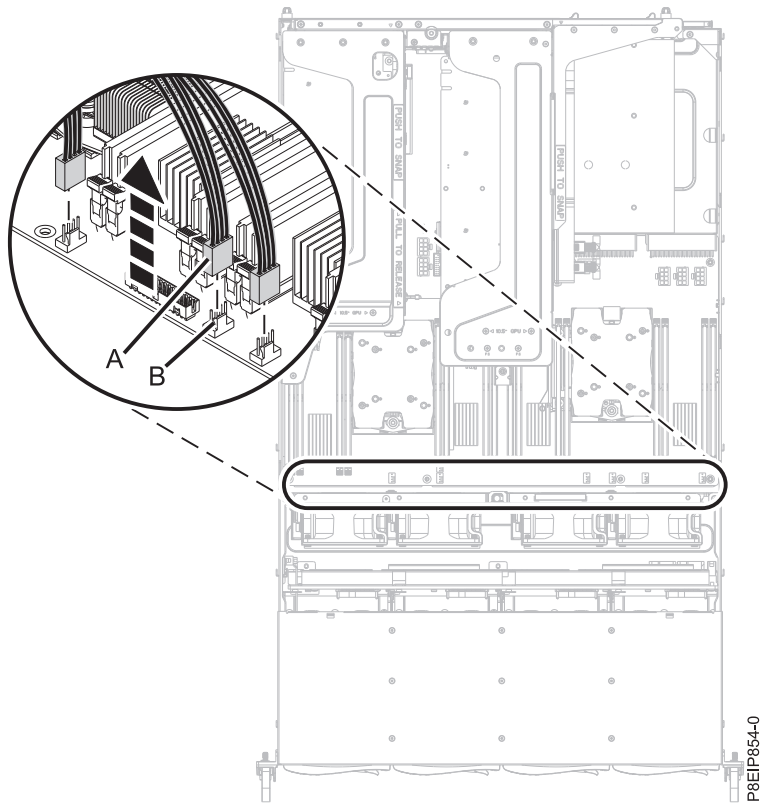
Figure 60. Disconnecting the fan cables

5. Remove the drive signal and drive power cables from the system backplane. For instructions, see "Removing the disk drive backplane from the 8001-22C or 8005-22N" on page 12.

6. Remove the operator panel cable from the system backplane as shown in Figure 61 on page 50.
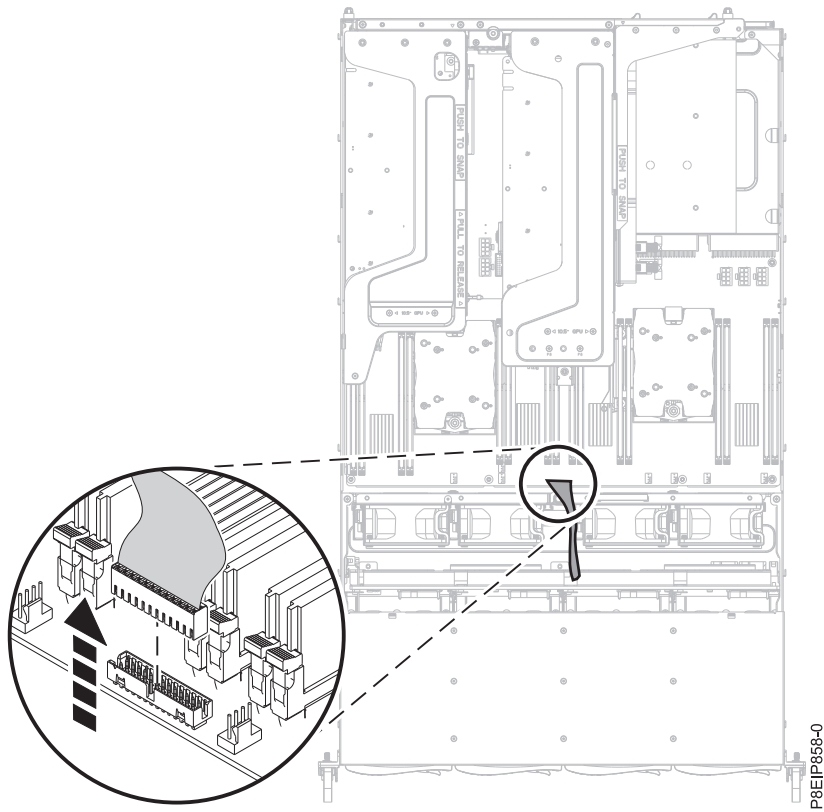
Figure 61. Removing the operator panel cable

7. Noting their slot locations, label, and remove the PCIe risers and adapters. For instructions, see "Removing a PCIe adapter from the 8001-22C or 8005-22N system" on page 33.

8. Remove the 14 screws from the system backplane. The screw locations are shown in Figure 62 on page 51.

Figure 62. Screw locations. The two screws at **(A)** are black and slightly longer. One long screw at **(B)** supports the PCIe adapter.

9. Moving the front cables out of the way, and carefully holding the processor heat sink, move the system backplane slightly forwards and up to remove it. See Figure 63 on page 52.
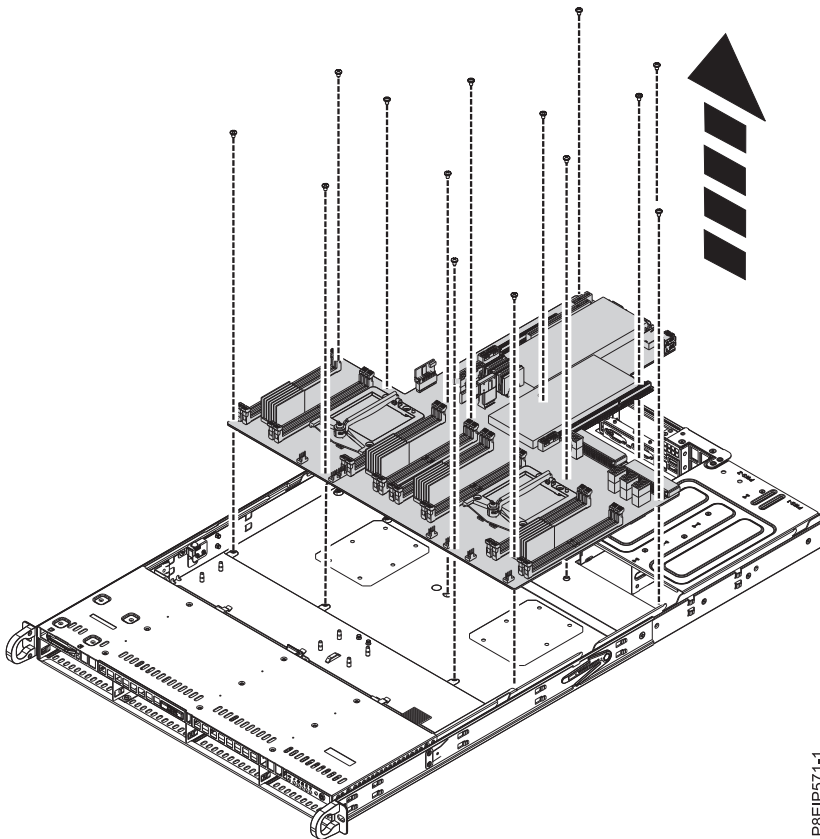
Figure 63. Lifting out the system backplane

10. Place the system backplane on an ESD mat.

Replacing the system backplane in the 8001-22C or 8005-22N

Learn how to replace the system backplane in the IBM Power System S822LC for Big Data (8001-22C) or the IBM CS822 (8005-22N) system.

Procedure

1. Ensure that you have the electrostatic discharge (ESD) wrist strap attached. If not, attach it now.
2. Remove the replacement system backplane from the static-protective package and place it on an ESD mat.

The following steps move the system processor module from the old system backplane to the new system backplane:

3. Loosen the load arm screw **(A)** of the system processor heat sink that you are removing by using a #3 Phillips screw driver as shown in Figure 64 on page 53.
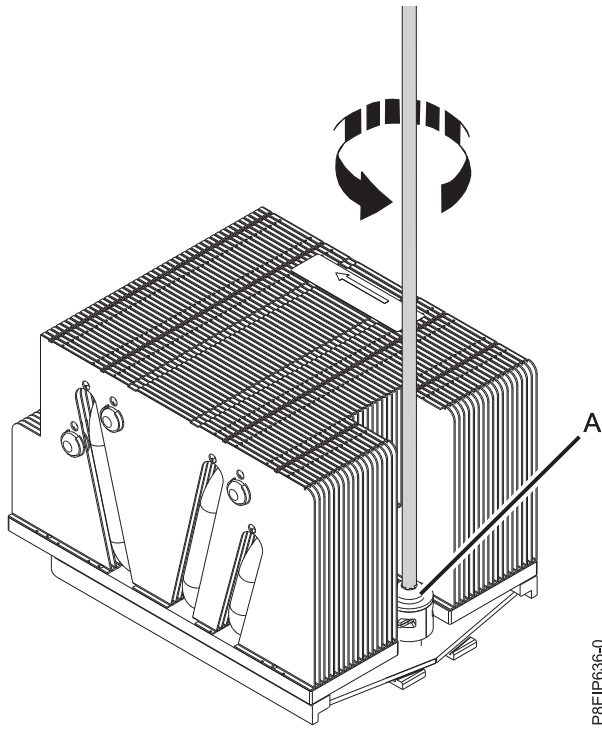
Figure 64. Loosening the load arm screw of the heat sink

4. Pivot and lift up on the heat sink. The load arm pivots up; pivot the heat sink and lift it from the load arm. See Figure 65.
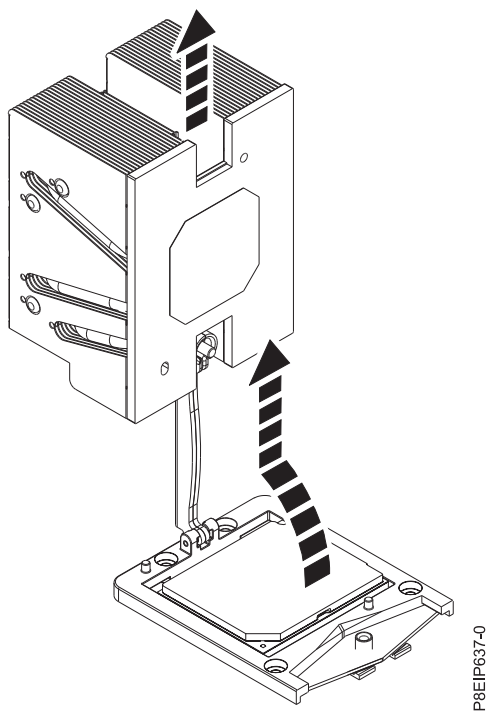
Figure 65. Lifting the heat sink from the load arm

5. Place the heat sink upside down on a clean surface.

6. Inspect the system processor socket area and remove any dust or debris (use a can of compressed air).
7. Lower the vacuum pen tool onto the system processor module to install. Fully press the top of the pen **(A)** and hold the pen in the center of the system processor module as shown in Figure 66. Release the top of the pen to fasten the pen onto the system processor module.

   Note: To prevent the system processor module from falling, do not press the tip while holding the pen and the system processor module. Minimize the time and distance that you have the pen holding the system processor module in case the vacuum seal releases early.
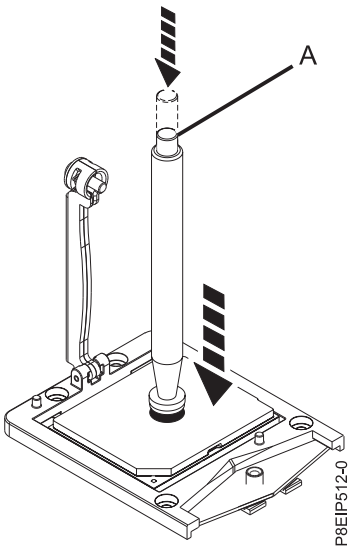
Figure 66. Lowering the removal tool onto the system processor module

8. Holding the pen, lift the pen and system processor module from the old system backplane socket to transfer it to the new system backplane socket.
9. Install the system processor module:
   a. Lower the pen and system processor module onto the socket as shown in Figure 67 on page 55. Align the beveled corner of the processor with the beveled corner on the socket. Use care to lower the tool evenly without tilting the processor.

      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.
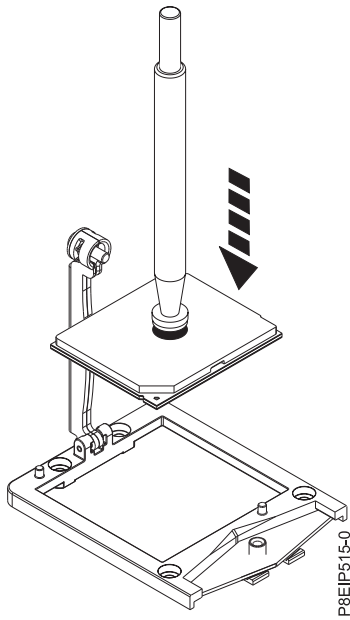
Figure 67. Lowering the processor into the socket

  b. After the system processor module is properly aligned, press the top of the pen to release it from the processor. Lift the pen off the processor.

10. Install the new supplied heat sink that is provided in the FRU kit. The TIM is pre-applied to the heat sink. Carefully lower the heat sink over the system processor module, passing the load arm through the heat sink. Ensure that the holes in the heat sink **(A)** align with the guide pins **(B)** on the socket, as shown in Figure 68.
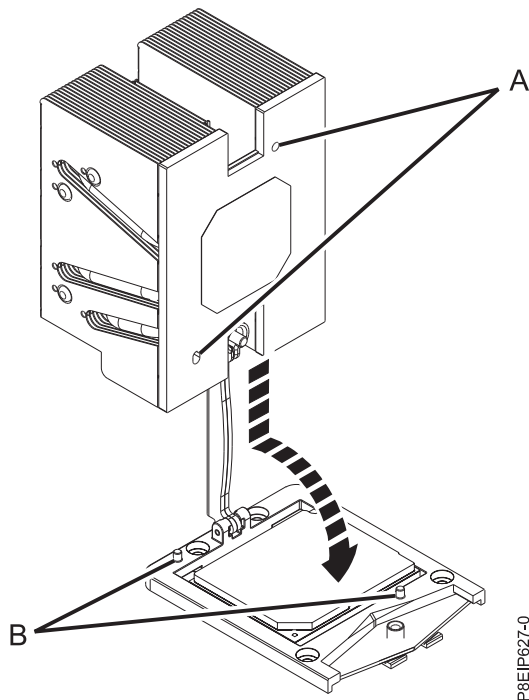
Figure 68. Installing the heat sink

11. Tighten the load arm **(A)** screw with a #3 Phillips screw driver, as shown in Figure 69 on page 56.

Note: Do not overtighten the load arm screw.
The following steps continue installing components into the new system backplane:
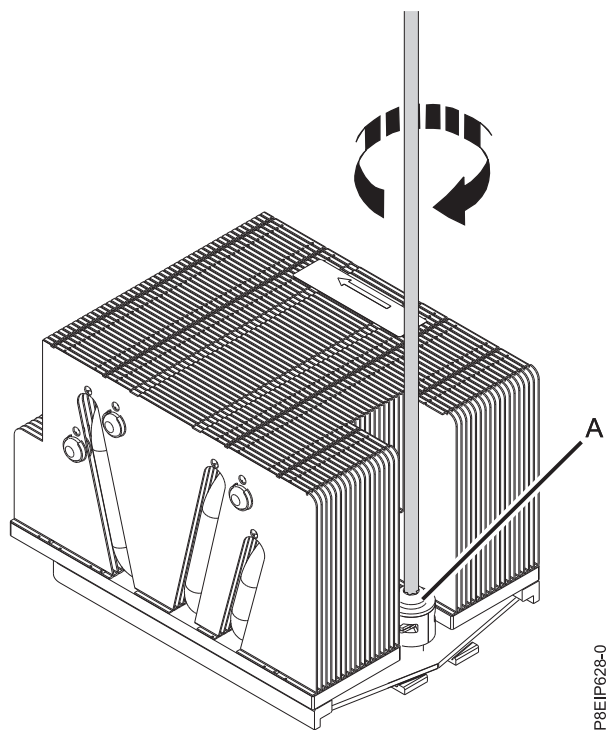
Figure 69. Tightening the load arm screw

12. Moving the front cables out of the way, and carefully holding the processor heat sink, lower the system backplane into the chassis, then slide it slightly back. See Figure 70 on page 57.
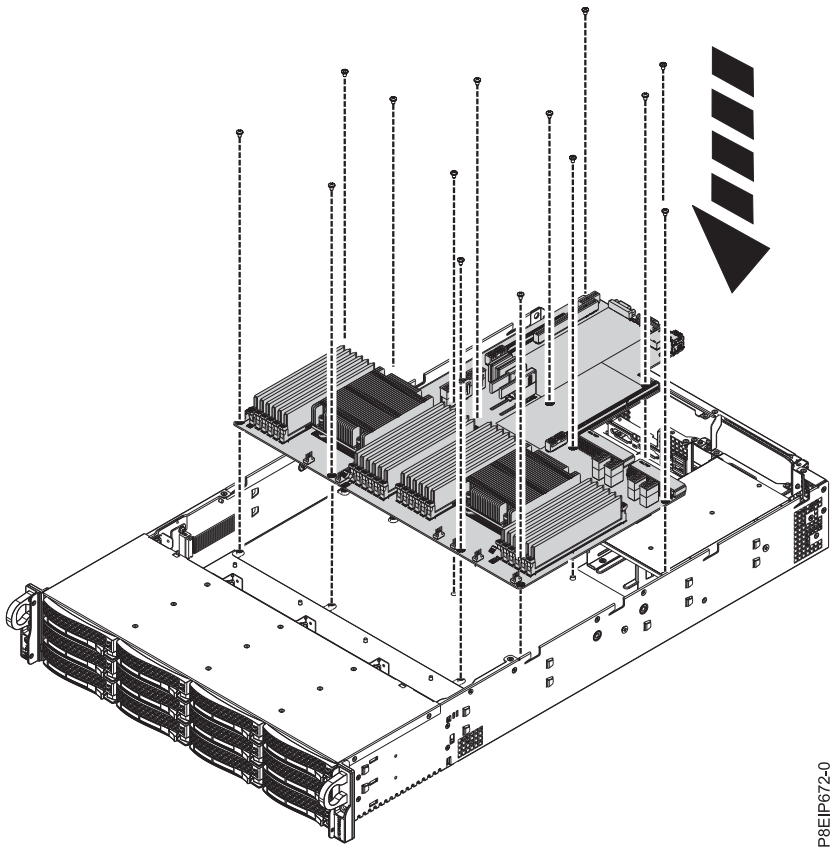
Figure 70. Replacing the system backplane

13. Align and screw the 14 screws into the system backplane. The screw locations are shown in Figure 71 on page 58.
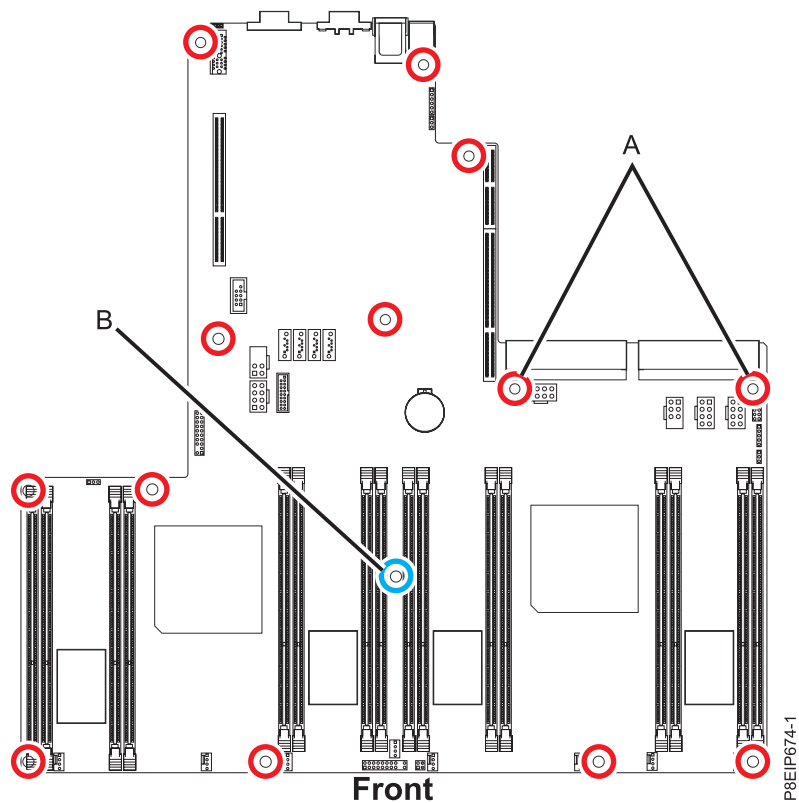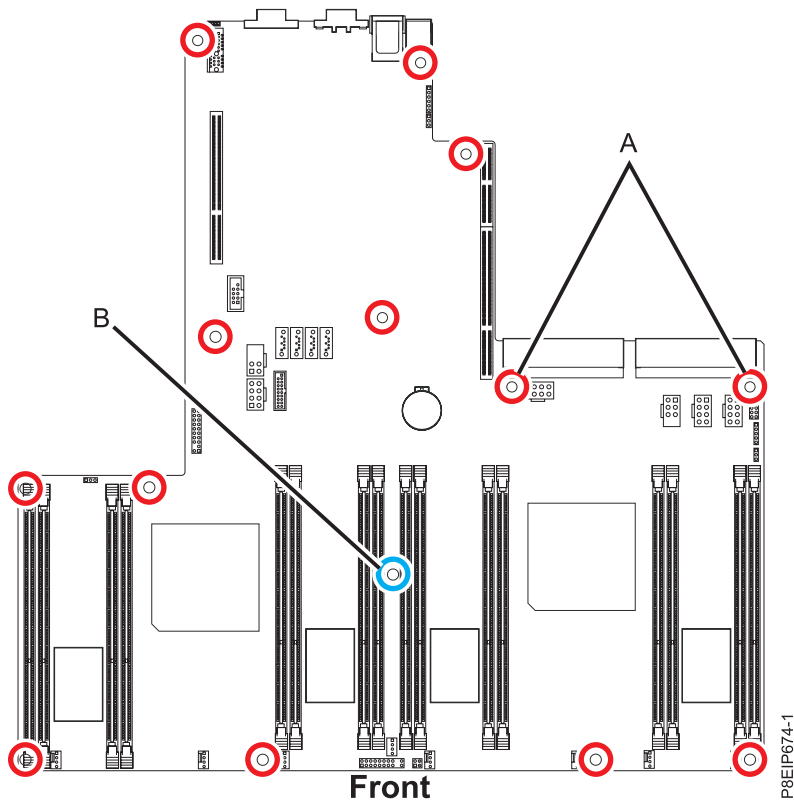
Figure 71. Screw locations. The two screws at **(A)** are black and slightly longer. One long screw at **(B)** supports the PCIe adapter.

14. Using your labels, replace the PCIe risers and adapters. For instructions, see "Replacing a PCIe adapter in the 8001-22C or 8005-22N system" on page 40.

15. Replace the operator panel cable into the system backplane as shown in "Replacing a disk drive in the 8001-12C, 8001-22C, 8005-12N, or 8005-22N system" on page 6.
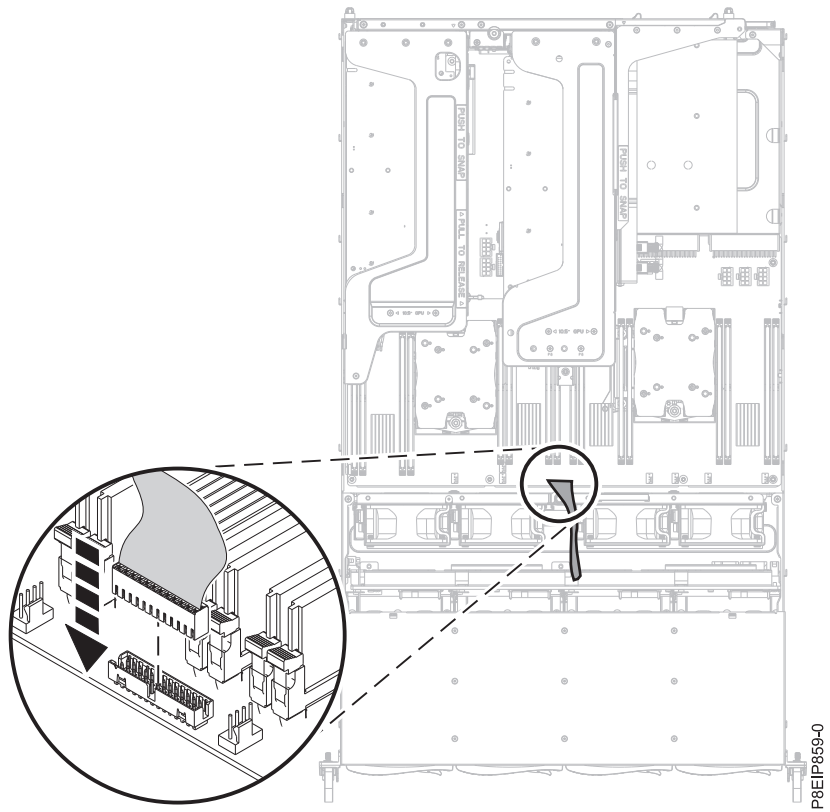
Figure 72. Replacing the operator panel cable

16. Replace the drive signal and drive power cables into the system backplane. For instructions, see "Replacing the disk drive backplane in the 8001-22C or 8005-22N" on page 15.

17. Connect the four fan power cables to the system backplane as shown in Figure 73 on page 60. Do not pull on the wires.
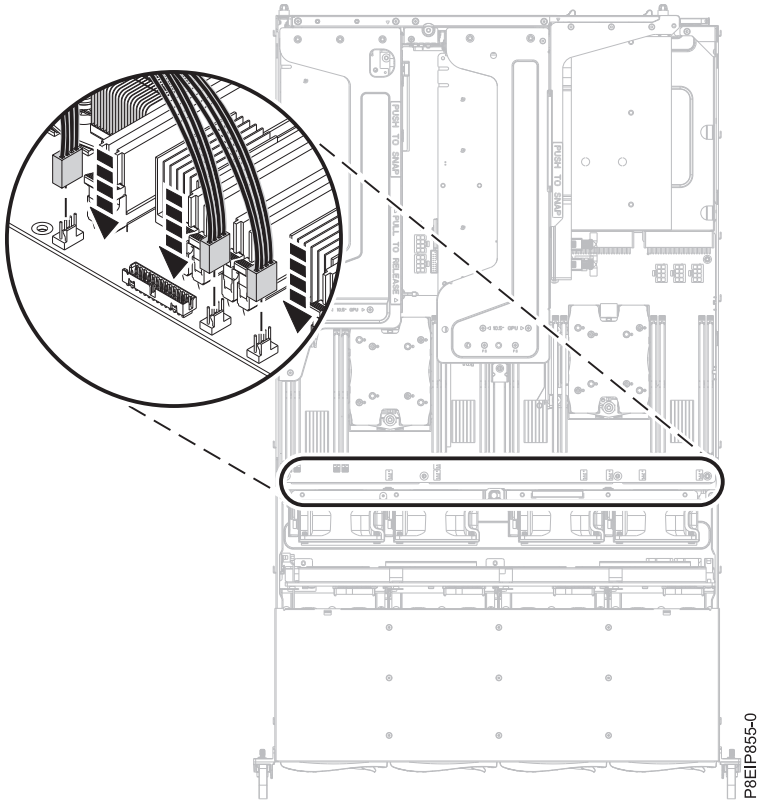
Figure 73. Connecting the fan cables

18. Using your labels, replace the memory DIMMs. For instructions, see "Removing and replacing memory in the 8001-22C or 8005-22N" on page 29.
19. Install the processor air baffle. Insert the edge of the baffle into the fan support as shown in Figure 74 on page 61. Then, carefully press the baffle down into place.
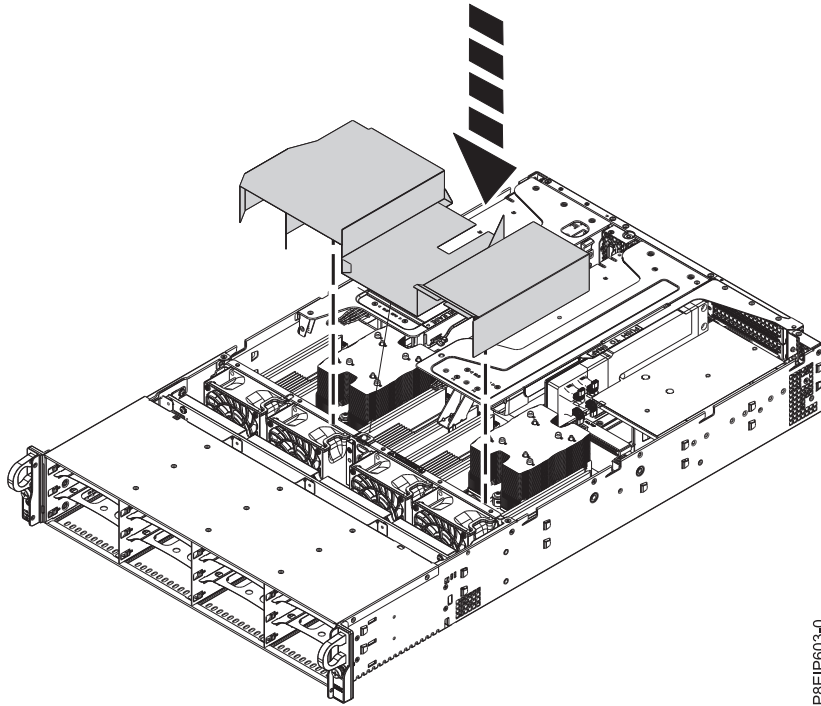
Figure 74. Installing the processor air baffle

What to do next

Prepare the system for operation. For instructions, see "Preparing the 8001-22C system for operation after you remove and replace internal parts" on page 80.

After you replace the system backplane, you must set the system serial number and model number in the system backplane by using the vital product data (VPD) update tool. To download the tool, complete the following steps:

1. Go to the Scale-out LC system VPD update tool website (www-304.ibm.com/support/customercare/sas/f/lopdiags/scaleOutLCdebugtool.html).
2. Download the Scale-out LC system VPD update tool.
3. Follow the directions that are provided with the tool to update the VPD.

Removing and replacing a system processor module in the 8001-22C or 8005-22N

Learn how to remove and replace a system processor module in the IBM Power System S822LC for Big Data (8001-22C) or the IBM CS822 (8005-22N) system.

Removing a system processor module from the 8001-22C or 8005-22N system

Learn how to remove a system processor module from the IBM Power System S822LC for Big Data (8001-22C) or the IBM CS822 (8005-22N) system.

Before you begin

Power off the system and place it in the service position. For instructions, see "Preparing the 8001-22C or 8005-22N system to remove and replace internal parts" on page 78.

About this task

As part of the system processor module replacement, the heat sink is removed. When the heat sink is removed from the system processor module, the thermal interface material (TIM) is typically adhered to the heat sink. Unless damaged, the TIM that is adhered to the heat sink can be reused. If the TIM is damaged, do not reuse the removed heat sink. Before you begin the processor removal and replacement procedure, ensure that you have a spare TIM and heat sink on hand.

Procedure

1. Attach the electrostatic discharge (ESD) wrist strap.

   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.

2. Open the packaging of the new system processor module and place the cover upside down next to the tray, as shown in Figure 75. The cover is used for the system processor module that you are replacing.
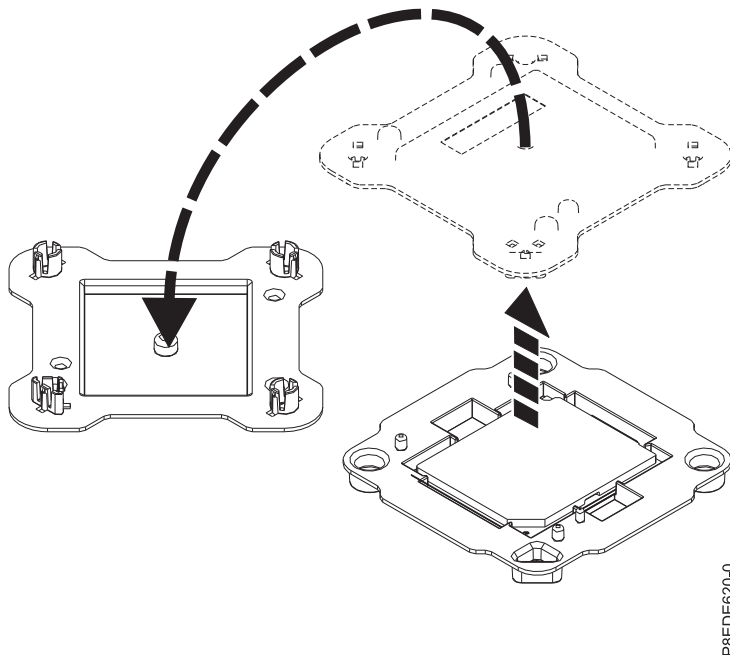
Figure 75. Opening the system processor module packaging

3. Remove the processor air baffle as shown in Figure 76 on page 63. Carefully unsnap and lift the processor air baffle from the system.
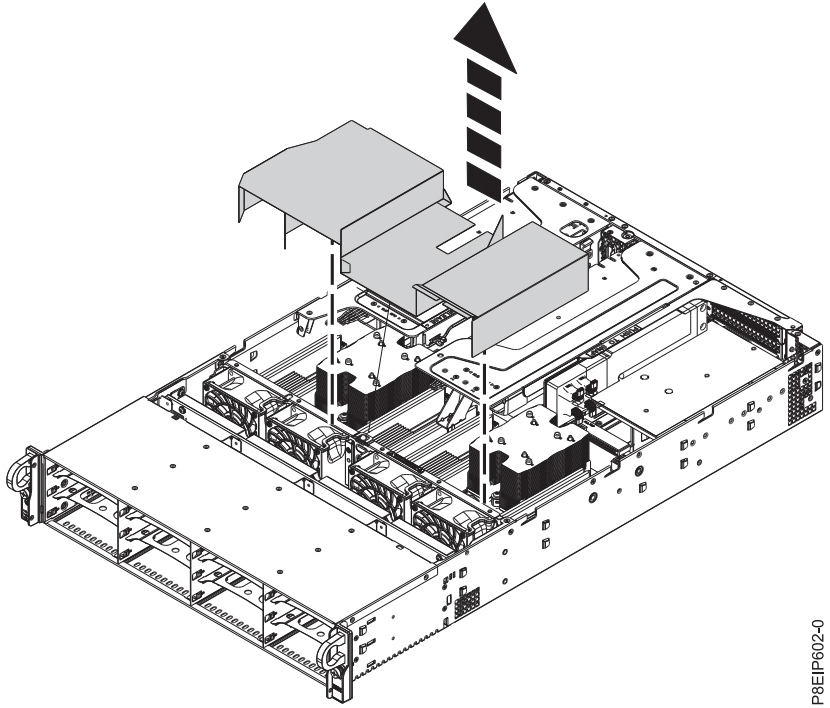
Figure 76. Removing the processor air baffle

4. Loosen the load arm screw **(A)** of the system processor heat sink that you are removing by using a #3 Phillips screw driver as shown in Figure 77.
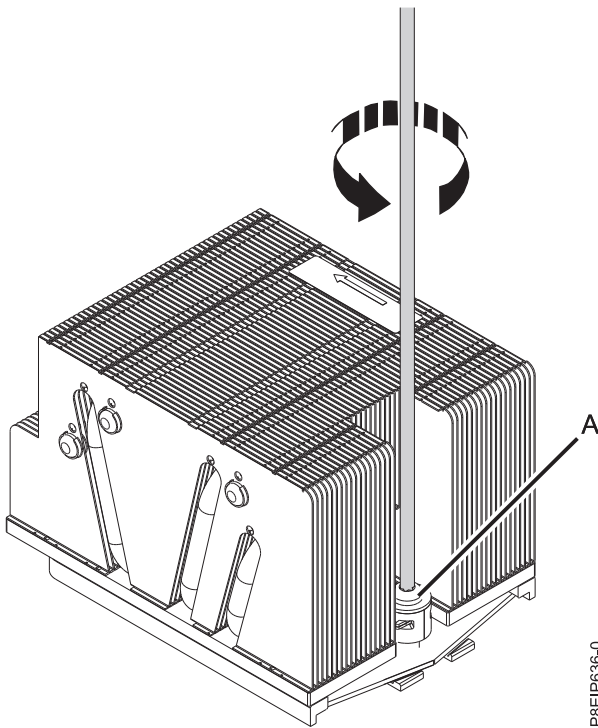
Figure 77. Loosening the load arm screw of the heat sink

5. Pivot and lift up on the heat sink. The load arm pivots up; pivot the heat sink and lift it from the load arm. See Figure 78.
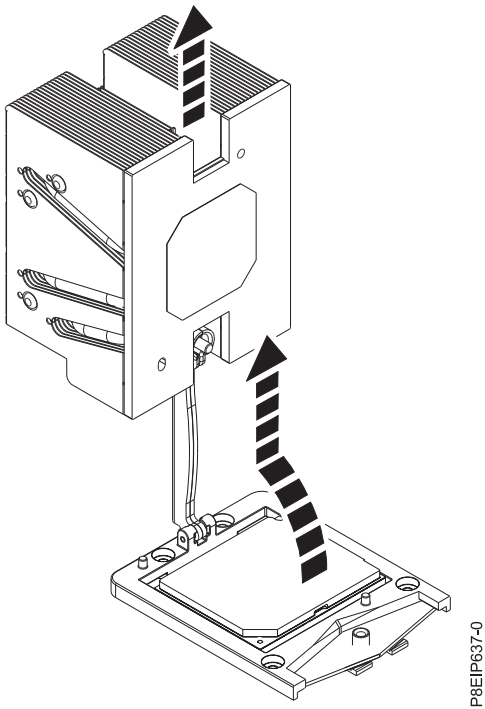
Figure 78. Lifting the heat sink from the load arm

6. Place the heat sink upside down on a clean surface.
7. Inspect the system processor socket area and remove any dust or debris (use a can of compressed air).
8. Lower the vacuum pen tool onto the system processor module. Fully press the top of the pen **(A)** and hold the pen in the center of the processor module as shown in Figure 79 on page 65. Release the top of the pen to fasten the pen onto the processor module.

   Note: To prevent the system processor module from falling, do not press the tip while holding the pen and the system processor module. Minimize the time and distance that you have the pen holding the system processor module in case the vacuum seal releases early.
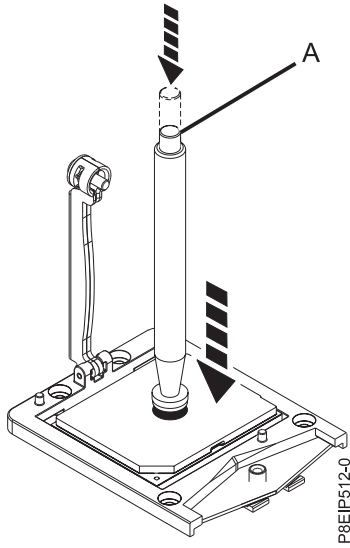
Figure 79. Locking the vacuum pen to the system processor module

9. Holding the vacuum pen, lift the pen and system processor module from the socket. Place them at an angle on the top cover of the system processor module packaging as shown in Figure 80. Setting the system processor module at an angle on the top cover of the system processor module packaging will make it easier to pick up and place in the packaging after you replace the system processor module.
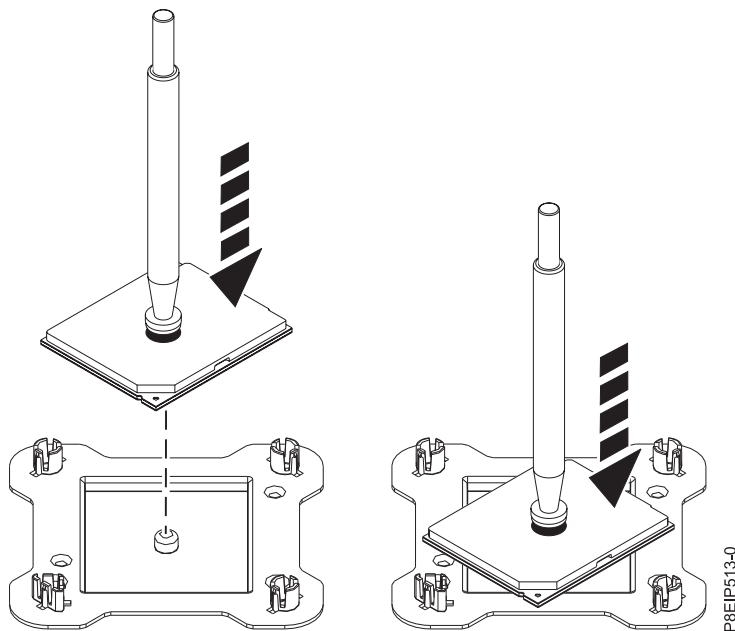
Figure 80. Placing the processor at an angle on the top cover of the packaging

10. Press the top of the pen to release the system processor module onto the cover.
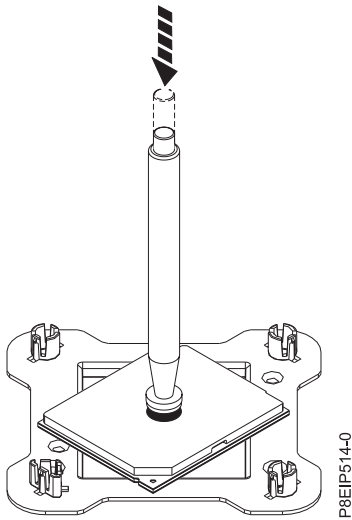
Figure 81. Releasing the pen

Replacing a system processor module for the 8001-22C or 8005-22N

Learn how to replace a system processor module in the IBM Power System S822LC for Big Data (8001-22C) or the IBM CS822 (8005-22N) system.

Procedure

1. Ensure that you have the electrostatic discharge (ESD) wrist strap attached. If not, attach it now.
2. Inspect the system processor socket area and remove any dust or debris (use a can of compressed air).
3. Lower the vacuum pen tool onto the system processor module to install. Fully press the top of the pen **(A)** and hold the pen in the center of the system processor module as shown in Figure 82 on page 67. Release the top of the pen to fasten the pen onto the system processor module.

   Note: To prevent the system processor module from falling, do not press the tip while holding the pen and the system processor module. Minimize the time and distance that you have the pen holding the system processor module in case the vacuum seal releases early.
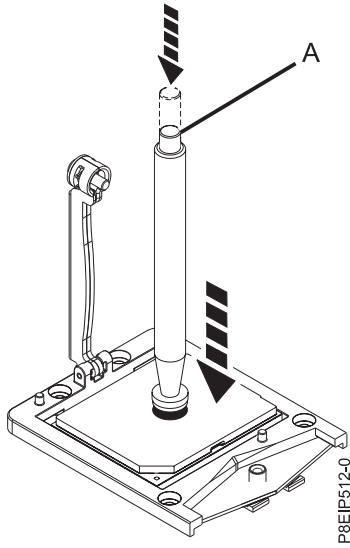
Figure 82. Lowering the removal tool onto the system processor module

4. Install the system processor module:

   a. Lower the pen and system processor module onto the socket as shown in Figure 83. Align the beveled corner of the processor with the beveled corner on the socket. Use care to lower the tool evenly without tilting the processor.

      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.
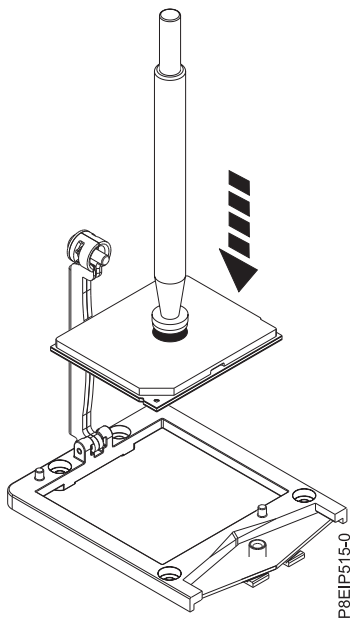
Figure 83. Lowering the processor into the socket

   b. After the system processor module is properly aligned, press the top of the pen to release it from the processor. Lift the pen off the processor.

5. Install the new supplied heat sink that is provided in the FRU kit. The TIM is pre-applied to the heat sink. Carefully lower the heat sink over the system processor module, passing the load arm through

the heat sink. Ensure that the holes in the heat sink **(A)** align with the guide pins **(B)** on the socket, as shown in Figure 84.
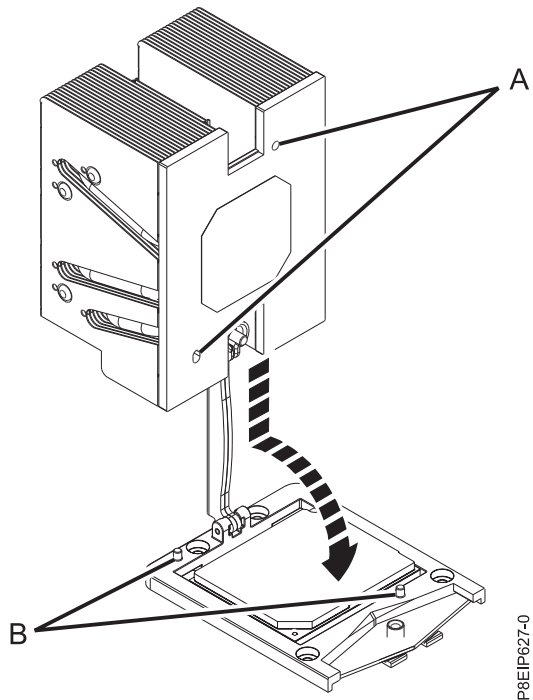
Figure 84. Installing the heat sink

6. Tighten the load arm **(A)** screw with a #3 Phillips screw driver, as shown in Figure 85 on page 69.

   Note: Do not overtighten the load arm screw.

P8EIP628-0
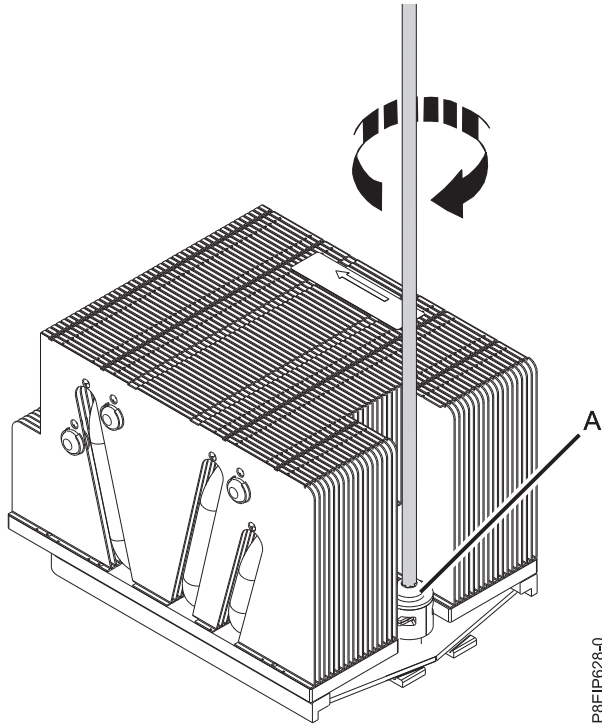
Figure 85. Tightening the load arm screw

7. Install the processor air baffle. Insert the edge of the baffle into the fan support as shown in Figure 86. Then, carefully press the baffle down into place.

P8EIP603-0
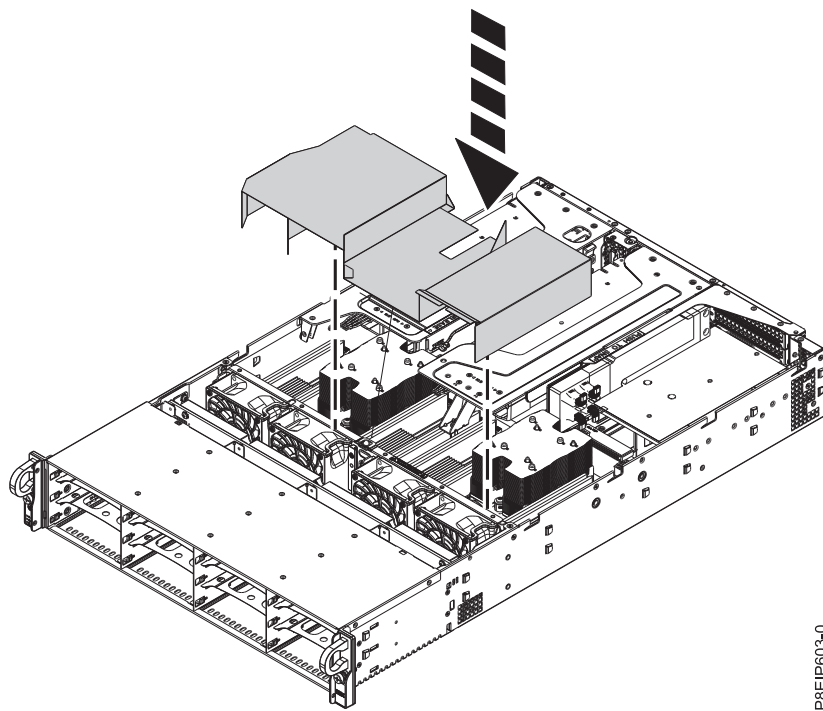
Figure 86. Installing the processor air baffle

8. Lightly grip the system processor module that you replaced by the edges and lift it off of the packaging cover. Align the beveled corner of the module **(A)** to the corner of the packaging with

triangle **(B)** and place it in the packaging, as shown in Figure 87. Close the packaging cover.
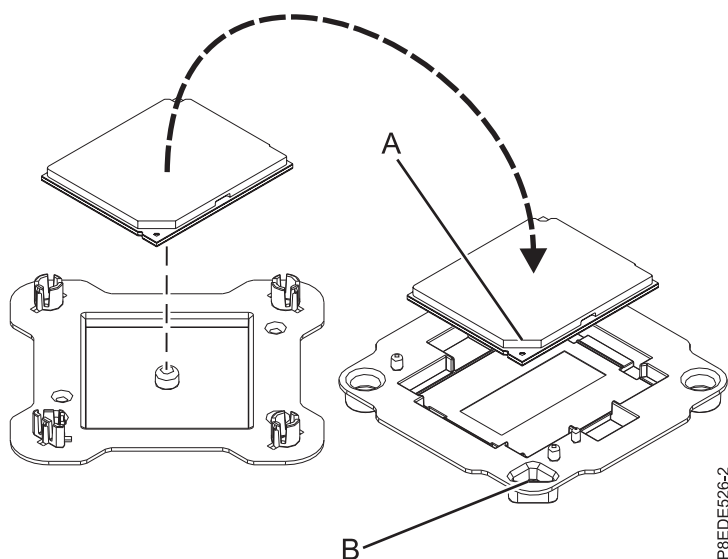
Figure 87. Placing the system processor module into the packaging

Removing and replacing the time-of-day battery in the 8001-22C or 8005-22N

Learn how to remove and replace the time-of-day battery in the IBM Power System S822LC for Big Data (8001-22C) or the IBM CS822 (8005-22N) system.

Before you begin

Power off the system and place it in the service position. For instructions, see "Preparing the 8001-22C or 8005-22N system to remove and replace internal parts" on page 78.

Procedure

1. Attach the electrostatic discharge (ESD) wrist strap.

   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.

2. If the time-of-day battery is covered by a PCIe adapter, move the adapter out of the way. For instructions, see "Removing a PCIe adapter from the 8001-22C or 8005-22N system" on page 33.

3. Remove the time-of-day battery **(A)** as shown in Figure 88 on page 71. When you remove the battery, do not use a metallic tool to disengage it from its slot.
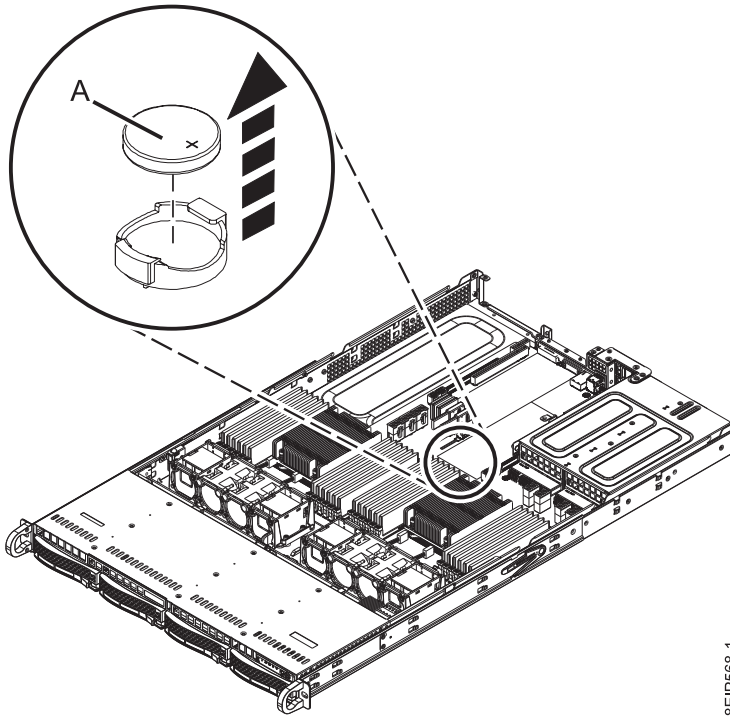
Figure 88. Time-of-day battery location

4. Replace the time-of-day battery. The orientation of the + of the battery is up.

5. If you moved a PCIe adapter to access the battery, replace the adapter. For instructions, see "Replacing a PCIe adapter in the 8001-22C or 8005-22N system" on page 40.

What to do next

Prepare the system for operation. For instructions, see "Preparing the 8001-22C system for operation after you remove and replace internal parts" on page 80.

Common procedures for servicing or installing features in the 8001-22C or 8005-22N

Learn about the common procedures related to installing, removing, and replacing features in the IBM Power System S822LC for Big Data (8001-22C) system.

Before you begin

Observe these precautions when you are installing, removing, or replacing features and parts.

About this task

These precautions are intended to create a safe environment to service your system and do not provide steps for servicing your system. The installation, removal, and replacement procedures provide the step-by-step processes that are required to service your system.

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.
- To avoid hazardous conditions due to uneven mechanical loading, always install the heaviest devices in the bottom of the rack cabinet. Always install servers and optional devices starting from the bottom of the rack cabinet.
- Rack-mounted devices are not to be used as shelves or work spaces. Do not place objects on top of rack-mounted devices. In addition, do not lean on rack mounted devices and do not use them to stabilize your body position (for example, when working from a ladder).

- Each rack cabinet might have more than one power cord.
  - For AC powered racks, be sure to disconnect all power cords in the rack cabinet when directed to disconnect power during servicing.
  - For racks with a DC power distribution panel (PDP), turn off the circuit breaker that controls the power to the system unit(s), or disconnect the customer's DC power source, when directed to disconnect power during servicing.
- Connect all devices installed in a rack cabinet to power devices installed in the same rack cabinet. Do not plug a power cord from a device installed in one rack cabinet into a power device installed in a different rack cabinet.
- An electrical outlet that is not correctly wired could place hazardous voltage on the metal parts of the system or the devices that attach to the system. It is the responsibility of the customer to ensure that the outlet is correctly wired and grounded to prevent an electrical shock.

(R001 part 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. 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.

Procedure

1. If you are installing a new feature, ensure that you have the software that is required to support the new feature. See IBM Prerequisite.
2. If you are installing or replacing something that might put your data at risk, ensure, wherever possible, that you have a current backup of your system or logical partition (including operating systems, licensed programs, and data).
3. Review the installation or replacement procedure for the feature or part.
4. Note the significance of color on your system.

   Blue or terra-cotta on a part of the hardware indicates a touch point where you can grip the hardware to remove it from or install it in the system, or open or close a latch. Terra-cotta might also indicate that the part can be removed and replaced with the system or logical partition powered on.
5. Ensure that you have access to a medium flat-blade screwdriver, a Phillips screwdriver, and a pair of scissors.
6. If parts are incorrect, missing, or visibly damaged, do the following steps:
   - If you are replacing a part, contact the provider of your parts or next level of support.
   - If you are installing a feature, contact one of the following service organizations:
     – The provider of your parts or next level of support.
     – In the United States, the IBM Rochester Manufacturing Automated Information Line (R-MAIL) at 1-800-300-8751.

   In countries and regions outside of the United States, use the following website to locate your service and support telephone numbers:

   http://www.ibm.com/planetwide
7. If you encounter difficulties during the installation, contact your service provider, your IBM reseller, or your next level of support.

8. For thermal performance, ensure that the top cover is on when the system is running.
9. If you are installing new hardware in a logical partition, you need to understand and plan for the implications of partitioning your system. For information, see Logical Partitioning.

Identifying the system that contains the part to replace

Learn how to determine which system has the part you want to replace.

LEDs on the 8001-22C or 8005-22N system

Use this information as a guide to the LEDs on the IBM Power System S822LC for Big Data (8001-22C) or the IBM CS822 (8005-22N) system.

The LEDs indicate various system status. If the part does not have a problem indicator LED, you can use a troubleshooting program such as **impitool** to identify the issue.

The front LEDs are shown in Figure 89.
- The green LED **(6)** indicates the power status.
- The identify LED **(2)** can indicate the following states:
  - Flashing blue indicates that a remote UID command was run.
  - Solid red indicates that the system is overheated.
  - Flashing red at 1 Hz indicates that a fan failed.
  - Flashing red at 0.25 Hz indicates that a power supply failed.
- The amber LED **(5)** flashes when there is SATA drive activity, for SATA drives directly attached to the system backplane.
- The network activity LEDs **(3)** and **(4)** flash when there is network activity on the feature EKA8 four port network card.
- The red LED **(8)** indicates a power supply failed.
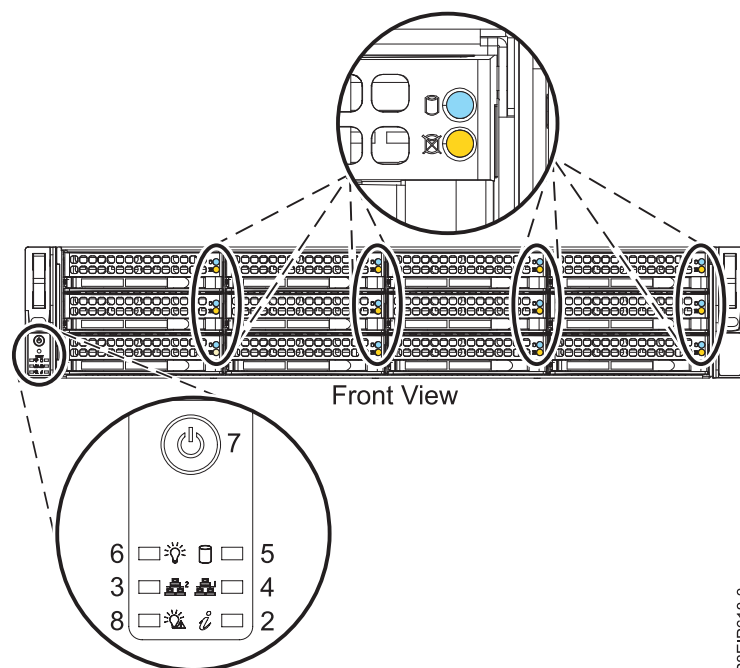
Figure 89. LEDs on the front of the system

LEDs are also on the rear of the system; see Figure 90.

The identify LED is at **(2)**. Turn it on by using a system identify command.
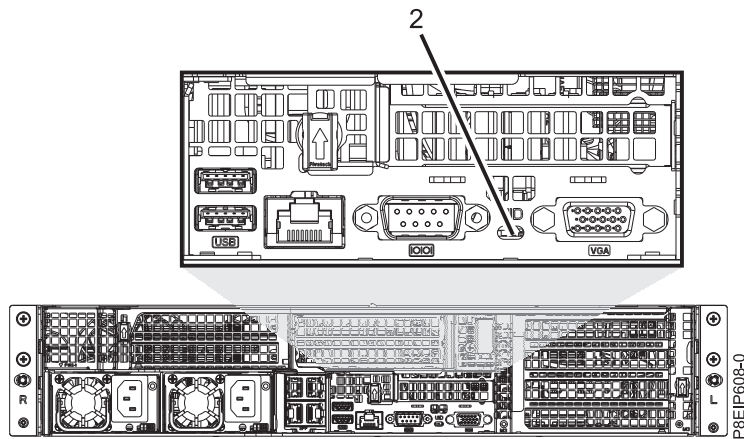
Figure 90. LEDs on the rear of the system

Drive LEDs can indicate the following states:
* Blue activity LED can indicate the following states:
  - When there is no activity, the LED is off for SATA drives; on for SAS drives.
  - Flashing blue indicates activity
* Red status LED can indicate the following states. The status LED does not work when SATA drives are directly attached to the system backplane.
  - Steady red indicates that the drive failed
  - Flashing red at 4 Hz identifies the drive
  - Flashing red at 1 Hz indicates that the drive is rebuilding

Power supply LEDs can indicate the following states:
* Steady green indicates that power is on
* Steady amber indicates that power is off, or a power fault occurred
* Flashing amber indicates that the power supply is overheating

Identifying the 8001-12C, 8001-22C, 8005-12N, or 8005-22N that needs servicing

Use the Intelligent Platform Management Interface (IPMI) program to turn on the blue identify LED to help you find the IBM Power System S821LC (8001-12C), the IBM Power System S822LC for Big Data (8001-22C), the IBM CS821 (8005-12N), or the IBM CS822 (8005-22N) system that needs servicing.

Procedure

Use the **ipmitool** command to activate the blue system identify LED.
For in-band networks, enter the following chassis identify command:

```
ipmitool -I <interface> chassis identify <interval>
```

interface
   The interface that you are using to connect to the system. For example, usb.

interval
   The time to turn on the identify LED in seconds. The default value is 15. This means that the LED is

on for 15 seconds and then turns off for 15 seconds. A value of zero (0) turns off the LED. A value of `force` turns on the LED and leaves it on until turned off.

To run the command remotely over the LAN, enter the following chassis identify command:

`ipmitool -I lanplus -H <hostname> -U <username> -P <password> chassis identify <interval>`

Preparing the 8001-22C or 8005-22N system to remove and replace internal parts

Learn how to prepare the IBM Power System S822LC for Big Data (8001-22C) or the IBM CS822 (8005-22N) system to remove and replace internal parts.

Procedure

1. Complete the prerequisite tasks. For instructions, see "Before you begin" on page 73.
2. Identify the part and the system that you will be working on. For instructions, see "Identifying the system that contains the part to replace" on page 76.
3. Attach the electrostatic discharge (ESD) wrist strap.

   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.
4. Stop the system. For instructions, see "Stopping the 8001-12C, 8001-22C, 8005-12N, or 8005-22N system" on page 83.
5. Disconnect the power source from the system by unplugging the system. For instructions, see "Disconnecting the power cords from an 8001-12C, 8001-22C, 8005-12N, or 8005-22N system" on page 94.

   Note: The system might be equipped with redundant power supply. Before you continue with this procedure, ensure that all power to your system is disconnected.

   (L003)
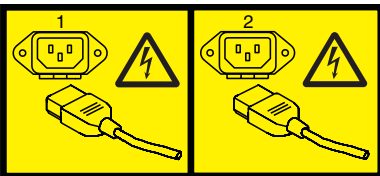
   or

or

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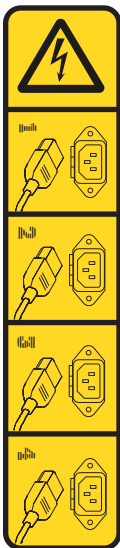
or
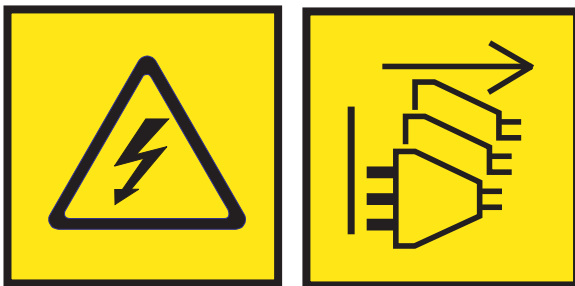
DANGER: Multiple power cords. The product might be equipped with multiple AC power cords or multiple DC power cables. To remove all hazardous voltages, disconnect all power cords and power cables. (L003)

(L005)

CAUTION: Hazardous energy present. Voltages with hazardous energy might cause heating when shorted with metal, which might result in splattered metal, burns, or both. (L005)

6. Place the system into the service position. For instructions, see "Placing an 8001-22C or 8005-22N system into the service position" on page 91.

    CAUTION:

    Do not place any object on top of a rack-mounted device unless that rack-mounted device is intended for use as a shelf. (R008)

    (L012)

 or

    CAUTION: Pinch hazard. (L012)

7. Remove the service access cover. For instructions, see "Removing the service access cover from an 8001-22C or 8005-22N system" on page 89.

Preparing the 8001-22C system for operation after you remove and replace internal parts

Learn how to prepare the IBM Power System S822LC for Big Data (8001-22C) or the IBM CS822 (8005-22N) system for operation after you remove and replace internal parts.

Procedure

1. Ensure that you have the electrostatic discharge (ESD) wrist strap attached. If not, attach it now.

2. Replace the service access cover. For instructions, see "Installing the service access cover on an 8001-22C or 8005-22N system" on page 90.

3. Place the system into the operating position. For instructions, see "Placing an 8001-22C or 8005-22N system into the operating position" on page 93.

    (L012)

 or

CAUTION: Pinch hazard. (L012)

4. Reconnect the power cords to the system. For instructions, see "Connecting the power cords to an 8001-12C, 8001-22C, 8005-12N, or 8005-22N system" on page 95.

5. Start the system. For instructions, see "Connecting the power cords to an 8001-12C, 8001-22C, 8005-12N, or 8005-22N system" on page 95.

6. If you installed or replaced a PCIe adapter, update the adapter firmware. See http://www.ibm.com/support/knowledgecenter/HW4P4/p8ei8/p8ei8_update_other_adapter.htm(www.ibm.com/support/knowledgecenter/HW4P4/p8ei8/p8ei8_update_other_adapter.htm).

7. Verify the installed part. For instructions, see Verifying a repair (www.ibm.com/support/knowledgecenter/POWER8//p8ei3/p8ei3_verifyrepair.htm).

Starting and stopping the 8001-12C, 8001-22C, 8005-12N, or 8005-22N

Learn how to start and stop the IBM Power System S821LC (8001-12C), the IBM Power System S822LC for Big Data (8001-22C), the IBM CS821 (8005-12N), or the IBM CS822 (8005-22N) system to perform a service action or system upgrade.

Starting the 8001-12C, 8001-22C, 8005-12N, or 8005-22N system

You can use the power button to start the IBM Power System S821LC (8001-12C), the IBM Power System S822LC for Big Data (8001-22C), the IBM CS821 (8005-12N), or the IBM CS822 (8005-22N) systems.

About this task

Attention: For safety, airflow purposes and thermal performance, the service access cover must be installed and fully seated before you power on the system.

You can use this procedure to power on the system; or you can use a console and the IPMI tool to power on the system.

Procedure

1. Before you press the power button, ensure that the power supplies are connected to the system unit and that the power cables are connected to a power source.

2. Press the power button **(7)** shown in Figure 91 on page 82 or Figure 92 on page 82. You may have to press the switch for 0.5 to 3 seconds.
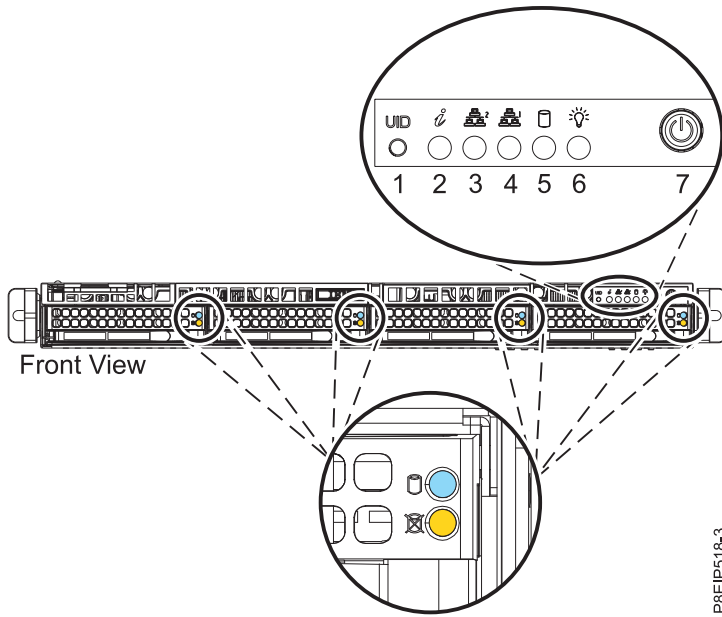
Figure 91. Power switch for 8001-12C
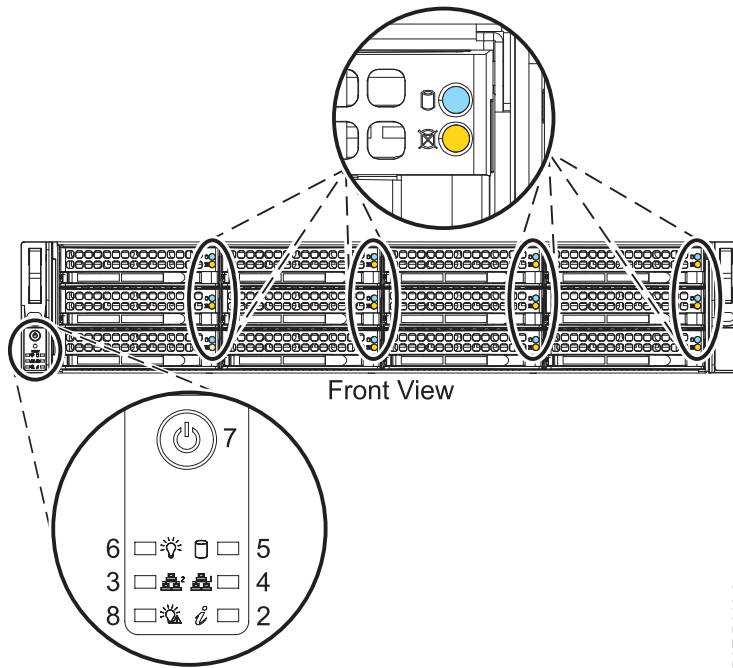
Figure 92. Power switch for 8001-22C

What to do next

If you press the power button and the system does not start, contact your next level of support or your service provider.

Stopping the 8001-12C, 8001-22C, 8005-12N, or 8005-22N system

Learn how to stop the IBM Power System S821LC (8001-12C), the IBM Power System S822LC for Big Data (8001-22C), the IBM CS821 (8005-12N), or the IBM CS822 (8005-22N) systems to complete another task.

Procedure

You can use the Linux **shutdown** command to stop and power down the system.
For example, the following command will shut down the system in 10 minutes and send the message "Repairs coming" to the users.

```
shutdown -P +10 "Repairs coming"
```

The -P setting instructs the system to shut down and then power down. The + indicates the time in minutes before the shutdown occurs.

Drive commands for 8001-12C, 8001-22C, 8005-12N, or 8005-22N

Learn about the storage drive commands for the IBM Power System S821LC (8001-12C), the IBM Power System S822LC for Big Data (8001-22C), the IBM CS821 (8005-12N), or the IBM CS822 (8005-22N) systems.

mvCLI commands

Learn about the mvCLI commands. They are for SATA drives and drive on modules (DOMs) that are directly connected to the system backplane without using a PCIe adapter.

To enter the mvCLI commands, enter this command to enable the commands:

```
modprobe sg
```

Run this mvCLI command to start it's shell mode:

```
./mvcli
```

To select the drive adapter, enter the following command. Valid values are 0 and 1. For example:

```
adapter -i 1
```

To show all physical disks and IDs:

```
info -o pd
```

To list the serial number of a drive:

```
info -o pd -i <id of drive>
```

To show all host bus adapters (HBAs):

```
info -o hba
```

To check for errors on a disk:

```
smart -p <disk_ID#>
```

You can also get the drive serial number by using the hdparm command from a shell. The setting sdx indicates the drive.

```
hdparm -i /dev/sdx
```

To create a virtual disk, where "MyVirtualDisk" is the name for the new array, and 0 and 1 are the physical IDs of the SATA DOMs from a previous info -o pd command:

```
create -o vd -r1 -n "MyVirtualDisk" -d 0,1
```

If the virtual disk was successfully created, show a new RAID virtual disk:

```
info -o vd
```

To take the device offline so that it can be removed:

1. Identify the disk to remove; for example, `sda` or `sdb`.
2. Log in as the root user. For example, to remove the `sda` drive, run the following command:
   ```
   echo 0 > /sys/block/sda/device/delete
   ```

StorCLI commands

Learn about the StorCLI commands. They are for feature code EKAA using a PCIe adapter.

If the command is not installed, download the utility from http://avagotech.com. You can find the download by searching that site for `storcli`. Get their latest "MegaRAID Storcli" download; the file is at https://docs.broadcom.com/docs/STORCLI-v1-21-12-Linux.zip. To install, follow their documentation. Unzip the file; then for:

RHEL

1. Navigate to the `Linux` folder.
2. Install the package by running this command, where `x.xx-x` equals the version of the utility. :
   ```
   rpm -ivh <StorCLI-x.xx-x.noarch.rpm>
   ```

Ubuntu:

1. Navigate to the `Ubuntu` folder.
2. Install the debian file by using this command:
   ```
   dpkg -i storcli_x.xx-x._all.deb
   ```

If you need to make the `storcli` run, use the following command:

```
chmod +x /path/to/file/filename
```

You can check the permissions of the file to see if it is executable by using the following command:

```
ls -l /path/to/file/filename
```

To upgrade the StorCLI RPM, run:

```
rpm -Uvh <StorCLI-x.xx-x.noarch.rpm>
```

To show a summary of the drive and controller status:

```
storcli show
```

To show a list of all controllers and drives that need attention:

```
storcli show all
```

To show information about the drives:

```
storcli /cx[/eall]/sall show
```

To locate a physical disk by turning on the identify LED:

```
storcli /cx[/ex]/sx start locate
```

To turn off the identify LED:

```
storcli /cx[/ex]/sx stop locate
```

To prepare a drive for removal:

```
storcli /cx[/ex]/sx spindown
```

To prepare a drive for use:

```
storcli /cx[/ex]/sx spinup
```

sas3ircu commands

Learn about the `sas3ircu` command. This command is for feature code EKAB using a PCIe adapter.

If the `sas3ircu` command is not installed, download the utility from ftp://ftp.supermicro.com/driver/P8DTU/. You can find the download by searching that site for `sas3ircu`; currently: **LSI MegaRAID and HBA (AOC-Utility)** > **SMC-Broadcom (Supermicro 12Gbs SAS HBA - AOC-S3008L-L8i)** > **AOC-S3008L-L8i** > **Tools**.

To install:
1. Download the `sas3ircu` command.
2. Copy the `sas3ircu` command file to the `/usr/local/bin` directory.
3. To enable the command to be executed, as root, run the command:
   ```
   chmod +x sas3ircu
   ```

General SAS3IRCU command syntax:

```
sas3ircu <controller_#> <command> <parameters>
```

To list the controllers:

```
sas3ircu list
```

To show the controller status:

```
sas3ircu <controller_#> status
```

To turn the drive light on:

```
sas3ircu <controller_#> locate <Enclosure:Bay> ON
```

And off:

```
sas3ircu <controller_#> locate <Enclosure:Bay> OFF
```

To view additional help for the command:

```
sas3ircu help
```

NVMe commands

Learn about the NVMe commands. These commands are for NVMe drives together with feature code EKAE using an NVMe PCIe adapter.

If the `nvme` command is not installed, download the utility from https://github.com/linux-nvme/nvme-cli. Follow the installation instructions found on that site.

To determine which drive you want to replace, use the command:

```
nvme list
```

If you are searching for a failed drive, you can check each drive using the command:

```
nvme smart-log <device>
```

To turn on the identify LED, use the command:

```
dd if=/dev/nvmeX of=/dev/null
```

You can also use the `ledctl` command from the optional `ledmon` package:

```
ledctl locate=/dev/rsnvmeX
```

To get the device serial number for verification, use the command:

```
nvme id-ctrl /dev/nvmeX | grep -i sn
```

To take the device offline so that it can be removed:

```
sh -c"echo 0 >/sys/block/nvmeX/device/delete"
```

Sensor readings GUI display

The sensor readings GUI display is a way to quickly determine the general health status of the server without having to look at the detailed system event log (SEL) information.

To view the sensor readings GUI display, log in to the BMC web interface. Click **Server Health** > **Sensor Readings**.

Some occurrences of errors in the system might not appear in the sensor readings GUI. After you view the sensor readings GUI display, use the SEL logs to view any active SEL events that indicate a service action event.

Sensor readings display operation

Most sensors are initially gray, then change status and color during the boot process when the FRU is initialized and either determined to be good (green) or faulty (red). No sensor display is available until you can get to the sensor display selection on the BMC, which means that the system attains a certain power level or that the BMC finishes initializing. The indicator color of the sensor is determined based on the sensor status at time of invocation of the display. The sensor display maintains the sensor status indicator color until the display is refreshed, which updates the sensor value with the latest status. Changes to SEL events changes color of sensor indicator when you refresh or restart the display. Sensor status display also starts over with a reboot or a power cycle.

Sensor status indicator descriptions

Gray indicator:
- FRU not plugged
- Sensor not initialized
- Sensor function is not initialized

Red (faulty) indicator:
- Critical threshold exceeded (an event requires a service action)
- Service action required for hard fail
- Partial function failure that reached a "service action required" state
- A deconfigured resource requires a service action

Green (good) indicator:
- FRU or sensor is plugged in and fully operational
- Recoverable event is below the critical "service action required" threshold
- FRU or sensor returned to "normal" operating range (for threshold sensors)

Removing and replacing a power supply in the 8001-12C, 8001-22C, 8005-12N, or 8005-22N

Learn how to remove and replace power supplies in the IBM Power System S821LC (8001-12C), the IBM Power System S822LC for Big Data (8001-22C), the IBM CS821 (8005-12N), or the IBM CS822 (8005-22N) systems.

Removing a power supply from the 8001-12C, 8001-22C, 8005-12N, or 8005-22N

Learn how to remove power supplies in the IBM Power System S821LC (8001-12C), the IBM Power System S822LC for Big Data (8001-22C), the IBM CS821 (8005-12N), or the IBM CS822 (8005-22N) systems.

About this task

If a single power supply failed, it can be replaced while the system is running.

Procedure

1. Attach the electrostatic discharge (ESD) wrist strap.

   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.

2. Label and remove the power cord from the power supply to remove. For instructions, see "Disconnecting the power cords from an 8001-12C, 8001-22C, 8005-12N, or 8005-22N system" on page 94.

3. Remove the power supply from the system.

   a. To unseat the power supply from its position in the system, push the locking-tab to the left as shown in Figure 93 on page 88.

   b. Grasp the power supply handle with one hand, and pull the power supply partially out of the system.

   c. Place your other hand underneath the power supply and pull the power supply out of the system and place it on an ESD mat.
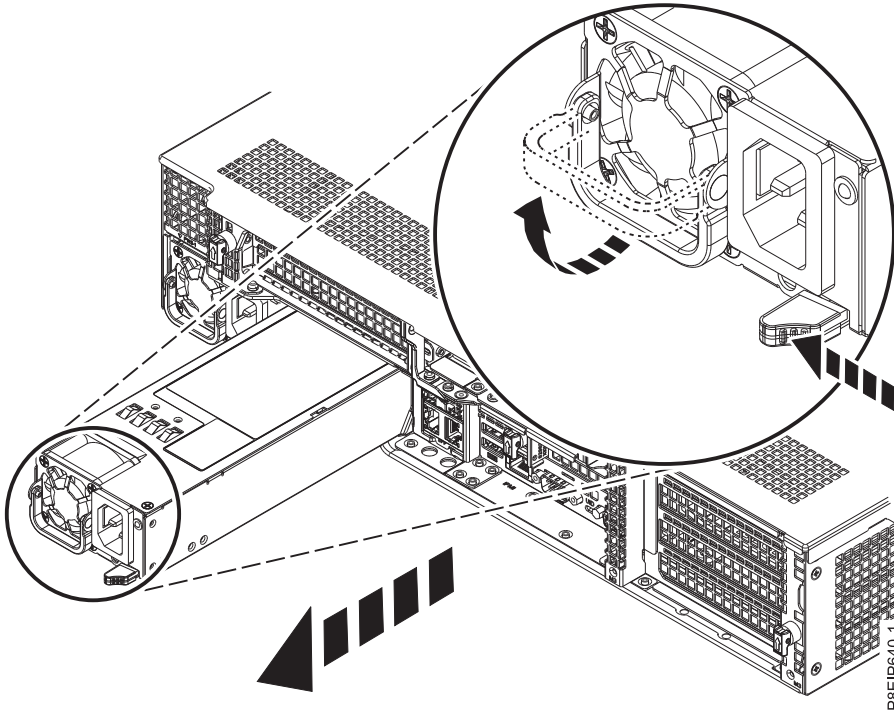
Figure 93. Removing a power supply from the system

Replacing a power supply in the 8001-12C, 8001-22C, 8005-12N, or 8005-22N

Learn how to replace power supplies in the IBM Power System S821LC (8001-12C), the IBM Power System S822LC for Big Data (8001-22C), the IBM CS821 (8005-12N), or the IBM CS822 (8005-22N) systems.

Procedure

1. Ensure that you have the electrostatic discharge (ESD) wrist strap attached. If not, attach it now.
2. Align the power supply with the bay as shown in Figure 94 on page 89. The fan is on the left; the plug is on the right. Slide the power supply into the system until the latch locks in place.
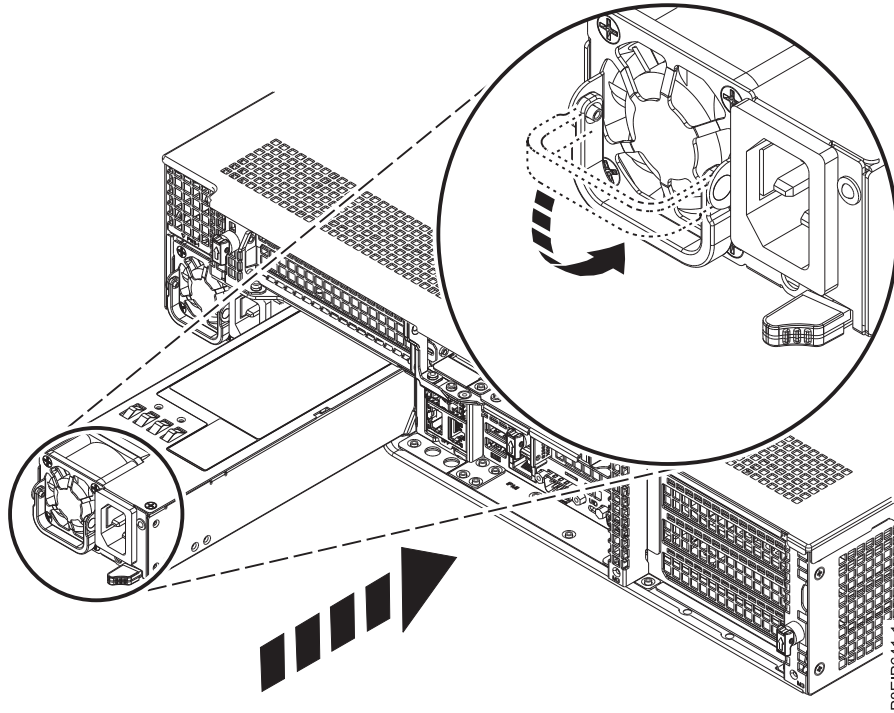
Figure 94. Replacing a power supply in the system

3. Reconnect the power cord. For instructions, see "Connecting the power cords to an 8001-12C, 8001-22C, 8005-12N, or 8005-22N system" on page 95.

Removing and replacing covers on an 8001-22C or 8005-22N system

Learn how to remove and replace the covers for an IBM Power System S822LC for Big Data (8001-22C) or the IBM CS822 (8005-22N) system so that you can access the hardware parts or service the system.

Removing the service access cover from an 8001-22C or 8005-22N system

Learn how to remove the service access cover from an IBM Power System S822LC for Big Data (8001-22C) or the IBM CS822 (8005-22N) system.

About this task

Attention: For safety, airflow purposes and thermal performance, the service access cover must be installed and fully seated before you power on the system.

Procedure

1. Ensure that you removed both power cords from the system. For instructions, see "Disconnecting the power cords from an 8001-12C, 8001-22C, 8005-12N, or 8005-22N system" on page 94.

   (L005)

CAUTION: Hazardous energy present. Voltages with hazardous energy might cause heating when shorted with metal, which might result in splattered metal, burns, or both. (L005)

2. Remove the two cover screws, one from each side of the cover.

3. Press both buttons on the top cover to release the latches as shown in Figure 95, and push the cover back about 0.5 in (1 cm) until it stops. If the buttons do not easily press down, partially remove the drives directly under the buttons.

P8EIP600-0
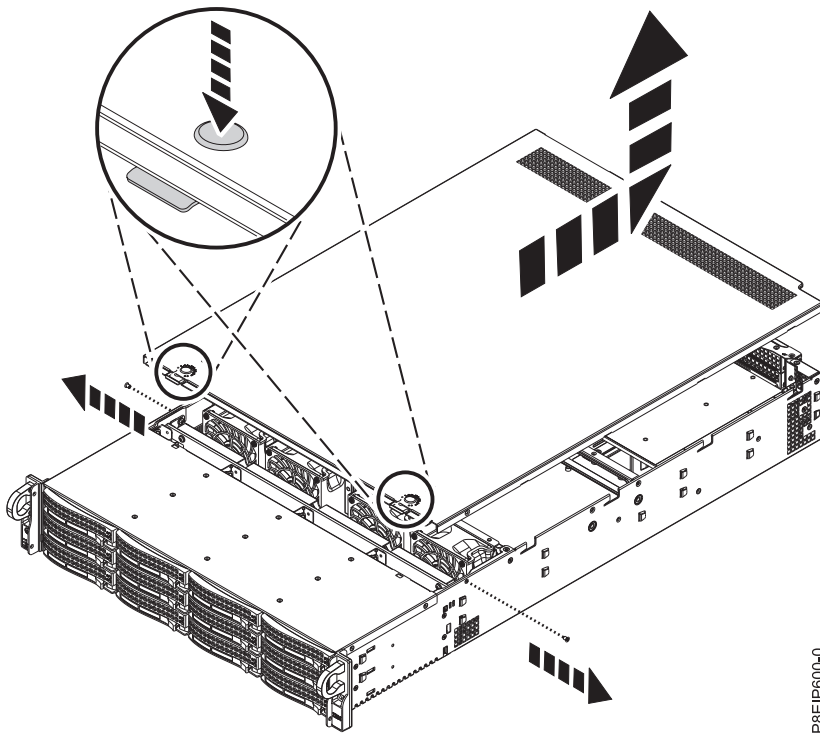
Figure 95. Releasing and opening the cover

4. Lift up the front of the cover up and remove it from the system.

Installing the service access cover on an 8001-22C or 8005-22N system

Learn how to install the service access cover on a rack-mounted IBM Power System S822LC for Big Data (8001-22C) or the IBM CS822 (8005-22N) system.

About this task

Attention: For safety, airflow purposes and thermal performance, the service access cover must be installed and fully seated before you power on the system.

Procedure

1. Place the rear of the cover on the system. Pivot to front of the cover down until it rests on the system.

2. Slide the cover forwards until it latches into place as shown in Figure 96.

P8EIP601-0
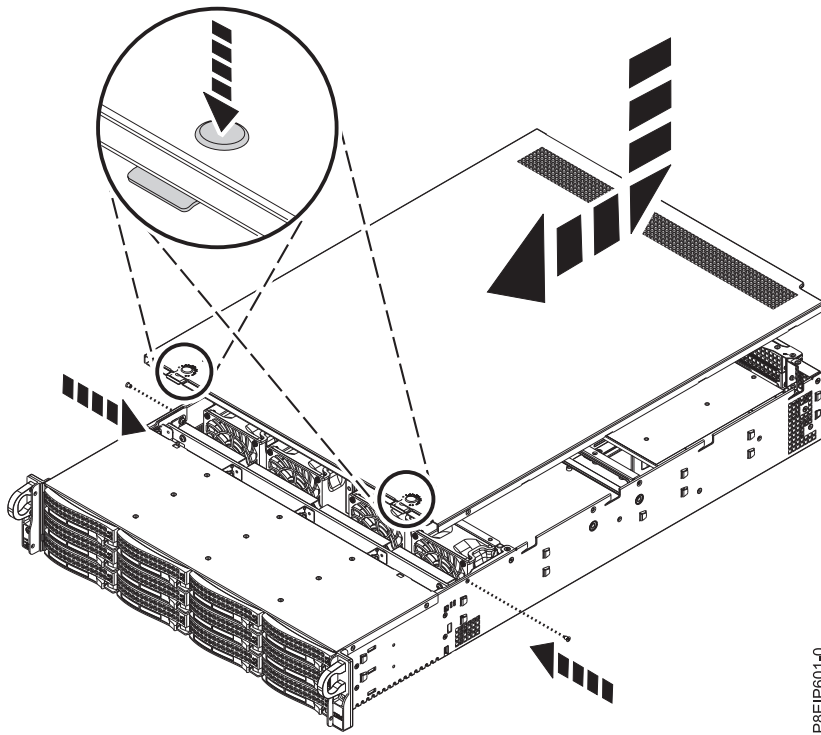
Figure 96. Replacing and securing the cover

3. Replace the two cover screws, one on each side of the cover.

Service and operating positions for 8001-22C or 8005-22N

Learn how to place an IBM Power System S822LC for Big Data (8001-22C) or the IBM CS822 (8005-22N) system into the service or operating position.

Placing an 8001-22C or 8005-22N system into the service position

Learn how to place an IBM Power System S822LC for Big Data (8001-22C) or the IBM CS822 (8005-22N) system into the service position.

Before you begin

The systems must be removed from the rails for servicing.

Notes:
- When you slide a system out of a rack, ensure that all stability plates are firmly installed to prevent the rack from toppling. Slide only one system out at a time.
- When the rails are fully extended, the rail safety latches lock into place. This action prevents the system from being pulled out too far.

Procedure

1. Lighten the system by removing all the power supplies and all the drives.
   a. Label and remove the drives, keeping track of their locations.
   b. Remove the power supplies.

2. Unlock the drive bay handle **(B)** by pushing in the handle release **(A)** as shown in Figure 97. The handle **(B)** snaps out towards you. If the handle does not snap out all the way, the drive does not slide out of the system. If the drive does not match the serial number you wrote down in the previous step, reinstall the drive in the bay you removed it from, and check the other drive bays.
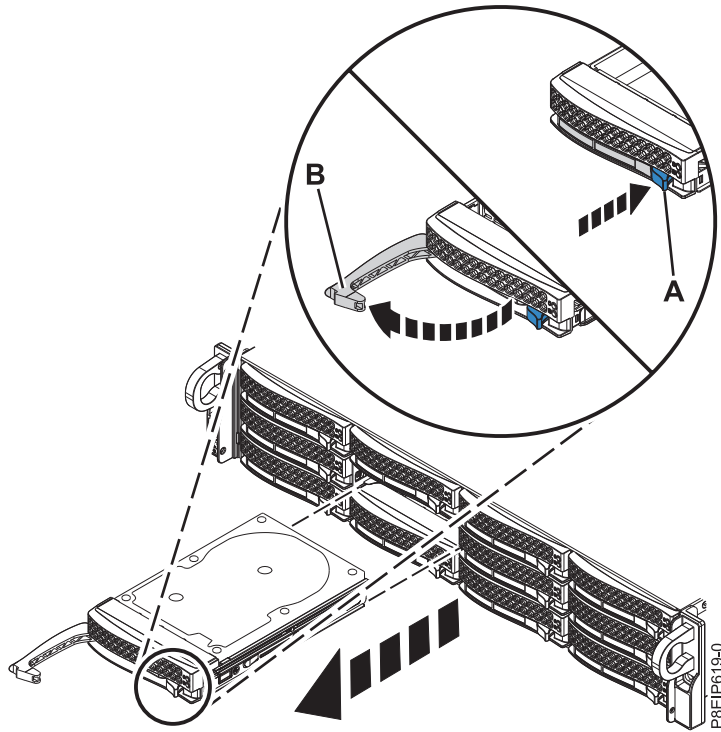
Figure 97. Removing a drive

3. Label and remove all cables from the rear of the system.
4. Remove the front screws **(A)** that secure the system to the rack from both sides of the system as shown in Figure 98 on page 93.
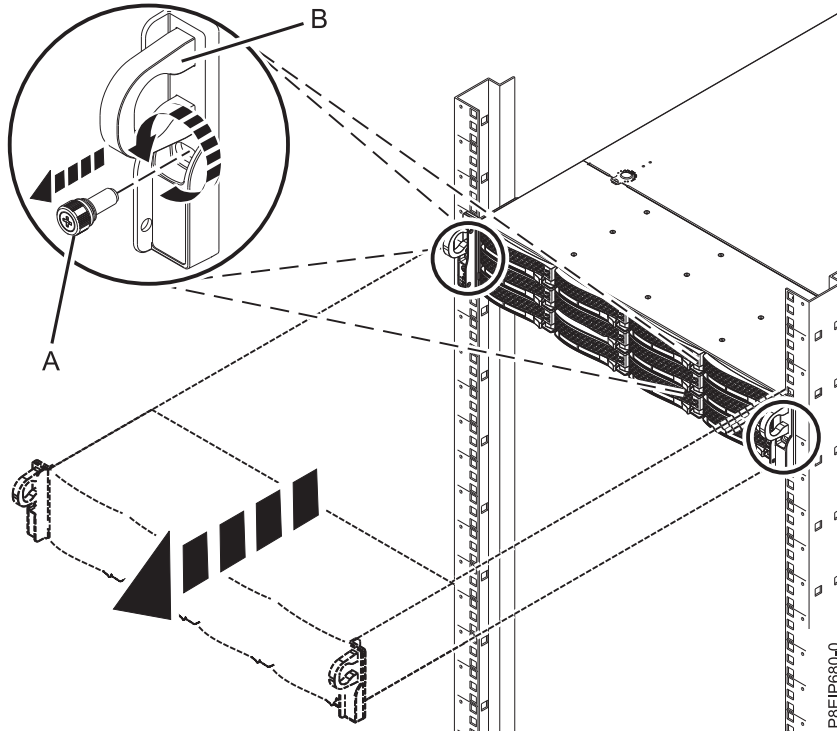
Figure 98. Removing the front screws and removing the system from the rack

5. Pull the system unit out of the rack.
6. Release the rail safety latches and remove the system from the rails.
7. Carefully set the system on a table with an appropriate ESD surface.

Placing an 8001-22C or 8005-22N system into the operating position

Learn how to place an IBM Power System S822LC for Big Data (8001-22C) or the IBM CS822 (8005-22N) system into the operating position.

Procedure

1. Lift the system from the table.
2. Tilt the system into position over the rails.
3. Carefully lower the system onto the rails.
4. Release the rail safety latches **(A)** by lifting them upward, as shown in Figure 99 on page 94, then push the system fully into the rack.
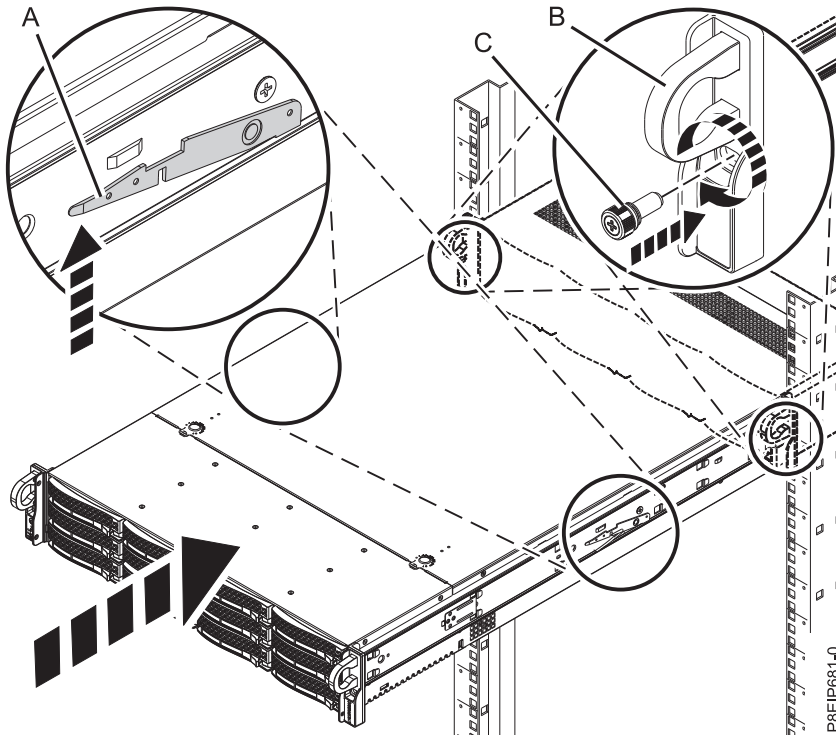
Figure 99. Placing the system into the operating position

5. Fasten the two front screws **(C)** to secure the system to the rack.
6. Using your labels, reconnect the cables at the rear of the system unit.
7. Using your labels, replace the drives in the proper locations.
8. Replace the power supplies.

Power cords

Learn how to disconnect and connect the power cords on IBM Power System S821LC (8001-12C), the IBM Power System S822LC for Big Data (8001-22C), the IBM CS821 (8005-12N), or the IBM CS822 (8005-22N) systems.

Disconnecting the power cords from an 8001-12C, 8001-22C, 8005-12N, or 8005-22N system

Learn how to disconnect the power cords from an IBM Power System S821LC (8001-12C), the IBM Power System S822LC for Big Data (8001-22C), the IBM CS821 (8005-12N), or the IBM CS822 (8005-22N) system.

Before you begin

Note: This system might be equipped with two or more power supplies. If the removing and replacing procedures require the power to be off, then ensure that all power sources to the system are disconnected.

Procedure

1. Identify the system unit that you are servicing in the rack.
2. Label and disconnect the power cords from the system unit as shown in Figure 100 on page 95.
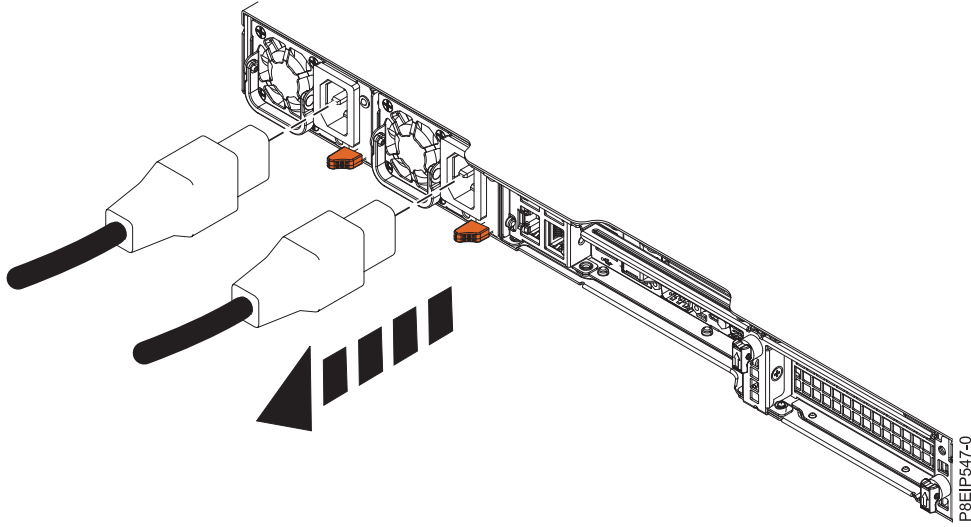
Figure 100. Removing the power cords from the system

Connecting the power cords to an 8001-12C, 8001-22C, 8005-12N, or 8005-22N system

Learn how to connect the power cords to an IBM Power System S821LC (8001-12C), the IBM Power System S822LC for Big Data (8001-22C), the IBM CS821 (8005-12N), or the IBM CS822 (8005-22N) system.

Procedure

Using your labels, reconnect the power cords to the system unit as shown in Figure 101.
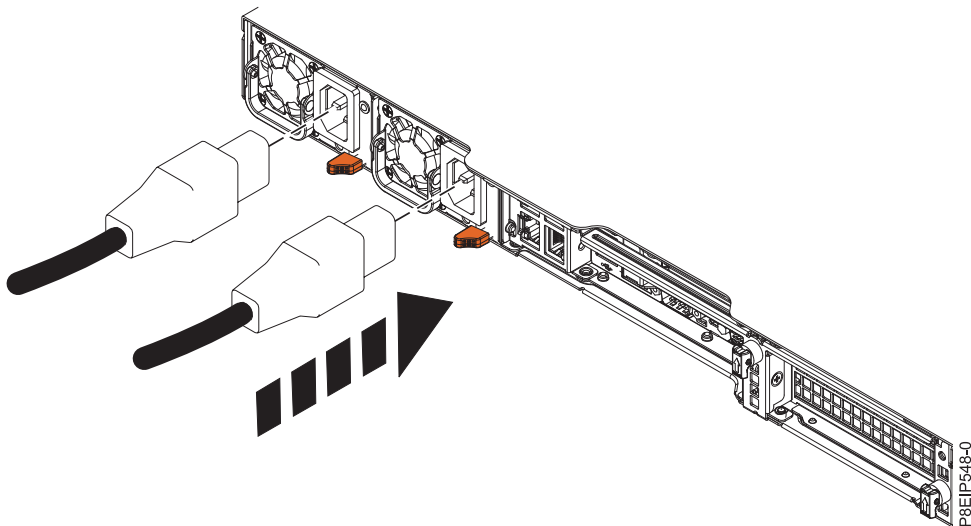
Figure 101. Connecting the power cords to the system

Additional information

Drive installation information for the 8001-22C system

Find information about the drive installation options for the IBM Power System S822LC for Big Data (8001-22C) system.

Notes for thermal limitations:

- If the 8001-22C system has no GPUs, the system can support up to twelve 3.5-inch drives. The ambient temperature must not be more than 35°C (95°F). If all twelve 3.5-inch drives are installed, the system limits the 10-core POWER8 processor to 234 W and the 8-core POWER8 processor to 204 W.
- Limitation on the number of supported drives if the 8001-22C system has one or two GPU accelerators (feature code EKAJ or EKAZ):
  - If your 8001-22C system with feature code EKB1 or EKB5 has feature code EKAJ or EKAZ, and if the system has storage adapters (feature codes EKEA or EKEB), the system can support up to eight 3.5-inch drives. The drives must be installed into the bottom two drive bay rows. The drives cannot be installed into the top drive bay row.
  - If your 8001-22C system with feature code EKB1 or EKB5 has feature code EKAJ or EKAZ, but has no storage adapters, the system can support up to six 3.5-inch drives. The drives must be installed into the bottom two drive bay rows in the leftmost positions. The drives cannot be installed into the top drive bay row nor into the rightmost positions.
  - The ambient temperature must not be more than 25°C (77°F). Reduce the maximum allowable dry-bulb temperature 1°C per 175 m above 950 m. IBM recommends a temperature range of 18°C - 27°C (64°F - 80.6°F). The system limits the 8-core POWER8 processor to 240 W.
  - The default Linux governor is "on-demand", which results in the CPU going to turbo frequency when the workload demands and the power and cooling parameters allow. The CPU can require up to 250W at turbo frequency and high utilization. For the cases described here which show less than 250W cooling capability, you might see the indicator "Performance Lags" in the system event log, when running a demanding workload in "on-demand" mode. That means that the maximum turbo frequency cannot be held all the time.

SATA Drives

The 8001-22C system with feature codes EKB1 or EKB5 can support up to eight SATA drives. The drives supported drops to six if the system has a GPU. The drives are directly connected to the SATA ports and controller on the system backplane. The SATA drives can be installed into the front drive bay locations. SATA drive cables connect the disk drive backplane to the SATA sockets on the system backplane.

Use SATA cables to connect the SATA ports on the system backplane to the SATA ports on the disk drive backplane.

You can plug SATA drive on module (DOM) drives directly into the system backplane. Use the two orange SATA connectors. If you use SATA DOM, they limit the number of front-mounted SATA drives. You can use up to two SATA DOM drives.

- If you have one SATA DOM plugged into the system backplane, you can use up to seven front-mounted SATA drives.
- If you have two SATA DOMs plugged into the system backplane, you can use up to six front-mounted SATA drives.

By adding a storage adapter, feature code EKEA or EKEB, you can have up to twelve front-mounted SATA drives. Drive cables connect to the storage adapter to eight of the front drives, and to the SATA connectors on the system backplane for the remaining four drives. Figure 102 shows the port to drive bay mapping for the disk drive backplane.

A: dotted area

Maps to mini-SAS drive connector 1 and supports the indicated drive bays 0 through 3.

B: dots and dashes area

Maps to mini-SAS drive connector 2 and supports the indicated drive bays 0 through 3.

C: dashes area

Maps to mini-SAS drive connector 3 and supports the indicated drive bays 0 through 3.
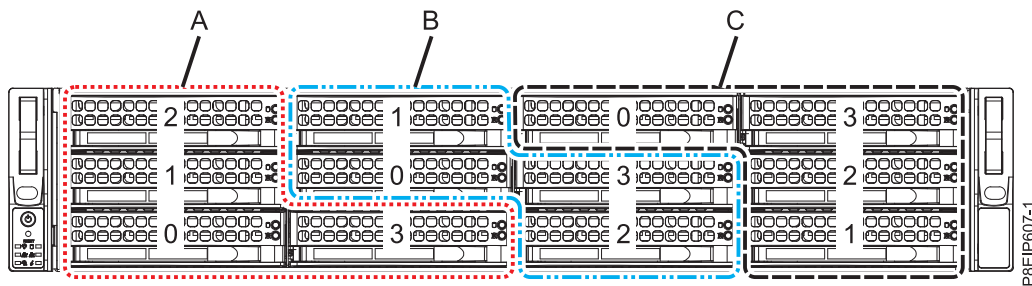
Figure 102. Port to drive bay mapping

SAS Drives

With system feature codes EKB1 or EKB5, and by using a SATA/SAS RAID adapter, the 8001-22C system can support up to eight SATA/SAS drives and four SATA drives. The drives supported drops to eight if the system has a GPU, and if two of the drives are SATA only. Adapter feature codes EKEA and EKEB each support up to eight SATA/SAS drives.

Use SAS cables to connect the SAS ports on the PCIe adapter cards to the SAS ports on the disk drive backplane.

If you are installing a RAID adapter, see the adapter documentation for information on configuring the drives.

As an example, consider the following configuration:
* No GPU
* Feature code EKEA supporting eight front-mounted SATA/SAS drives.
* Two SATA DOMs plugged into the system backplane.

NVMe Enabled System and Drives

When the system is enabled for NVMe support (feature codes EKB8 or EKB9), the system supports both SATA/SAS and NVMe drives. You can install up to twelve SATA/SAS drives using the SATA/SAS adapter. To support up to two NVMe drives, you need a feature code EKAE PCIe adapter. To support up to four NVMe drives, you need two EKAE PCIe adapters. The first two NVMe drives need to be plugged into drive locations 9 and 10 as shown in Figure 103 on page 99. The second two NVMe drives need to be plugged into locations 11 and 12.

NVMe drives are only supported on host operating systems; NVMe drives are not supported by guest operating systems. On systems with RHEL 7.3 or later, or Ubuntu 16.04 or later, NVMe drives can be

used as bootable drives. Port 1 of the internal NVMe host bus adapter must be plugged into NVMe port 1 on the disk drive backplane.
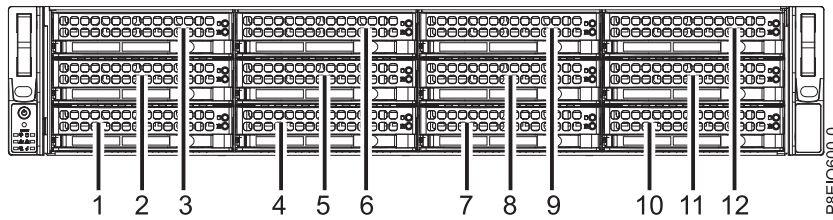
Figure 103. NVMe drives go in locations 9 through 12

.

As an example, consider the following configuration:

- No GPU
- Four NVMe front-mounted drives with two EKAE PCIe adapters.
- Eight front-mounted SATA/SAS drives. If no NVMe drives are needed, then 12 SATA/SAS drives can be plugged.
- Two SATA DOMs plugged into the system backplane.

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Accessibility features for IBM Power Systems servers

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

Overview

The IBM Power Systems servers include the following major accessibility features:
- Keyboard-only operation
- Operations that use a screen reader

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

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

Keyboard navigation

This product uses standard navigation keys.

Interface information

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

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

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

Vendor software

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

Related accessibility information

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

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

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

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Electronic emission notices

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

Class A Notices

The following Class A statements apply to the IBM servers that contain the POWER8 processor and its features unless designated as electromagnetic compatibility (EMC) Class B in the feature information.

Federal Communications Commission (FCC) Statement

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense.

Properly shielded and grounded cables and connectors must be used in order to meet FCC emission limits. IBM is not responsible for any radio or television interference caused by using other than recommended cables and connectors or by unauthorized changes or modifications to this equipment. Unauthorized changes or modifications could void the user's authority to operate the equipment.

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

Industry Canada Compliance Statement

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

European Community Compliance Statement

This product is in conformity with the protection requirements of EU Council Directive 2014/30/EU on the approximation of the laws of the Member States relating to electromagnetic compatibility. IBM cannot accept responsibility for any failure to satisfy the protection requirements resulting from a non-recommended modification of the product, including the fitting of non-IBM option cards.

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

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

VCCI Statement - Japan

この装置は、クラスA 情報技術装置です。この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。   VCCI-A

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

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

Japan Electronics and Information Technology Industries Association Statement

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

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

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

高調波電流規格　JIS C 61000-3-2 適合品

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

高調波電流規格　JIS C 61000-3-2 準用品

本装置は、「高圧又は特別高圧で受電する需要家の高調波抑制対策ガイドライン」対象機器（高調波発生機器）です。
・回路分類　：6（単相、ＰＦＣ回路付）
・換算係数　：0

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

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

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

声　明

此为 A 级产品,在生活环境中、
该产品可能会造成无线电干扰。
在这种情况下,可能需要用户对其
干扰采取切实可行的措施。

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

Electromagnetic Interference (EMI) Statement - Taiwan

警告使用者：
這是甲類的資訊產品，在
居住的環境中使用時，可
能會造成射頻干擾，在這
種情況下，使用者會被要
求採取某些適當的對策。

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

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

IBM Taiwan Contact Information:

台灣IBM 產品服務聯絡方式：
台灣國際商業機器股份有限公司
台北市松仁路7號3樓
電話：0800-016-888

Electromagnetic Interference (EMI) Statement - Korea

이 기기는 업무용 환경에서 사용할 목적으로 적합성평가를 받은 기기로서 가정용 환경에서 사용하는 경우 전파간섭의 우려가 있습니다.

Germany Compliance Statement

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

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

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

EN 55022 / EN 55032 Klasse A Geräte müssen mit folgendem Warnhinweis versehen werden: "Warnung: Dieses ist eine Einrichtung der Klasse A. Diese Einrichtung kann im Wohnbereich Funk-Störungen verursachen; in diesem Fall kann vom Betreiber verlangt werden, angemessene Maßnahmen zu ergreifen und dafür aufzukommen."

Deutschland: Einhaltung des Gesetzes über die elektromagnetische Verträglichkeit von Geräten

Dieses Produkt entspricht dem "Gesetz über die elektromagnetische Verträglichkeit von Geräten (EMVG)". Dies ist die Umsetzung der EU-Richtlinie 2014/30/EU in der Bundesrepublik Deutschland.

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

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 55022 / EN 55032 Klasse A.

Electromagnetic Interference (EMI) Statement - Russia

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

Class B Notices

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

Federal Communications Commission (FCC) Statement

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

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

If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:
• Reorient or relocate the receiving antenna.
• Increase the separation between the equipment and receiver.
• Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
• Consult an IBM-authorized dealer or service representative for help.

Properly shielded and grounded cables and connectors must be used in order to meet FCC emission limits. Proper cables and connectors are available from IBM-authorized dealers. IBM is not responsible for any radio or television interference caused by unauthorized changes or modifications to this equipment. Unauthorized changes or modifications could void the user's authority to operate this equipment.

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

Industry Canada Compliance Statement

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

European Community Compliance Statement

This product is in conformity with the protection requirements of EU Council Directive 2014/30/EU on the approximation of the laws of the Member States relating to electromagnetic compatibility. IBM cannot accept responsibility for any failure to satisfy the protection requirements resulting from a non-recommended modification of the product, including the fitting of non-IBM option cards.

European Community contact:
IBM Deutschland GmbH
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IBM-Allee 1, 71139 Ehningen, Germany
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取扱説明書に従って正しい取り扱いをして下さい。　　　　VCCI－B

Japan Electronics and Information Technology Industries Association Statement

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

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要領に基づく定格入力電力値：　Knowledge Centerの各製品の
仕様ページ参照

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

高調波電流規格　JIS C 61000-3-2 適合品

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

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

IBM Taiwan Contact Information

台灣IBM 產品服務聯絡方式：
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台北市松仁路7號3樓
電話：0800-016-888

Germany Compliance Statement

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

Dieses Produkt entspricht den Schutzanforderungen der EU-Richtlinie 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.

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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

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Tel: 914-499-1900

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Tel: +49 (0) 800 225 5426
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Generelle Informationen:

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

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