

Power Systems

Servicing the 5104-22C or 9006-22C



Note

Before using this information and the product it supports, read the information in [“Safety notices” on page v](#), [“Notices” on page 95](#), the *IBM Systems Safety Notices* manual, G229-9054, and the *IBM Environmental Notices and User Guide*, Z125-5823.

This edition applies to IBM® Power Systems servers that contain the POWER9™ processor and to all associated models.

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Safety notices

Safety notices may be printed throughout this guide:

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

World Trade safety information

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

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

German safety information

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

Laser safety information

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

Laser compliance

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



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

Electrical voltage and current from power, telephone, and communication cables are hazardous. To avoid a shock hazard: If IBM supplied the power cord(s), connect power to this unit only with the IBM provided power cord. Do not use the IBM provided power cord for any other product. Do not open or service any power supply assembly. Do not connect or disconnect any cables or perform installation, maintenance, or reconfiguration of this product during an electrical storm.



- The product might be equipped with multiple power cords. To remove all hazardous voltages, disconnect all power cords. For AC power, disconnect all power cords from their AC power source. For racks with a DC power distribution panel (PDP), disconnect the customer's DC power source to the PDP.
- When connecting power to the product ensure all power cables are properly connected. For racks with AC power, connect all power cords to a properly wired and grounded electrical outlet. Ensure that the outlet supplies proper voltage and phase rotation according to the system rating plate. For racks with a DC power distribution panel (PDP), connect the customer's DC power source to the PDP. Ensure that the proper polarity is used when attaching the DC power and DC power return wiring.
- Connect any equipment that will be attached to this product to properly wired outlets.

- When possible, use one hand only to connect or disconnect signal cables.
- Never turn on any equipment when there is evidence of fire, water, or structural damage.
- Do not attempt to switch on power to the machine until all possible unsafe conditions are corrected.
- When performing a machine inspection: 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 attempt to switch power to the machine until all possible unsafe conditions are corrected. 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.
- Connect and disconnect cables as described in the following procedures when installing, moving, or opening covers on this product or attached devices.

To Disconnect: 1) Turn off everything (unless instructed otherwise). 2) For AC power, remove the power cords from the outlets. 3) For racks with a DC power distribution panel (PDP), turn off the circuit breakers located in the PDP and remove the power from the Customer's DC power source. 4) Remove the signal cables from the connectors. 5) Remove all cables from the devices.

To Connect: 1) Turn off everything (unless instructed otherwise). 2) Attach all cables to the devices. 3) Attach the signal cables to the connectors. 4) For AC power, attach the power cords to the outlets. 5) For racks with a DC power distribution panel (PDP), restore the power from the Customer's DC power source and turn on the circuit breakers located in the PDP. 6) Turn on the devices.



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

(R001 part 1 of 2):



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

- Heavy equipment—personal injury or equipment damage might result if mishandled.
- Always lower the leveling pads on the rack cabinet.
- Always install stabilizer brackets on the rack cabinet if provided, unless the earthquake option is to be installed.
- To avoid hazardous conditions due to uneven mechanical loading, always install the heaviest devices in the bottom of the rack cabinet. Always install servers and optional devices starting from the bottom of the rack cabinet.
- Rack-mounted devices are not to be used as shelves or work spaces. Do not place objects on top of rack-mounted devices. In addition, do not lean on rack mounted devices and do not use them to stabilize your body position (for example, when working from a ladder).



- Stability hazard:
 - The rack may tip over causing serious personal injury.
 - Before extending the rack to the installation position, read the installation instructions.
 - Do not put any load on the slide-rail mounted equipment mounted in the installation position.
 - Do not leave the slide-rail mounted equipment in the installation position.
- Each rack cabinet might have more than one power cord.
 - For AC powered racks, be sure to disconnect all power cords in the rack cabinet when directed to disconnect power during servicing.

- For racks with a DC power distribution panel (PDP), turn off the circuit breaker that controls the power to the system unit(s), or disconnect the customer’s DC power source, when directed to disconnect power during servicing.
- Connect all devices installed in a rack cabinet to power devices installed in the same rack cabinet. Do not plug a power cord from a device installed in one rack cabinet into a power device installed in a different rack cabinet.
- An electrical outlet that is not correctly wired could place hazardous voltage on the metal parts of the system or the devices that attach to the system. It is the responsibility of the customer to ensure that the outlet is correctly wired and grounded to prevent an electrical shock. (R001 part 1 of 2)

(R001 part 2 of 2):



CAUTION:

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



- *(For fixed drawers.)* This drawer is a fixed drawer and must not be moved for servicing unless specified by the manufacturer. Attempting to move the drawer partially or completely out of the rack might cause the rack to become unstable or cause the drawer to fall out of the rack. (R001 part 2 of 2)



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

- Reduce the weight of the rack cabinet by removing equipment starting at the top of the rack cabinet. When possible, restore the rack cabinet to the configuration of the rack cabinet as you received it. If this configuration is not known, you must observe the following precautions:
 - Remove all devices in the 32U position and above.
 - Ensure that the heaviest devices are installed in the bottom of the rack cabinet.

- Ensure that there are little-to-no empty U-levels between devices installed in the rack cabinet below the 32U level, unless the received configuration specifically allowed it.
- If the rack cabinet you are relocating is part of a suite of rack cabinets, detach the rack cabinet from the suite.
- If the rack cabinet you are relocating was supplied with removable outriggers they must be reinstalled before the cabinet is relocated.
- Inspect the route that you plan to take to eliminate potential hazards.
- Verify that the route that you choose can support the weight of the loaded rack cabinet. Refer to the documentation that comes with your rack cabinet for the weight of a loaded rack cabinet.
- Verify that all door openings are at least 760 x 2083 mm (30 x 82 in.).
- Ensure that all devices, shelves, drawers, doors, and cables are secure.
- Ensure that the four leveling pads are raised to their highest position.
- Ensure that there is no stabilizer bracket installed on the rack cabinet during movement.
- Do not use a ramp inclined at more than 10 degrees.
- When the rack cabinet is in the new location, complete the following steps:
 - Lower the four leveling pads.
 - Install stabilizer brackets on the rack cabinet or in an earthquake environment bolt the rack to the floor.
 - If you removed any devices from the rack cabinet, repopulate the rack cabinet from the lowest position to the highest position.
- If a long-distance relocation is required, restore the rack cabinet to the configuration of the rack cabinet as you received it. Pack the rack cabinet in the original packaging material, or equivalent. Also lower the leveling pads to raise the casters off of the pallet and bolt the rack cabinet to the pallet.

(R002)

(L001)



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

(L002)



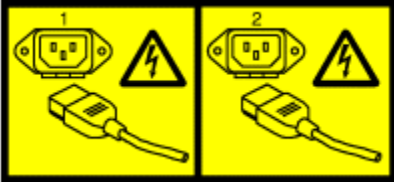
DANGER: Rack-mounted devices are not to be used as shelves or work spaces. Do not place objects on top of rack-mounted devices. In addition, do not lean on rack-mounted devices and do not use them to stabilize your body position (for example, when working from a ladder). Stability hazard:

- The rack may tip over causing serious personal injury.
- Before extending the rack to the installation position, read the installation instructions.

- Do not put any load on the slide-rail mounted equipment mounted in the installation position.
- Do not leave the slide-rail mounted equipment in the installation position.

(L002)

(L003)



or



or

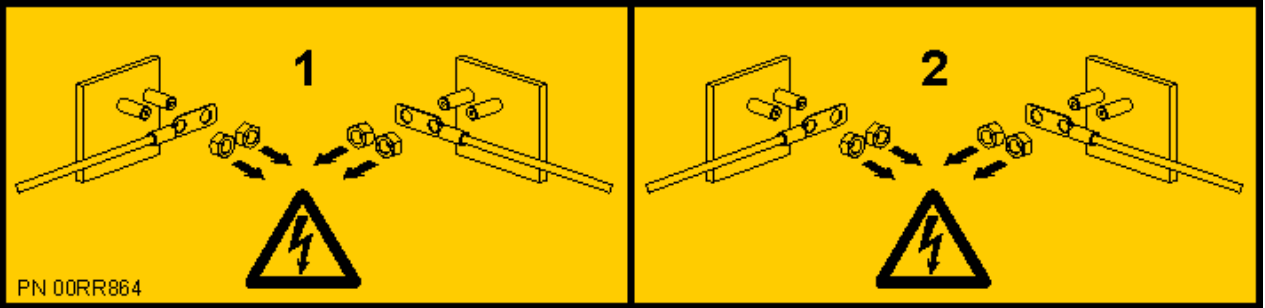



or



or






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


(L007)




 **CAUTION:** A hot surface nearby. (L007)

(L008)



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

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

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

- Do not remove the covers. Removing the covers of the laser product could result in exposure to hazardous laser radiation. There are no serviceable parts inside the device.
- Use of the controls or adjustments or performance of procedures other than those specified herein might result in hazardous radiation exposure.

(C026)



CAUTION: Data processing environments can contain equipment transmitting on system links with laser modules that operate at greater than Class 1 power levels. For this reason, never look into the end of an optical fiber cable or open receptacle. Although shining light into one end and looking into the other end of a disconnected optical fiber to verify the continuity of optic fibers may not injure the eye, this procedure is potentially dangerous. Therefore, verifying the continuity of optical fibers by shining light into one end and looking at the other end is not recommended. To verify continuity of a fiber optic cable, use an optical light source and power meter. (C027)



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



CAUTION: Some laser products contain an embedded Class 3A or Class 3B laser diode. Note the following information:

- Laser radiation when open.
- Do not stare into the beam, do not view directly with optical instruments, and avoid direct exposure to the beam. (C030)

(C030)



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

Do Not:

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

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



CAUTION: Regarding IBM provided VENDOR LIFT TOOL:

- Operation of LIFT TOOL by authorized personnel only.
- LIFT TOOL intended for use to assist, lift, install, remove units (load) up into rack elevations. It is not to be used loaded transporting over major ramps nor as a replacement for such designated tools like pallet jacks, walkies, fork trucks and such related relocation practices. When this is not practicable, specially trained persons or services must be used (for instance, riggers or movers).
- Read and completely understand the contents of LIFT TOOL operator's manual before using. Failure to read, understand, obey safety rules, and follow instructions may result in property damage and/or personal injury. If there are questions, contact the vendor's service and support. Local paper manual must remain with machine in provided storage sleeve area. Latest revision manual available on vendor's web site.
- Test verify stabilizer brake function before each use. Do not over-force moving or rolling the LIFT TOOL with stabilizer brake engaged.
- Do not raise, lower or slide platform load shelf unless stabilizer (brake pedal jack) is fully engaged. Keep stabilizer brake engaged when not in use or motion.
- Do not move LIFT TOOL while platform is raised, except for minor positioning.
- Do not exceed rated load capacity. See LOAD CAPACITY CHART regarding maximum loads at center versus edge of extended platform.
- Only raise load if properly centered on platform. Do not place more than 200 lb (91 kg) on edge of sliding platform shelf also considering the load's center of mass/gravity (CoG).
- Do not corner load the platforms, tilt riser, angled unit install wedge or other such accessory options. Secure such platforms -- riser tilt, wedge, etc options to main lift shelf or forks in all four (4x or all other provisioned mounting) locations with provided hardware only, prior to use. Load objects are designed to slide on/off smooth platforms without appreciable force, so take care not

to push or lean. Keep riser tilt [adjustable angling platform] option flat at all times except for final minor angle adjustment when needed.

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

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

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

The equipment is suitable for installation in the following:

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

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

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

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

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

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

Removing and replacing parts in the 5104-22C or 9006-22C

Use these procedures to remove and replace failing parts in the system.

Note: See the [International Information Bulletin for Customers - Installation of IBM Machines](http://www.ibm.com/e-business/linkweb/publications/servlet/pbi.wss) (<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. Parts must be replaced with the identical part in the exact same place.
2. 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).
3. Review the installation or replacement procedure for the feature or part.
4. The color **blue** on the part indicates a touch point.
5. Ensure that you have access to a medium, flat-blade screwdriver, and a Phillips screwdriver.
6. 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.
- When performing a machine inspection: 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 attempt to switch power to the machine until all possible unsafe conditions are corrected. 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.

- 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 part removal or installation might result in part 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 disk drive in the 5104-22C or 9006-22C

Learn how to remove and replace a disk drive in the system.

Removing a disk drive from the 5104-22C or 9006-22C system

To remove a disk drive from the system, complete the steps in this procedure.

Before you begin

You can remove and replace disk drives with the system powered on and running.

Parts must be replaced with the identical part in the exact same place.

Procedure

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

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



Attention:

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

To list the logical drives and device configurations, use the following `arcconf` command.

```
arcconf getconfig 1
```

Note the Channel and Device numbers of the desired drive. Also note the serial number of the drive. In the following example, the channel number is 0 and the device number is 11.

```
Reported Channel,Device(T:L) : 0,11(11:0)
```

Identify the fault LED on the drive using the following command:

```
arcconf identify 1 device 0 2
```

Take the drive off line. Run the following `arcconf setstate` command that uses the Channel and Device numbers from the `arcconf getconfig` command:

```
arcconf setstate 1 device 0 11 ddd
```

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.

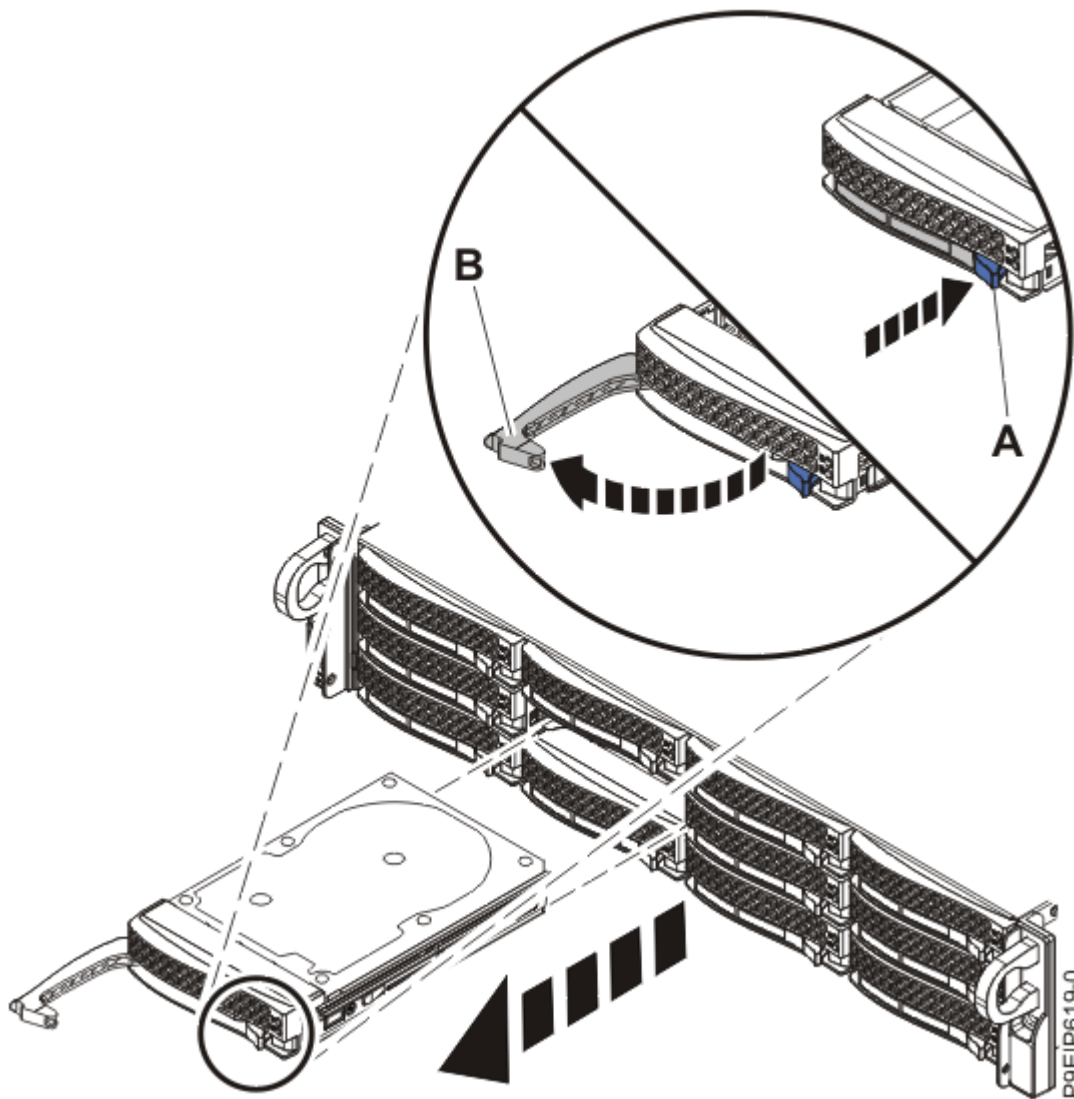


Figure 1. Removing a front drive

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 the drive does not match the serial number you wrote down in a previous step, reinstall the drive in the bay you removed it from, and check the other drive bays.
6. Remove a drive from the tray.

Unfasten the drive from the sides of the tray by removing the screws (two or three on each side), as shown in [Figure 2](#) on [page 5](#).

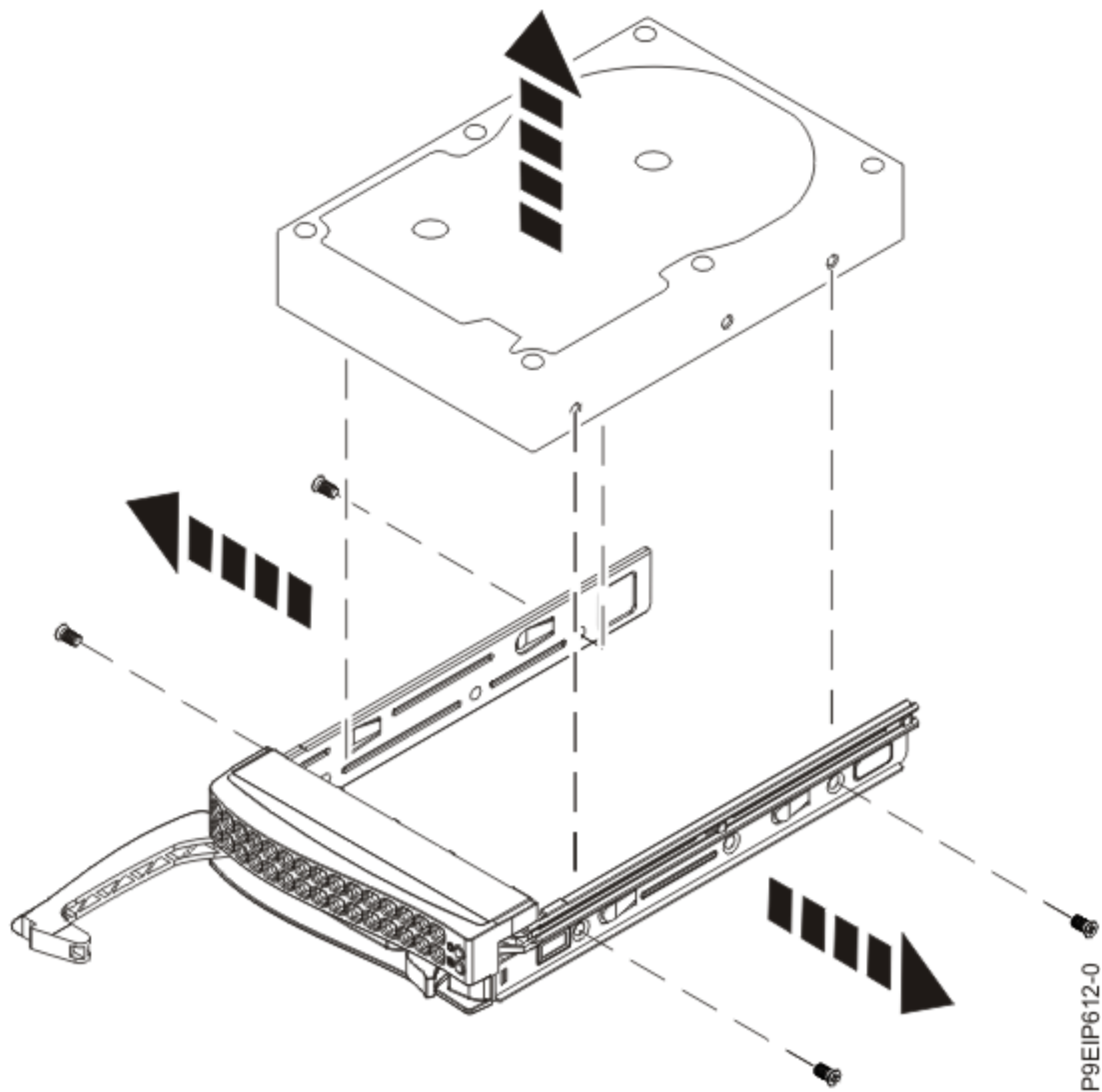


Figure 2. Removing the 3.5-inch drive from the tray

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

Replacing a disk drive in the 5104-22C or 9006-22C system

To replace a disk drive in the system, complete the steps in this procedure.

Procedure

1. Ensure that you have the electrostatic discharge (ESD) wrist strap on and that the ESD clip is plugged into a ground jack or connected to an unpainted metal surface. If not, do so now.
2. Install a drive into the tray.

Orient the drive such that the connectors are pointing to the rear of the drive tray. See [Figure 3 on page 6](#). Fasten the drive to the sides of the tray with the screws (two or three screws on each side), depending on the number of threaded holes present on the drive. If the number of threaded holes is greater than the number of screws that are available, use the threaded holes that are closest to each end of the drive.

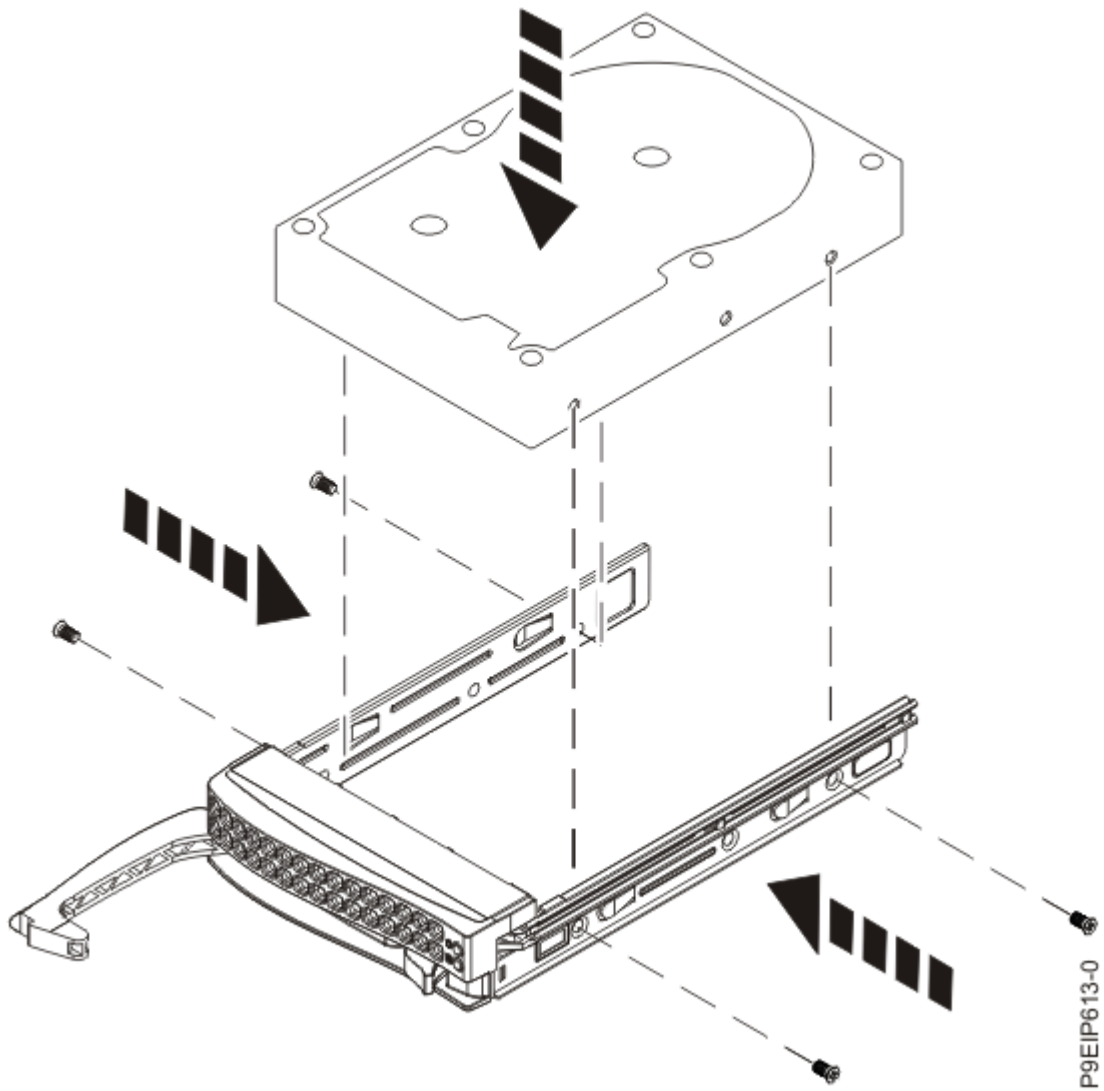


Figure 3. Mounting the 3.5-inch drive in the tray

3. Ensure that the drive handle is open. Support the drive by the bottom as you position the drive, and insert it into the drive slot.

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 4](#) on page 7.

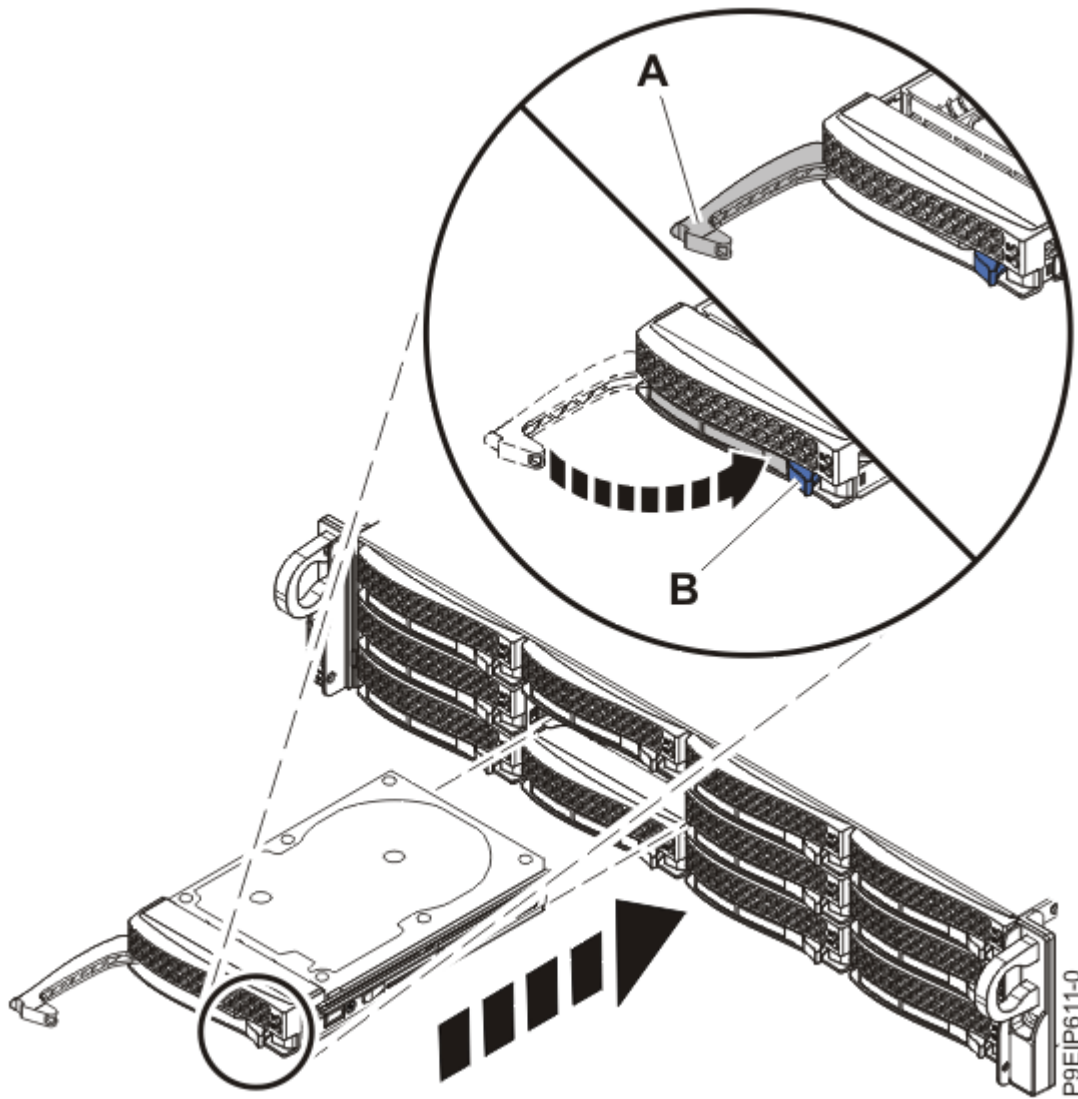


Figure 4. Disk drive lock detail

5. For a non-RAID drive, configure the installed drive for your environment. If the drive is part of a RAID configuration, skip this step, the drive is detected and configured when inserted.

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 RHEL version 7.2 operating system, log in to the system as the root user, and run the following 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 refer to: [Adding a Storage Device or Path \(https://access.redhat.com/documentation/en-US/Red_Hat_Enterprise_Linux/7/html/Storage_Administration_Guide/logical-unit-add-remove.html\)](https://access.redhat.com/documentation/en-US/Red_Hat_Enterprise_Linux/7/html/Storage_Administration_Guide/logical-unit-add-remove.html).

6. Load or restore data from your backup media.

Removing and replacing a disk drive backplane in the 5104-22C or 9006-22C

Learn how to remove and replace a disk drive backplane in the system.

About this task

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

Removing the front disk drive backplane from the 5104-22C or 9006-22C

Learn how to remove the front disk drive backplane in the system.

Before you begin

Power off the system and place it in the service position. For instructions, see [“Preparing the 5104-22C, 9006-22C, or 9006-22P system to remove and replace internal parts” on page 77](#).

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.

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



Attention:

- Attach an electrostatic discharge (ESD) wrist strap to the front ESD jack, to the rear ESD jack, or to an unpainted metal surface of your hardware to prevent the electrostatic discharge from damaging your hardware.
 - When you use an ESD wrist strap, follow all electrical safety procedures. An ESD wrist strap is used for static control. It does not increase or decrease your risk of receiving electric shock when using or working on electrical equipment.
 - If you do not have an ESD wrist strap, just prior to removing the product from ESD packaging and installing or replacing hardware, touch an unpainted metal surface of the system for a minimum of 5 seconds. If at any point in this service process you move away from the system, it is important to again discharge yourself by touching an unpainted metal surface for at least 5 seconds before you continue with the service process.
2. Remove the processor air baffle.
Carefully unsnap and lift the processor air baffle from the system.
 3. Remove the fans.
For instructions, see [“Removing a system fan from the 5104-22C or 9006-22C” on page 14](#).

4. As appropriate, label and remove the drive signal cables **(A)** and **(D)** as shown in [Figure 5](#) on page 9. Label and remove the drive power cables **(C)** from the system backplane. Using your thumb, press the release latch on the connector to unplug the cable.

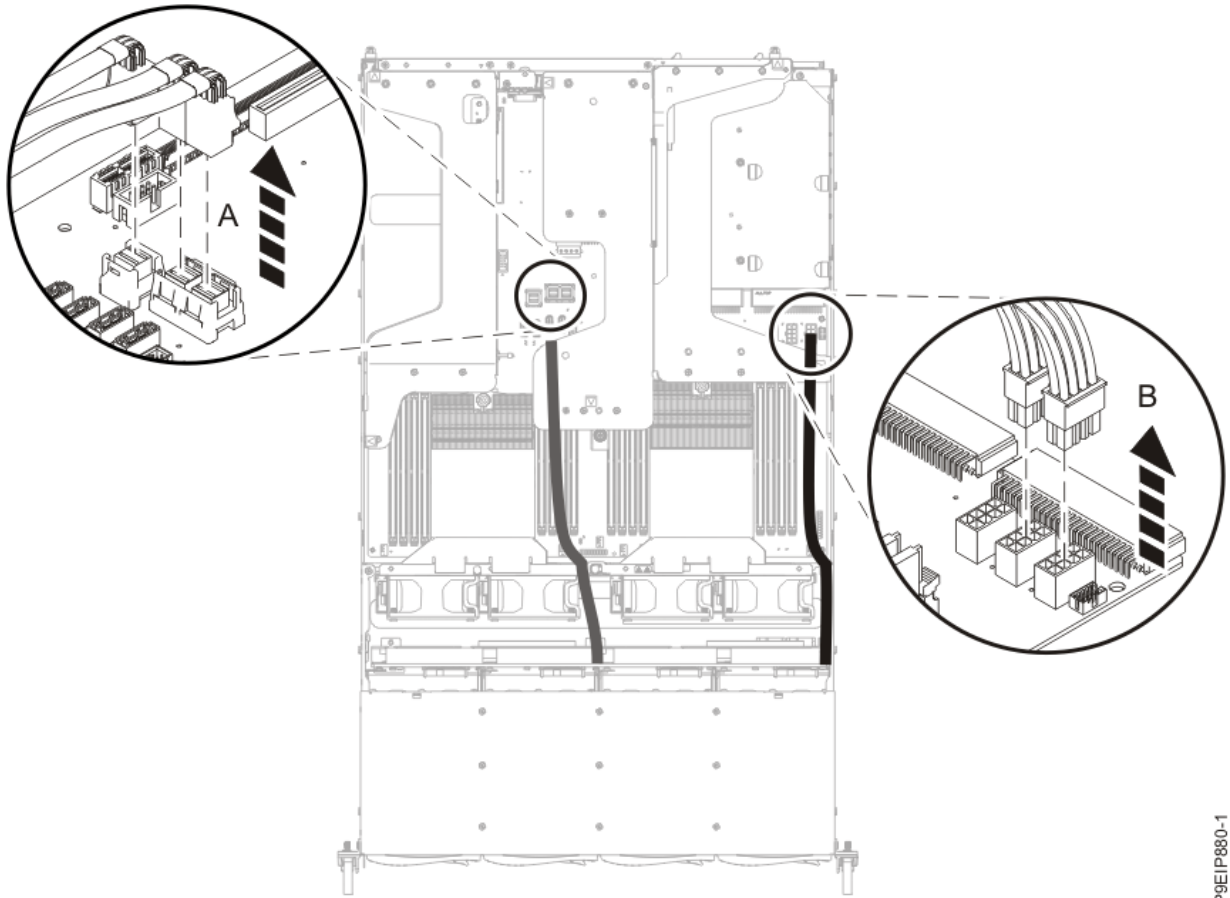
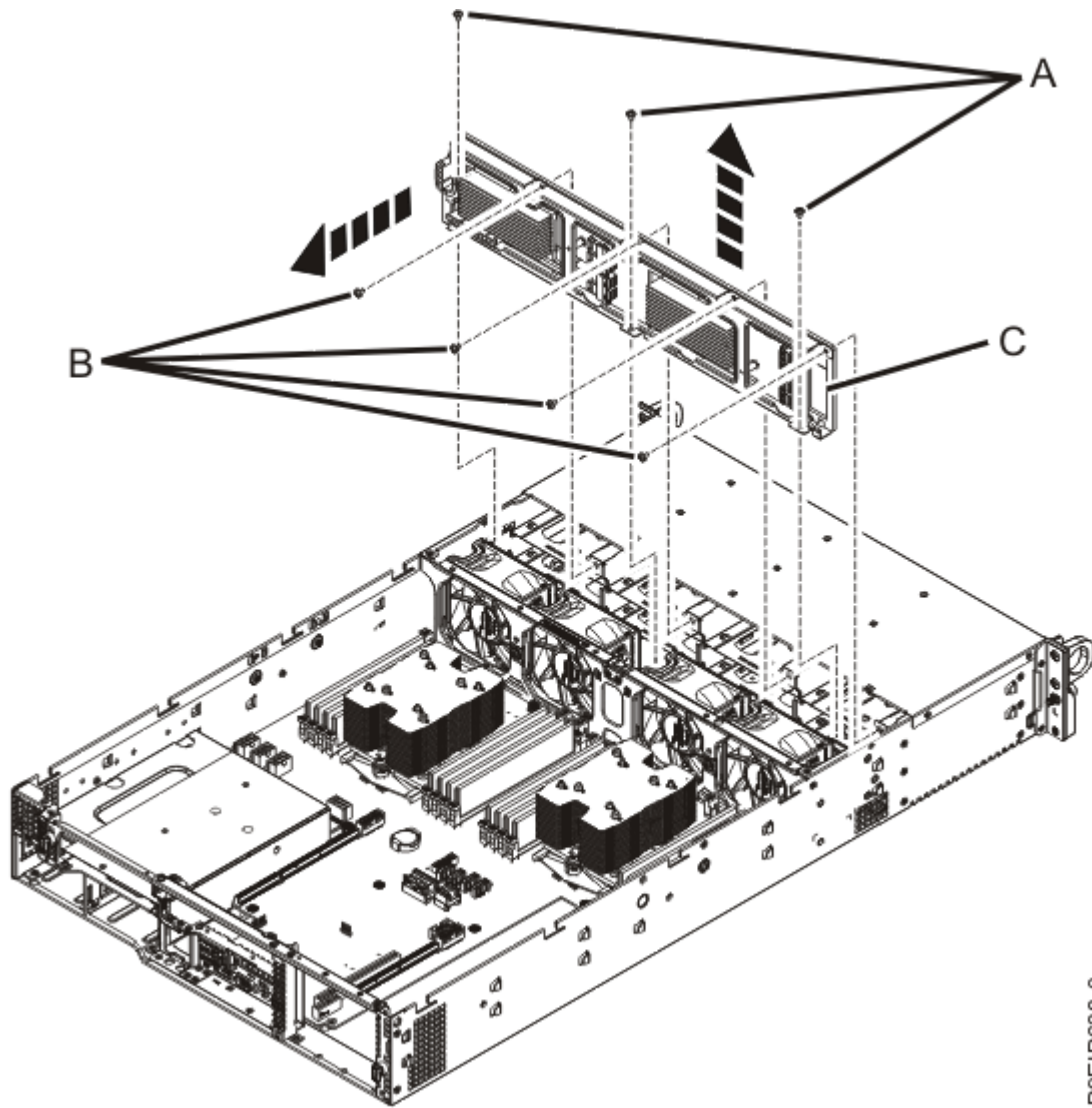


Figure 5. Disconnecting the drive signal cables the drive power cables

5. 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 5104-22C or 9006-22C system”](#) on page 2.
6. Label and remove the seven screws **(A, B)** and the disk drive backplane **(C)** as shown in [Figure 6](#) on page 10.
- (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)** indicates the four top screws.
 - Lift the disk drive backplane straight out from the chassis as shown in [Figure 6](#) on page 10.

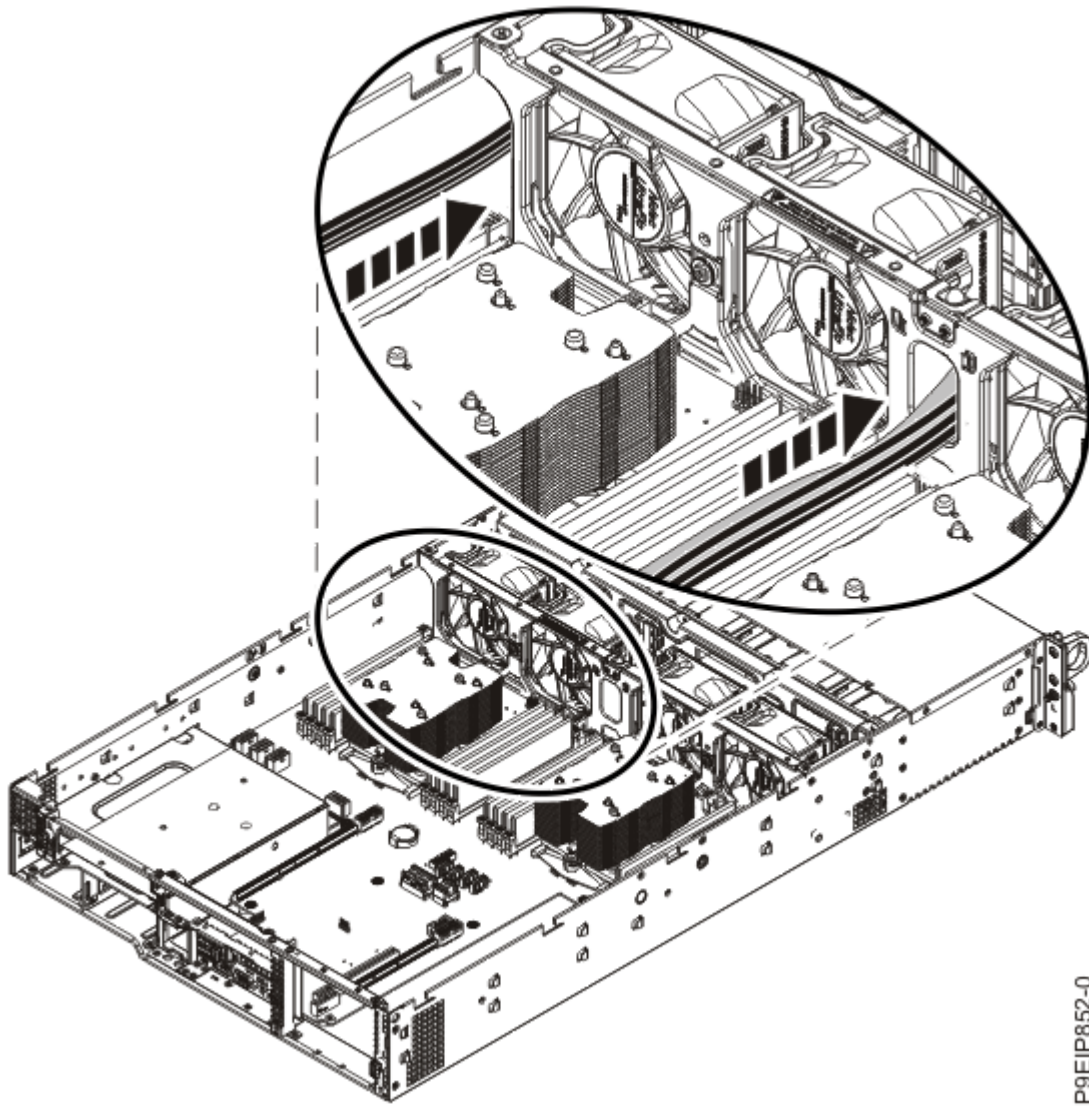
P9EIP880-1



P9EIP638-0

Figure 6. Removing the disk drive backplane and screws

7. Carefully pass the drive signal cables and drive power cables through the chassis to remove them as shown in [Figure 7 on page 11](#).



P9EIP852-0

Figure 7. Removing the disk drive backplane cables

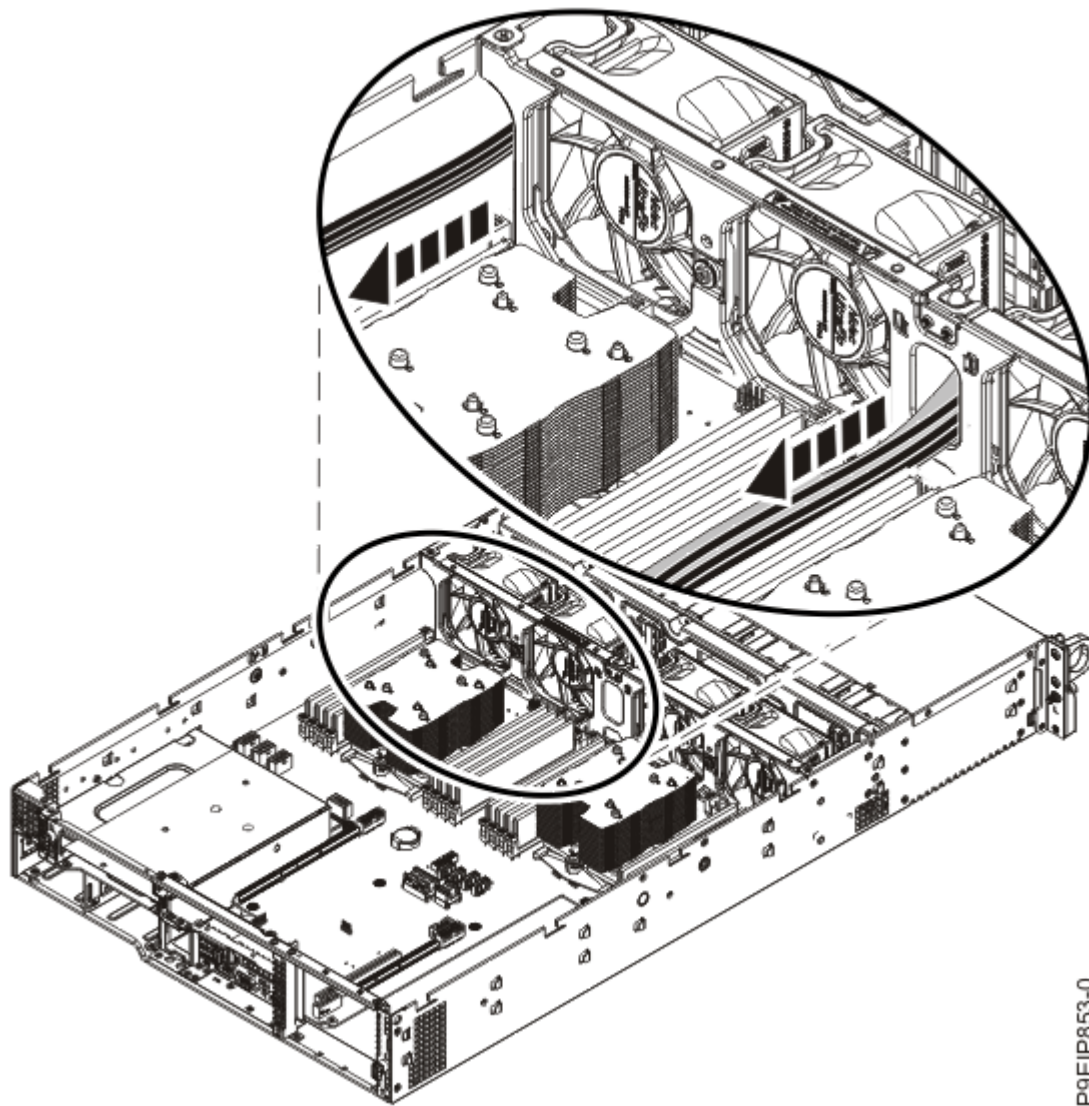
8. Place the disk drive backplane and cables on an ESD surface.

Replacing the front disk drive backplane in the 5104-22C or 9006-22C

Learn how to replace the front disk drive backplane in the system.

Procedure

1. Ensure that you have the electrostatic discharge (ESD) wrist strap on and that the ESD clip is plugged into a ground jack or connected to an unpainted metal surface. If not, do so now.
2. Remove the replacement disk drive backplane and cables from the protective plastic envelope.
3. Ensure that the jumper settings on the new disk drive backplane match the jumper settings disk drive backplane that you are replacing.
4. Move the drive cables from to old disk drive backplane to the new disk drive backplane.
5. Carefully pass the drive power cables and drive signal cables through the chassis to install them as shown in [Figure 8 on page 12](#).



P9EIP853-0

Figure 8. Installing the drive cables

6. Carefully lower the disk drive backplane **(A)** straight into the chassis, as shown in [Figure 9 on page 13](#), so that the screw holes align.

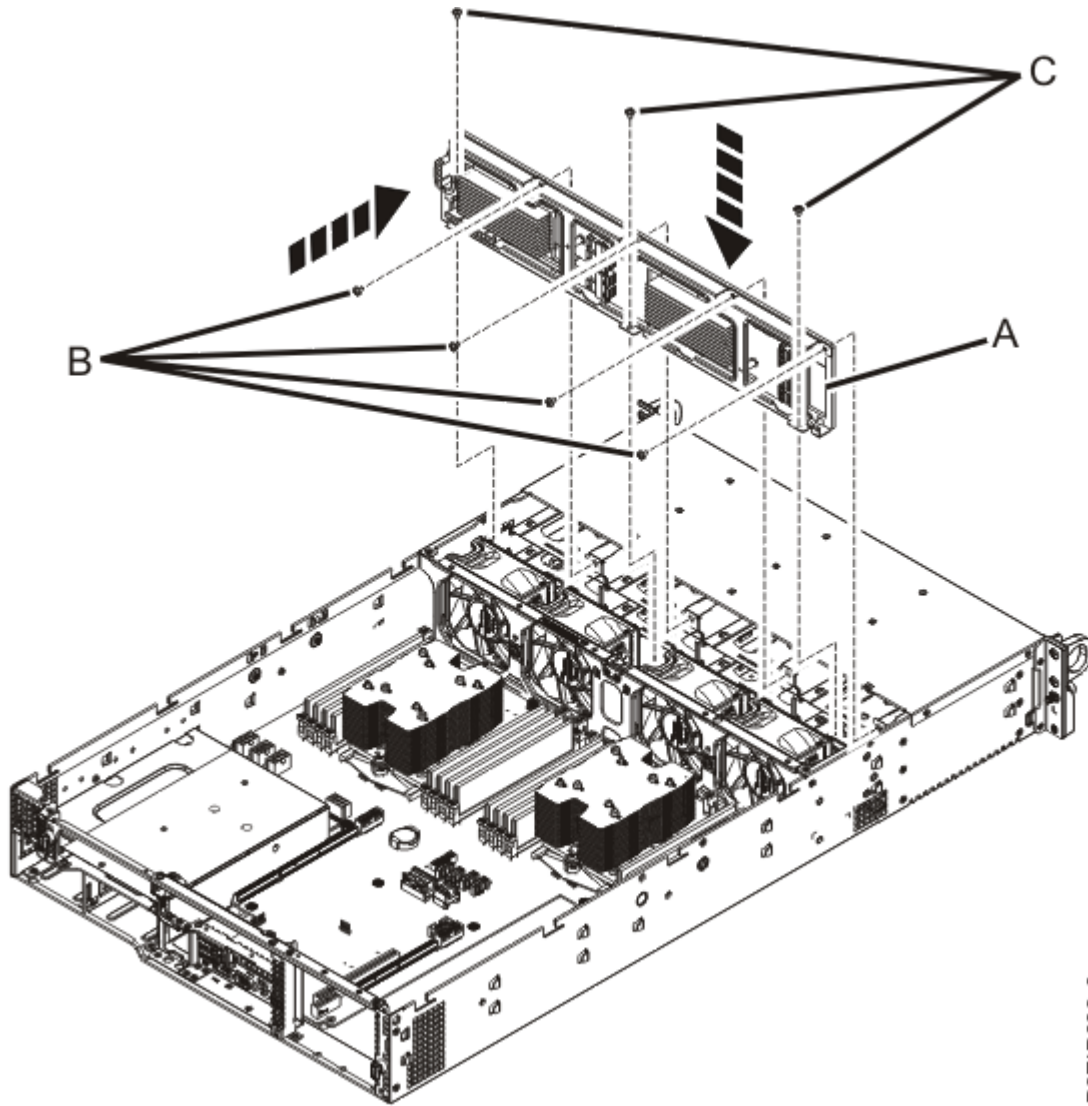
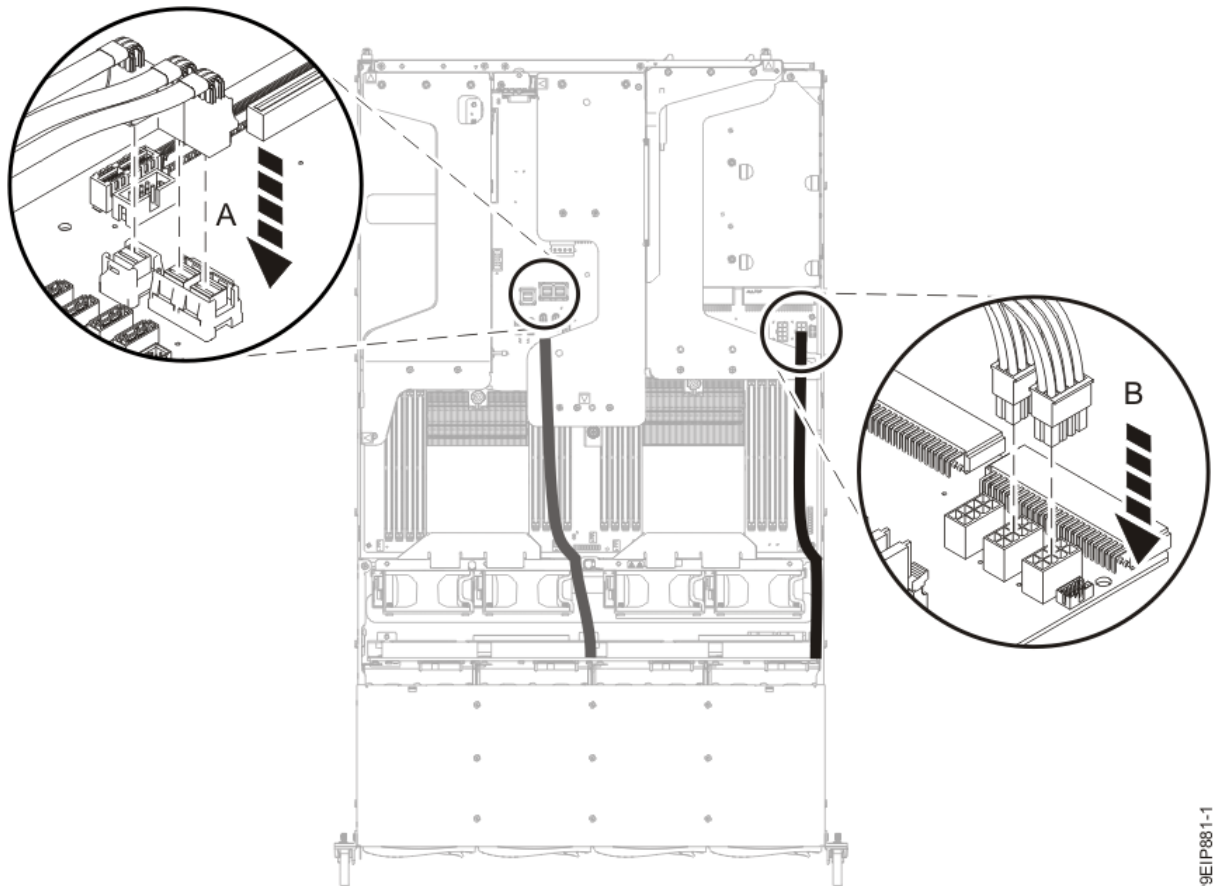


Figure 9. Installing the disk drive backplane and screws

7. Using your labels, replace the seven screws **(A, B)** that secure the disk drive backplane to the chassis as shown in [Figure 9](#) on page 13.
 - 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.
8. Fully insert the front drive trays.
For instructions, see [“Replacing a disk drive in the 5104-22C or 9006-22C system”](#) on page 5.
9. Using your labels, replace the drive signal cables **(A)** and **(D)** as shown in [Figure 10](#) on page 14. Using your labels, replace, the drive power cables **(C)**, into the system backplane .



P9EIP881-1

Figure 10. Connecting the drive signal cables and the drive power cables

10. Replace the fans.

For instructions, see [“Replacing a system fan in the 5104-22C or 9006-22C”](#) on page 16.

11. Install the processor air baffle.

Insert the edge of the air baffle into the fan support. Then, carefully press the air baffle down into place.

What to do next

Prepare the system for operation. For instructions, see [“Preparing the 5104-22C, 9006-22C, or 9006-22P system for operation after you remove and replace internal parts”](#) on page 80.

Removing and replacing fans in the 5104-22C or 9006-22C

Learn how to remove and replace the fans in the system.

Removing a system fan from the 5104-22C or 9006-22C

To remove the fans in the system, complete the steps in this procedure.

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 5104-22C, 9006-22C, or 9006-22P system to remove and replace internal parts”](#) on page 77.

Parts must be replaced with the identical part in the exact same place.

Procedure

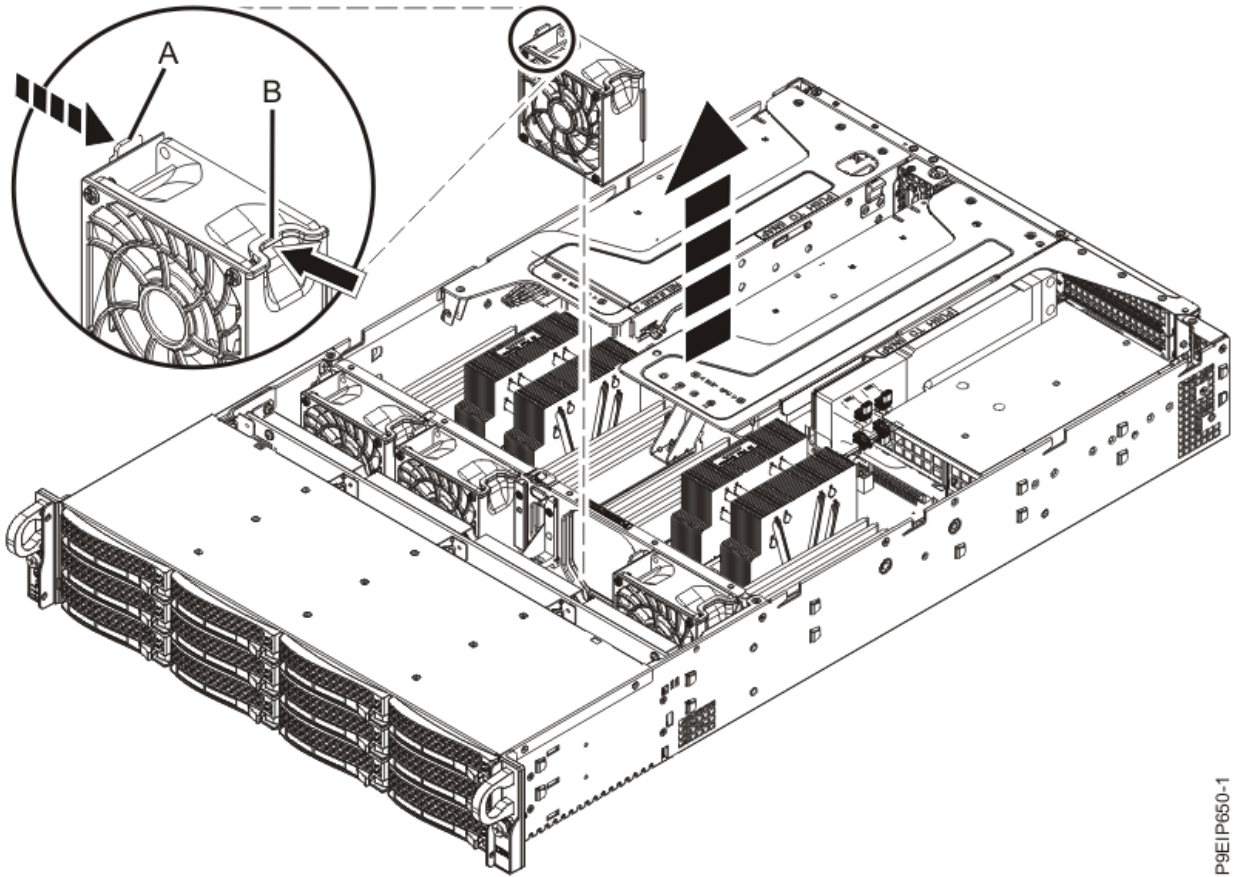
1. Attach the electrostatic discharge (ESD) wrist strap.

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



Attention:

- Attach an electrostatic discharge (ESD) wrist strap to the front ESD jack, to the rear ESD jack, or to an unpainted metal surface of your hardware to prevent the electrostatic discharge from damaging your hardware.
 - When you use an ESD wrist strap, follow all electrical safety procedures. An ESD wrist strap is used for static control. It does not increase or decrease your risk of receiving electric shock when using or working on electrical equipment.
 - If you do not have an ESD wrist strap, just prior to removing the product from ESD packaging and installing or replacing hardware, touch an unpainted metal surface of the system for a minimum of 5 seconds. If at any point in this service process you move away from the system, it is important to again discharge yourself by touching an unpainted metal surface for at least 5 seconds before you continue with the service process.
2. Remove the processor air baffle.
Carefully unsnap and lift the processor air baffle from the system.
 3. Press in the latch at **(A)**, grasp the fan at **(B)**, and lift the fan from the system as shown in [Figure 11](#) on [page 16](#).



P9EIP650-1

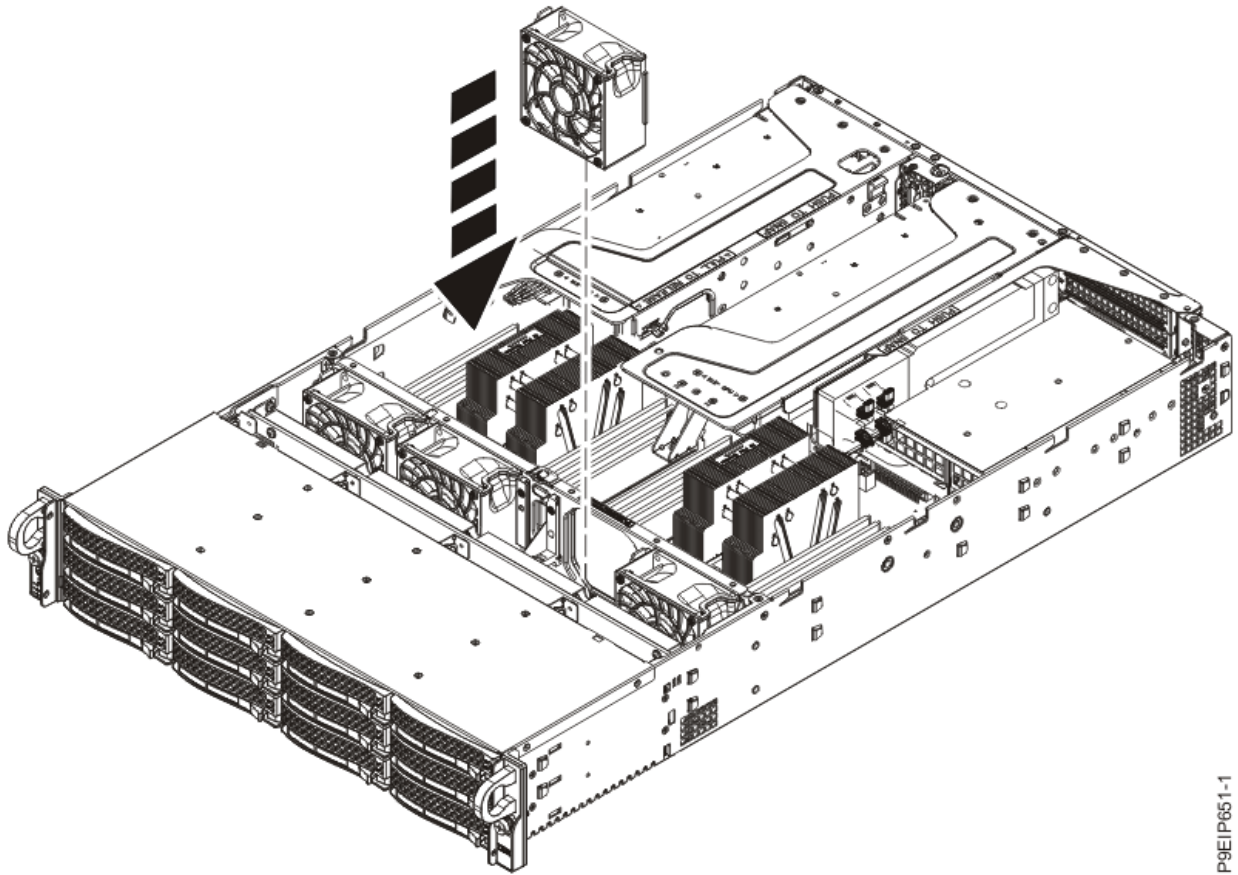
Figure 11. Removing a fan

Replacing a system fan in the 5104-22C or 9006-22C

To replace the fans in the system, complete the steps in this procedure.

Procedure

1. Ensure that you have the electrostatic discharge (ESD) wrist strap on and that the ESD clip is plugged into a ground jack or connected to an unpainted metal surface. If not, do so now.
2. Lower the fan into the system and align the fan with the slots in the fan holder as shown in [Figure 12](#) on [page 17](#). Press the fan down until it snaps into place.



P9EIP651-1

Figure 12. Replacing the fan

3. Install the processor air baffle.

Insert the edge of the air baffle into the fan support. Then, carefully press the air baffle down into place.

What to do next

Prepare the system for operation. For instructions, see [“Preparing the 5104-22C, 9006-22C, or 9006-22P system for operation after you remove and replace internal parts”](#) on page 80.

Removing and replacing memory in the 5104-22C or 9006-22C

To remove and replace memory in the system, complete the steps in this procedure.

Before you begin

Power off the system and place it in the service position. For instructions, see [“Preparing the 5104-22C, 9006-22C, or 9006-22P system to remove and replace internal parts”](#) on page 77.

Parts must be replaced with the identical part in the exact same place.

Procedure

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

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



Attention:

- Attach an electrostatic discharge (ESD) wrist strap to the front ESD jack, to the rear ESD jack, or to an unpainted metal surface of your hardware to prevent the electrostatic discharge from damaging your hardware.
 - When you use an ESD wrist strap, follow all electrical safety procedures. An ESD wrist strap is used for static control. It does not increase or decrease your risk of receiving electric shock when using or working on electrical equipment.
 - If you do not have an ESD wrist strap, just prior to removing the product from ESD packaging and installing or replacing hardware, touch an unpainted metal surface of the system for a minimum of 5 seconds. If at any point in this service process you move away from the system, it is important to again discharge yourself by touching an unpainted metal surface for at least 5 seconds before you continue with the service process.
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.
 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 13 on page 18. 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.

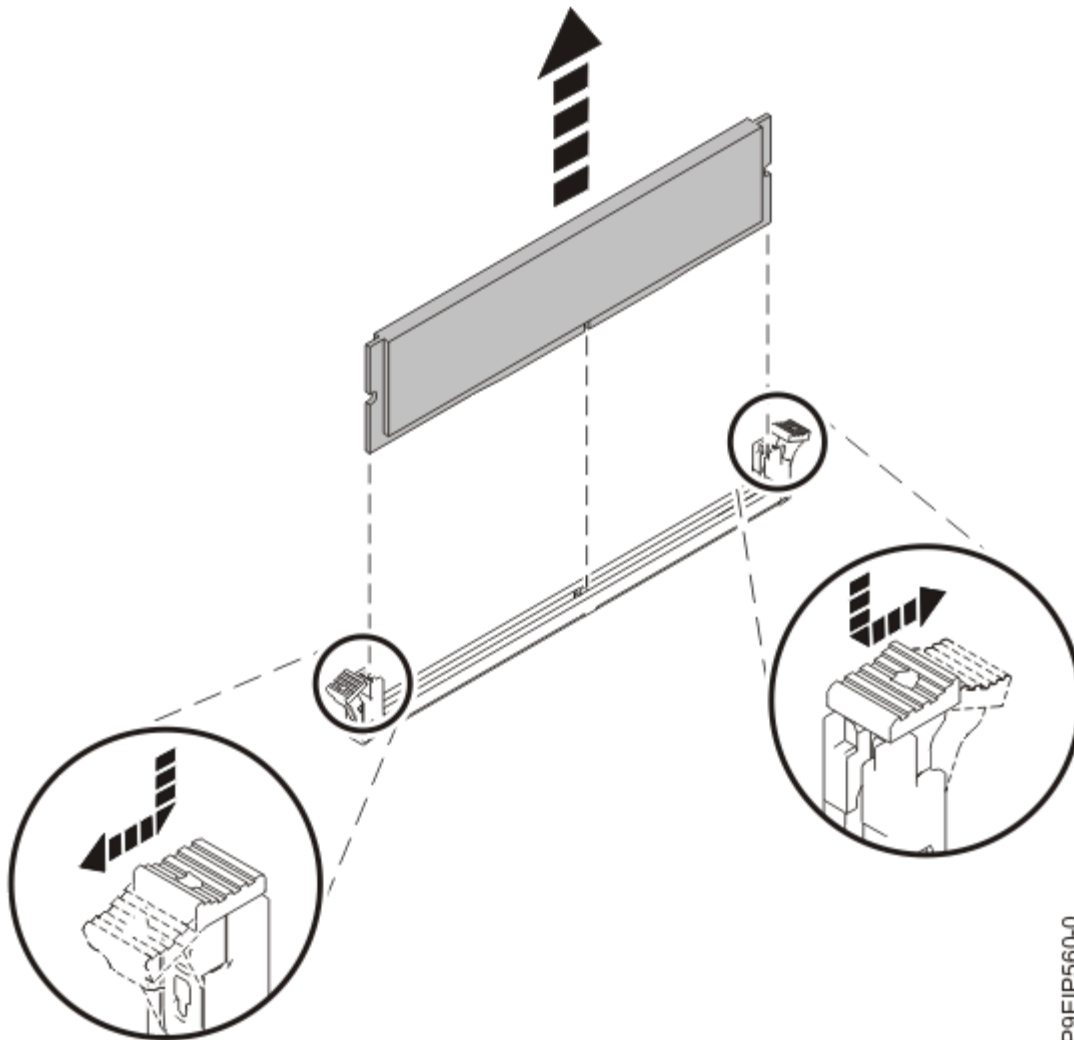


Figure 13. Removing the memory

4. Insert the memory DIMM.

P9EIP560-0

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.

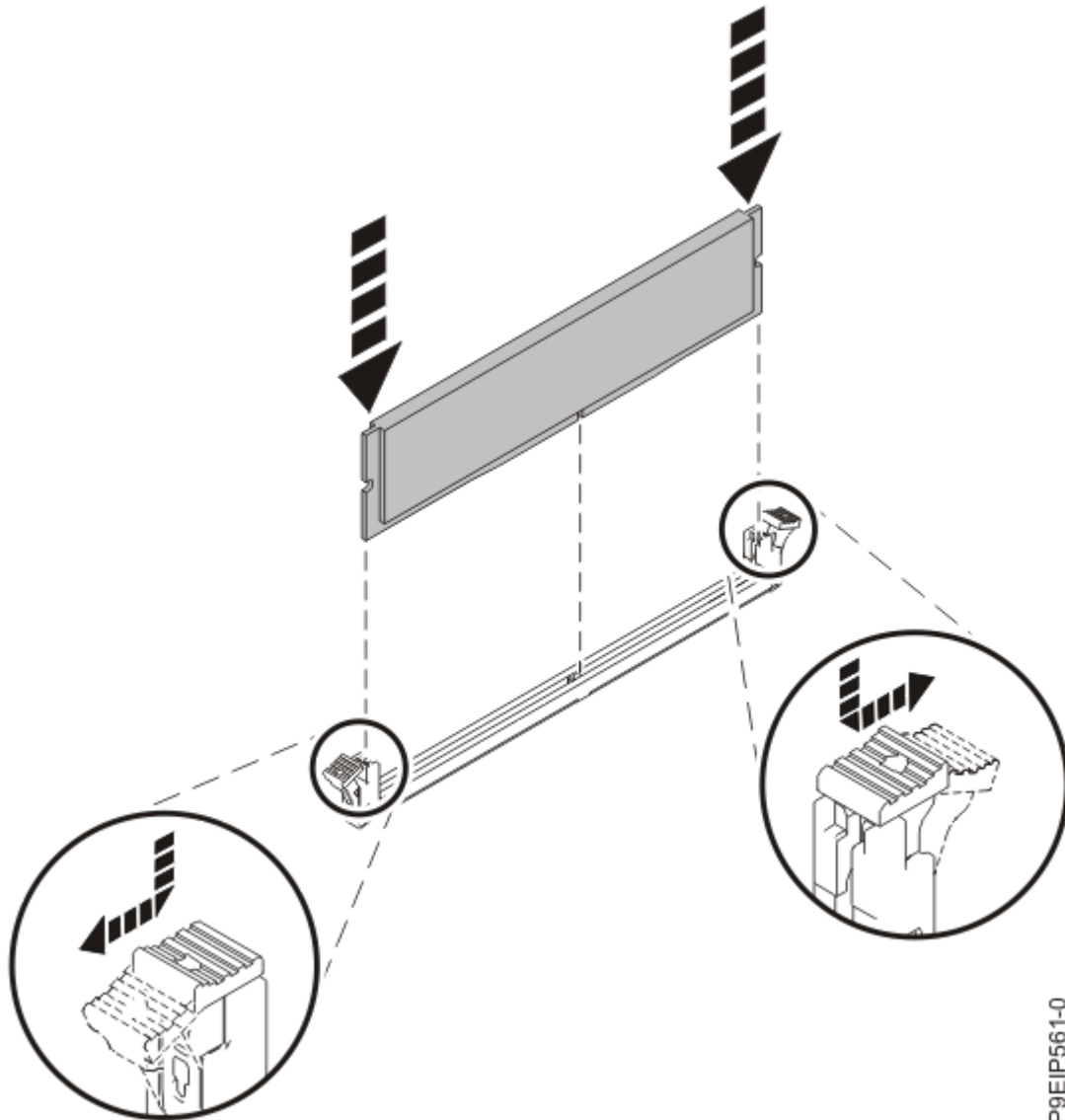


Figure 14. Inserting the memory DIMM

5. If you removed the system processor air baffle, replace it.

Insert the edge of the air baffle into the fan support. Then, carefully press the air baffle down into place.

What to do next

Prepare the system for operation. For instructions, see [“Preparing the 5104-22C, 9006-22C, or 9006-22P system for operation after you remove and replace internal parts” on page 80.](#)

Removing and replacing PCIe adapters in the 5104-22C or 9006-22C

Learn how to remove and replace Peripheral Component Interconnect (PCI) Express (PCIe) adapters in the system.

Removing a PCIe adapter from the 5104-22C or 9006-22C system

To remove a PCIe adapter from the system, complete the steps in this procedure.

Before you begin

Power off the system and place it in the service position. For instructions, see [“Preparing the 5104-22C, 9006-22C, or 9006-22P system to remove and replace internal parts”](#) on page 77.

Parts must be replaced with the identical part in the exact same place.

Procedure

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

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



Attention:

- Attach an electrostatic discharge (ESD) wrist strap to the front ESD jack, to the rear ESD jack, or to an unpainted metal surface of your hardware to prevent the electrostatic discharge from damaging your hardware.
 - When you use an ESD wrist strap, follow all electrical safety procedures. An ESD wrist strap is used for static control. It does not increase or decrease your risk of receiving electric shock when using or working on electrical equipment.
 - If you do not have an ESD wrist strap, just prior to removing the product from ESD packaging and installing or replacing hardware, touch an unpainted metal surface of the system for a minimum of 5 seconds. If at any point in this service process you move away from the system, it is important to again discharge yourself by touching an unpainted metal surface for at least 5 seconds before you continue with the service process.
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 15 on page 20](#).

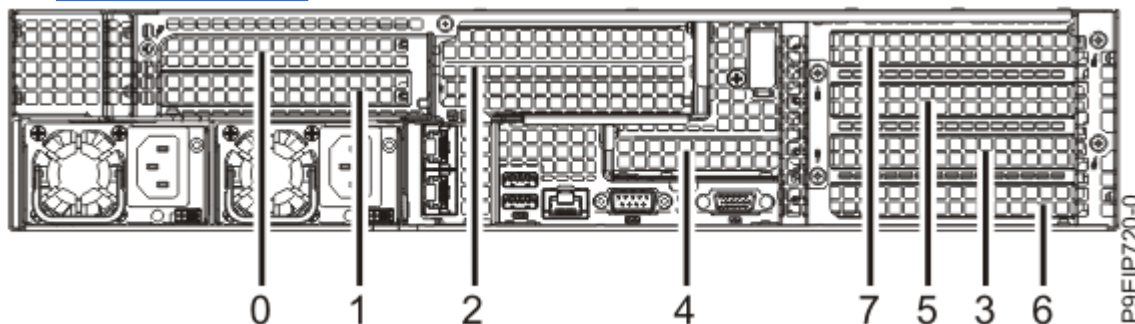


Figure 15. 9006-22C PCIe adapter positions

Position	Step
0 (UIO Slot2), 1 (UIO Slot3), 2 (UIO Slot1)	“3” on page 21

Position	Step
4 (WIO-R Slot)	“4” on page 23
3 (WIO Slot3), 5 (WIO Slot2), 6 (WIO Slot4), 7 (WIO Slot1)	“5” on page 24

3. For an adapter in position 0, 1 or 2, remove the PCIe riser as shown in [Figure 16 on page 21](#).

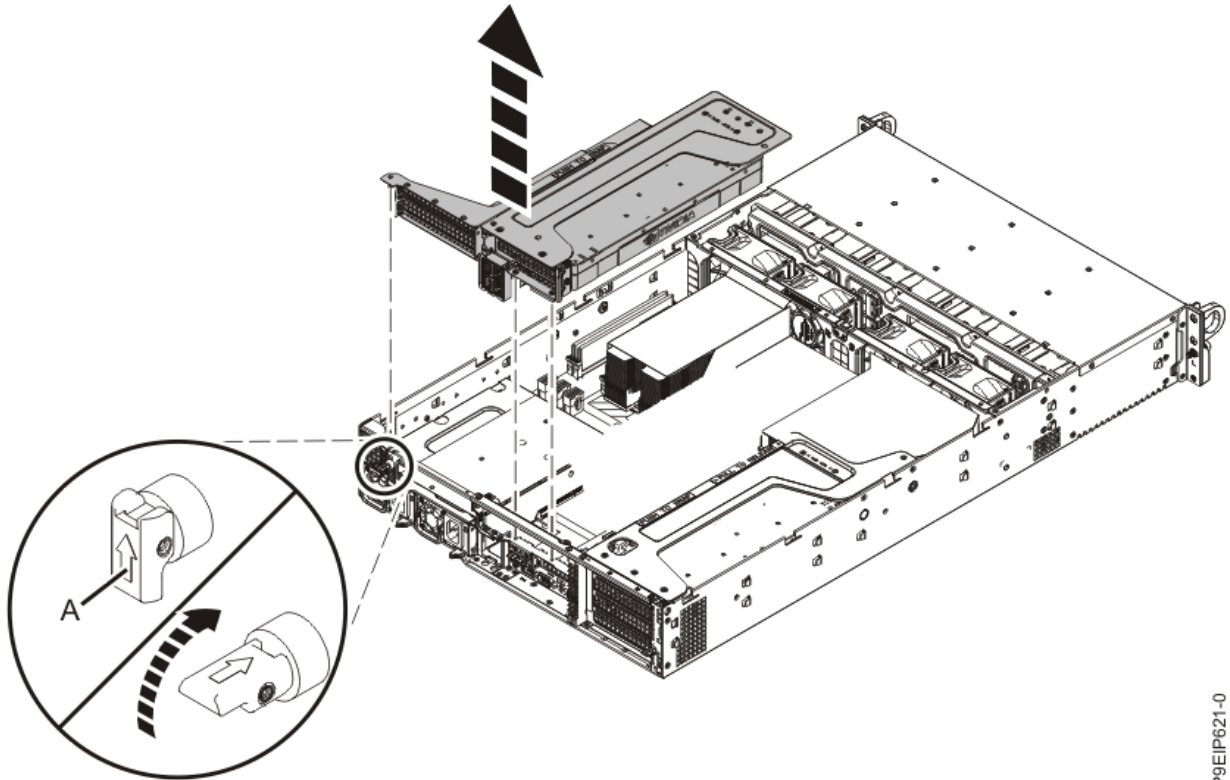


Figure 16. Removing the PCIe riser

- a) Retract the retaining pin **(A)** so the arrow is pointing to the system.
Also, if the system has a thumbscrew near the front of the riser securing the riser to the system backplane, fully loosen that thumbscrew.
- 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) Place the PCIe adapter riser and cards on an ESD surface.
- e) For an adapter in positions 0 or 1, remove the screw that holds the tail-stock.
- f) Unplug an adapter **(A)** from the PCIe adapter riser **(B)** as shown in [Figure 17 on page 22](#).

P9EIP621-0

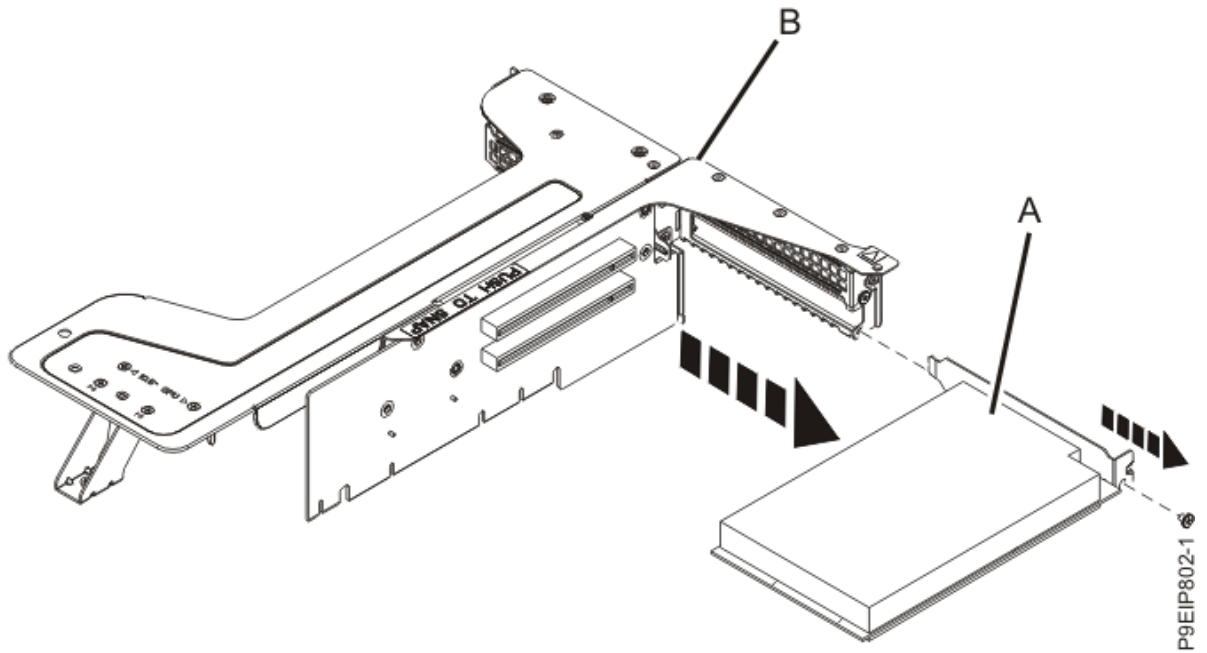


Figure 17. Removing an adapter in positions 0 or 1 from the riser

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

h) Unplug an adapter (A) in position 2 from the PCIe adapter riser (B) as shown in [Figure 18 on page 22](#).

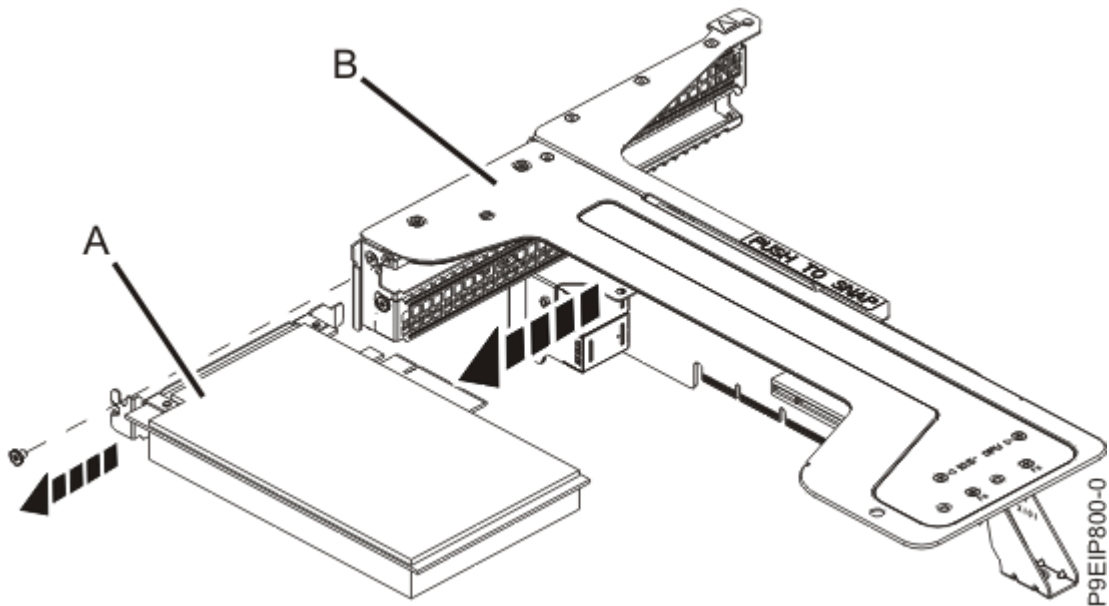


Figure 18. Removing a position 2 adapter from the riser

i) If the riser card in position 1 needs replacing, remove it from the riser support.

Remove the five screws that secure the riser card (A) to the riser support (B) as shown in [Figure 19 on page 23](#).

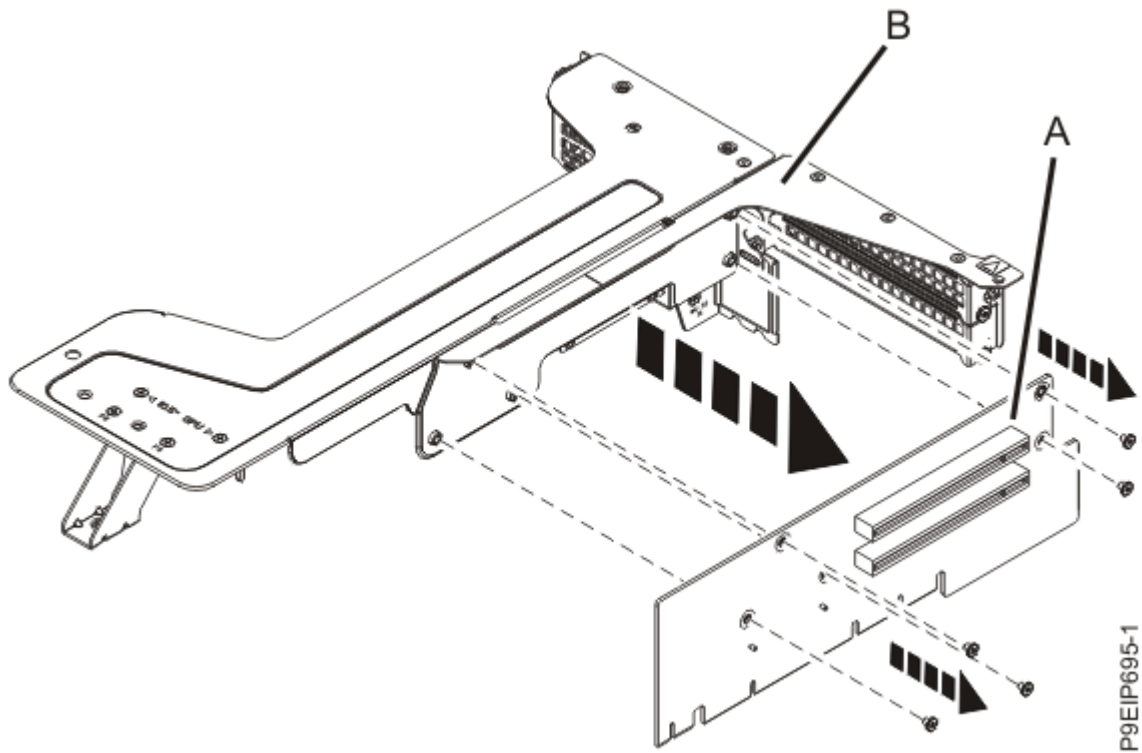


Figure 19. Removing position 1 riser card

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 20 on page 24](#).

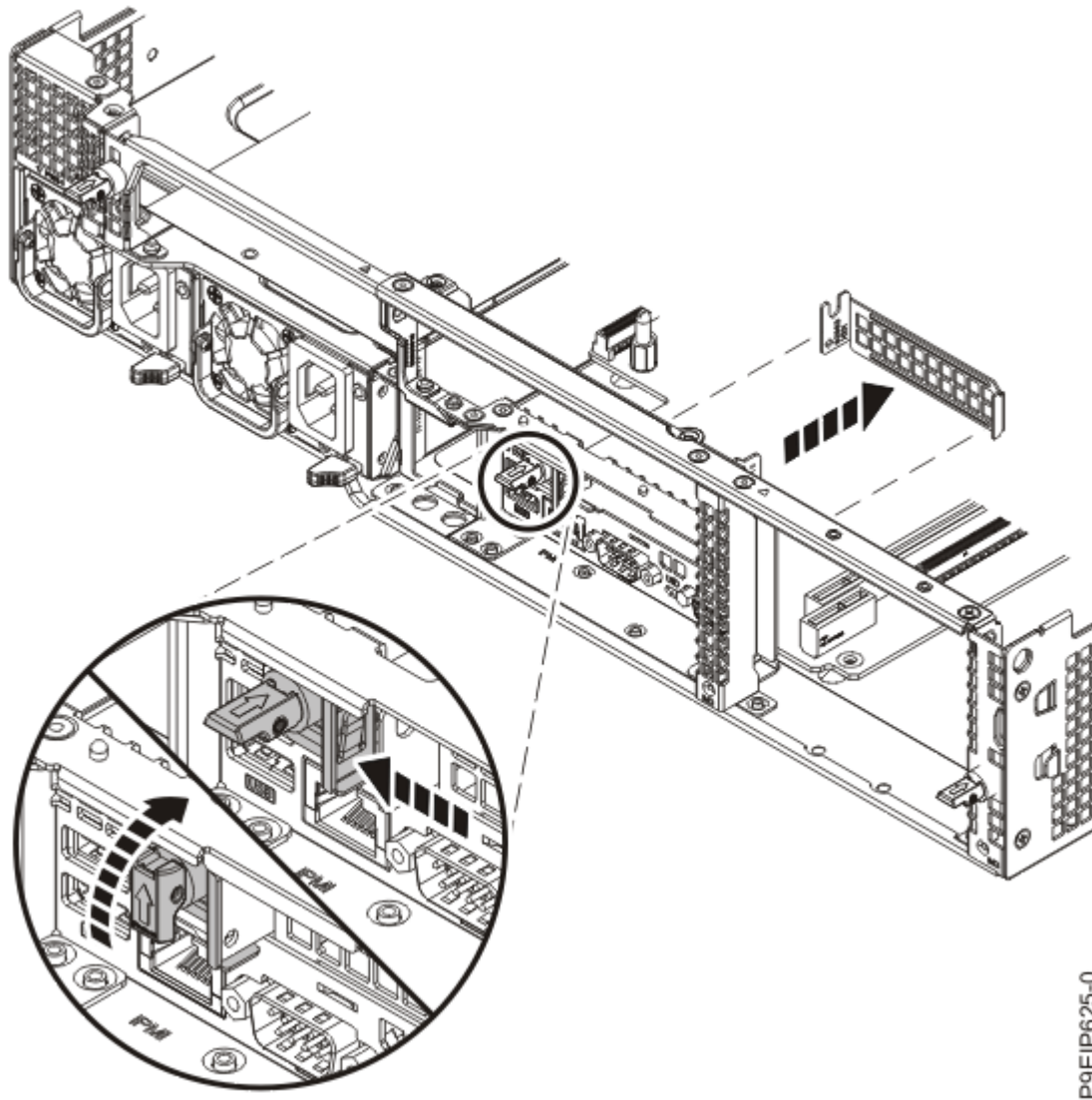
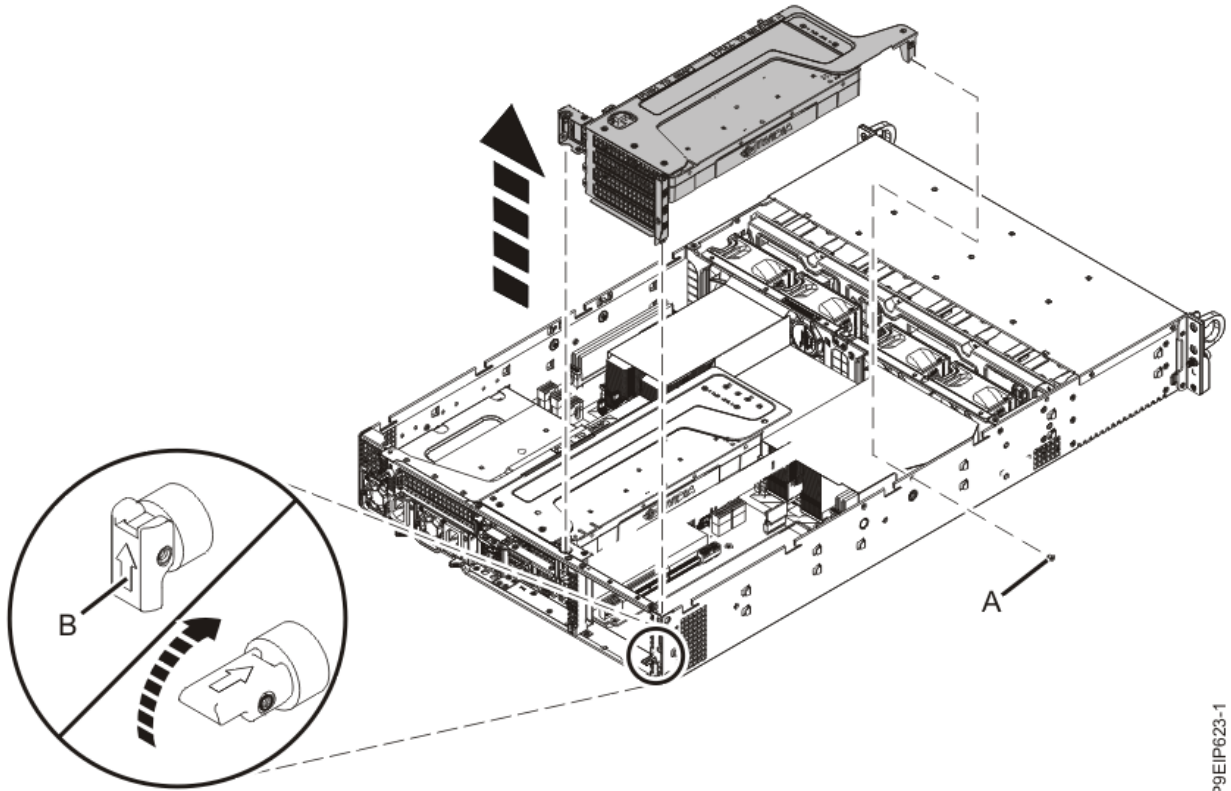


Figure 20. Releasing the tail-stock

- 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 3, 5, 6, and 7.
- For instructions, see step “5” on page 24.
5. For an adapter in position 3, 5, 6, or 7, remove the riser as shown in [Figure 21 on page 25](#).



P9EIP623-1

Figure 21. Removing the PCIe riser

- a) Remove the screw **(A)** and retract the retaining pin **(B)**.
- 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) Place the PCIe adapter riser and cards on an ESD surface.
- e) Remove the screw that holds the tail-stock.
- f) Unplug an adapter **(A)** from the PCIe adapter riser **(B)** as shown in [Figure 22 on page 26](#).

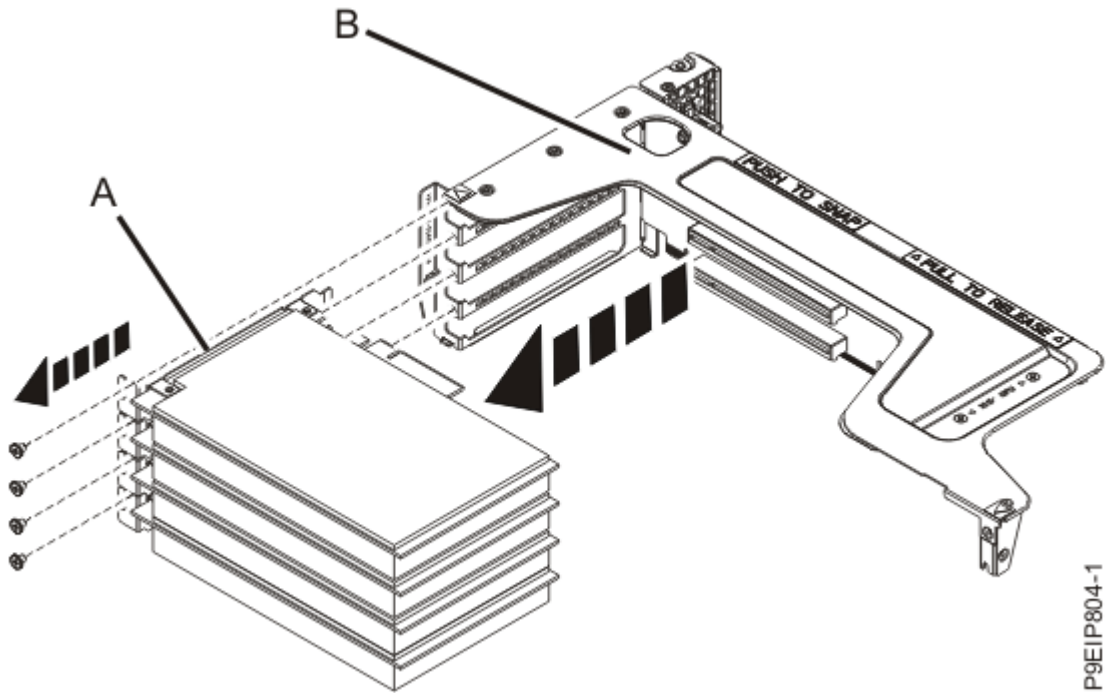


Figure 22. Removing an adapter from the riser

- g) If the riser card for positions 3, 5, 6, or 7 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 23](#) on page 26.

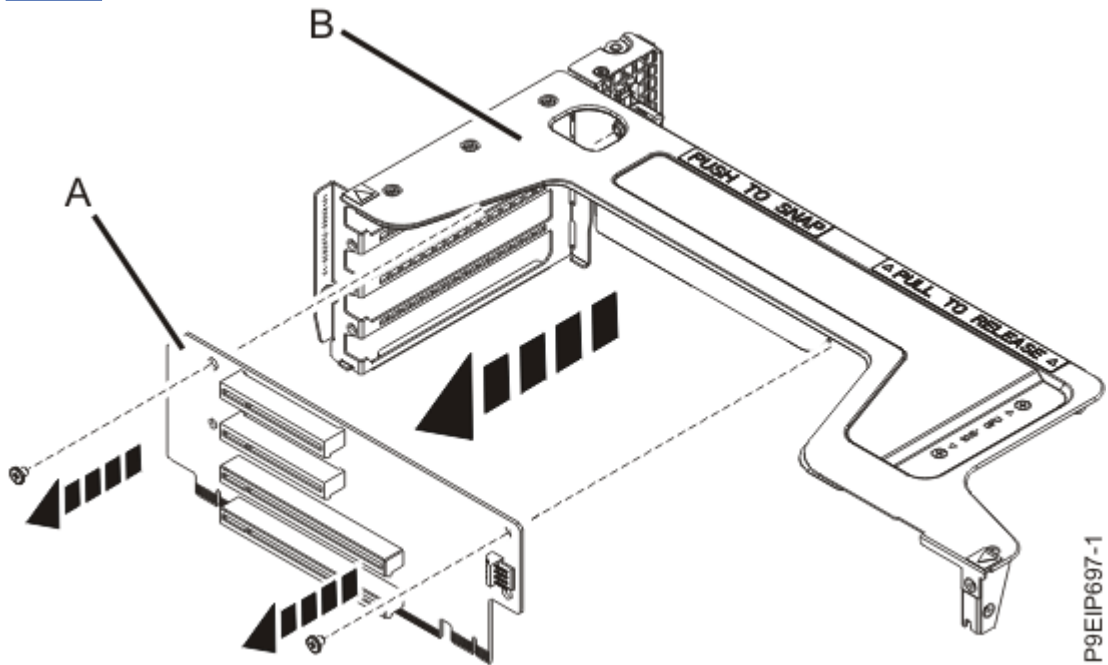


Figure 23. Removing position 3, 5, 6, and 7 riser card

6. Place the adapter on an ESD surface.

Replacing a PCIe adapter in the 5104-22C or 9006-22C system

To replace a PCIe adapter in the 5104-22C or 9006-22C system, complete the steps in this procedure.

Procedure

1. Ensure that you have the electrostatic discharge (ESD) wrist strap on and that the ESD clip is plugged into a ground jack or connected to an unpainted metal surface. If not, do so now.
2. An adapter can share a PCIe riser with other adapters.

See Figure 24 on page 27.

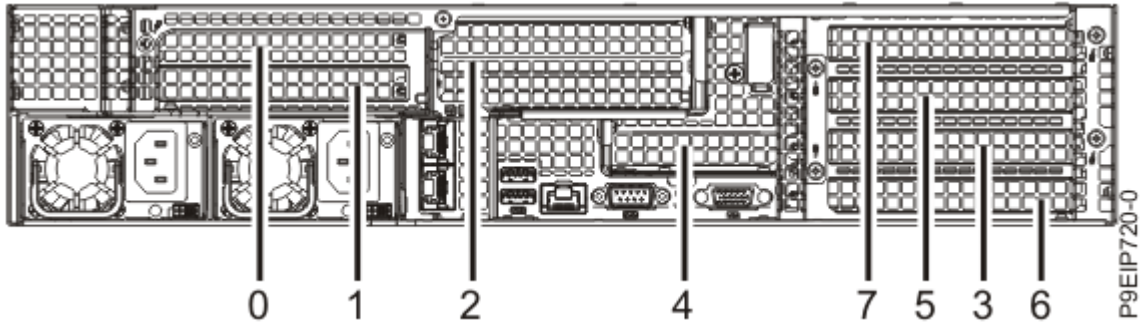


Figure 24. 9006-22C PCIe adapter positions

Position	Step
0 (UIO Slot2), 1 (UIO Slot3), 2 (UIO Slot1)	“3” on page 27
4 (WIO-R Slot)	“4” on page 30
3 (WIO Slot3), 5 (WIO Slot2), 6 (WIO Slot4), 7 (WIO Slot1)	“5” on page 31

3. For an adapter in position 0, 1 or 2, complete the following steps:
 - a) If the riser card in position 0 or 1 needs replacing, replace it in the riser support.
Replace the five screws to secure the riser card **(A)** to the riser support **(B)** as shown in [Figure 25 on page 28](#).

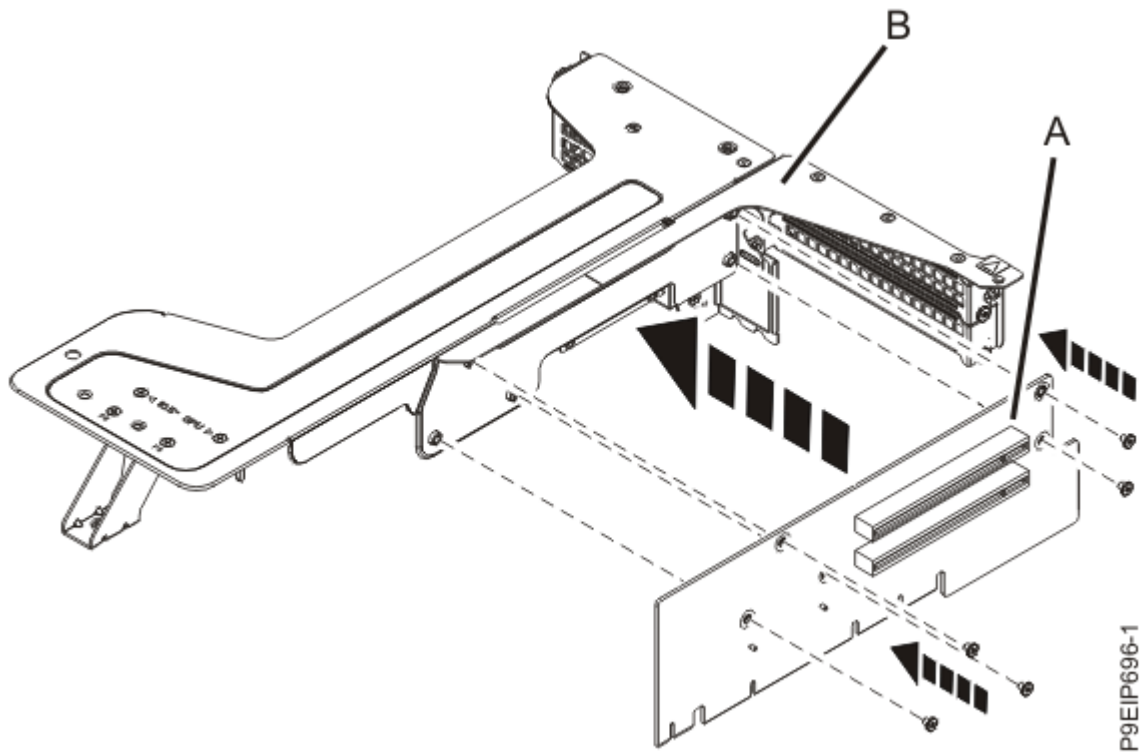


Figure 25. Replacing position 0 or 1 adapter

- b) Insert the PCIe adapter **(A)** in position 0 or 1 of the PCIe adapter riser **(B)** as shown in [Figure 26](#) on [page 28](#).

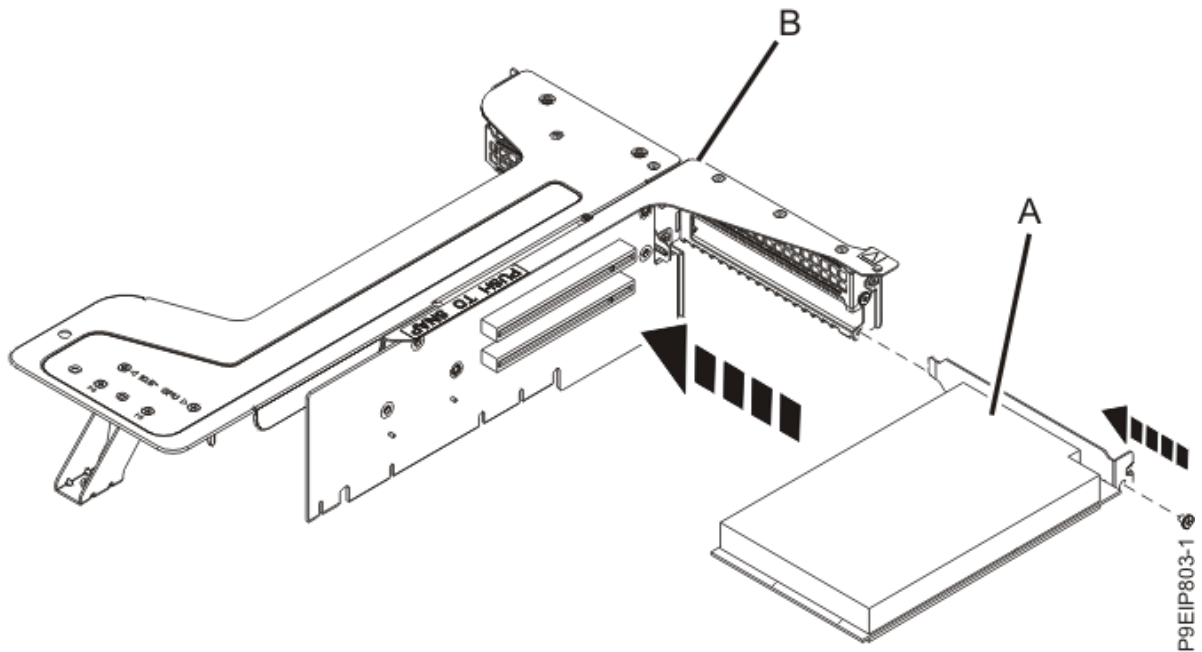


Figure 26. Inserting an adapter into position 0 or 1 of the PCIe riser

- c) Insert the PCIe adapter **(A)** that is located in position 2 into the PCIe adapter riser **(B)** as shown in [Figure 27](#) on [page 29](#).

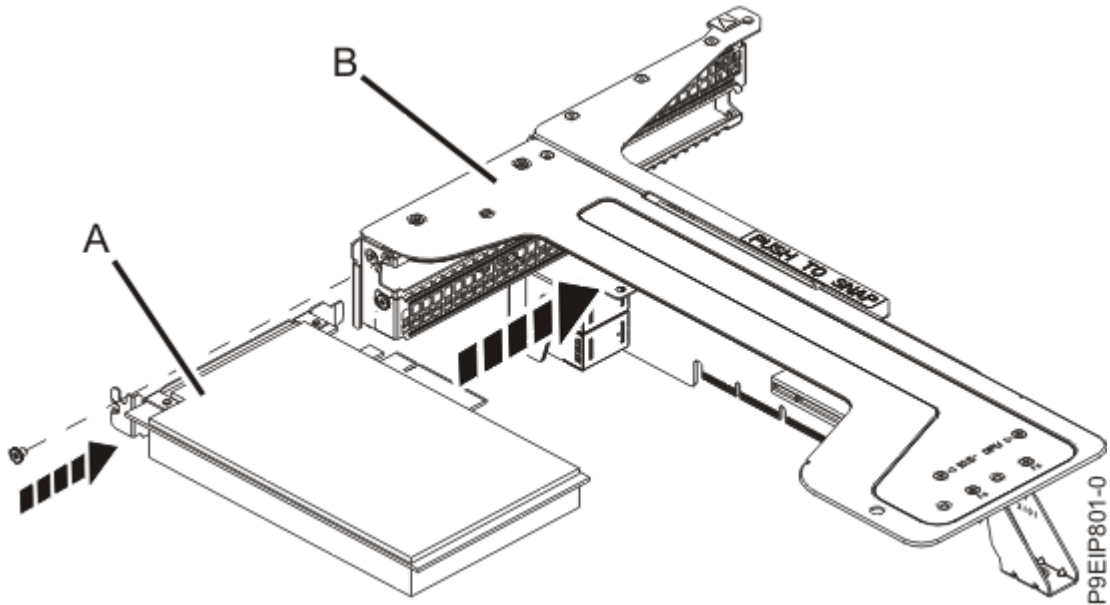
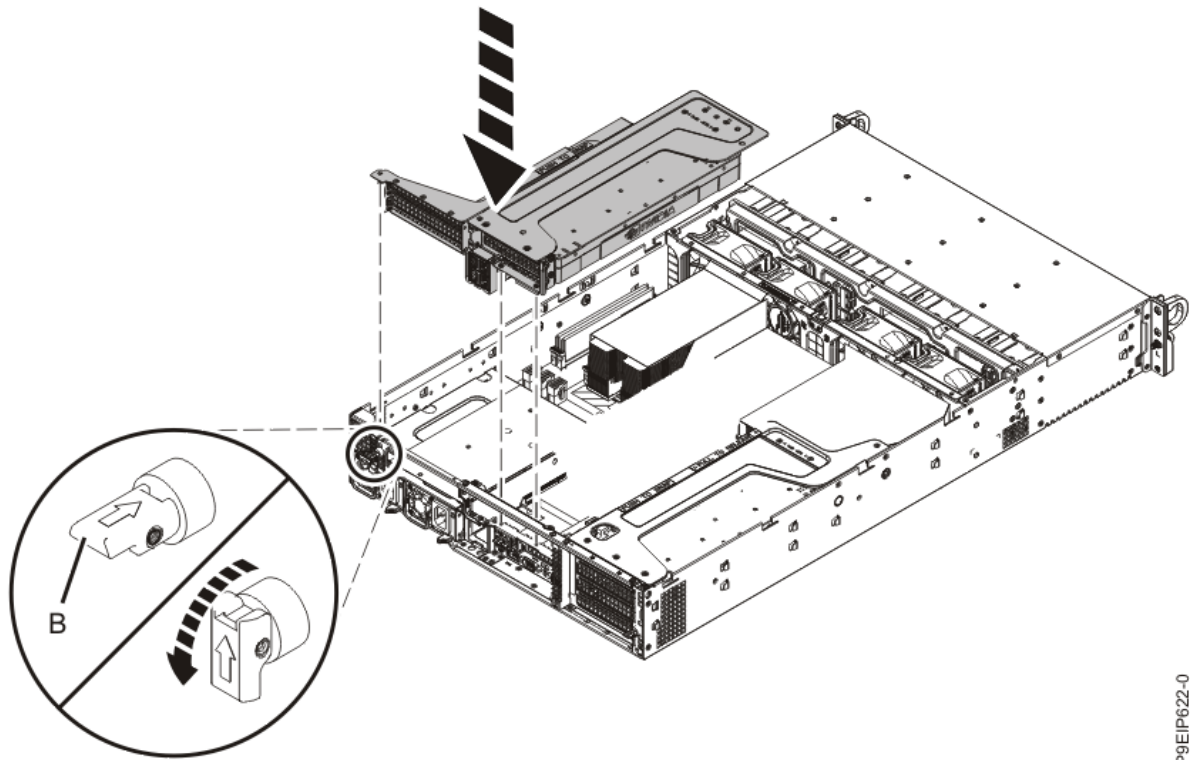


Figure 27. Inserting an adapter into position 2 of the PCIe riser

- d) Replace the screw to secure the tail-stock.
- e) If you are inserting a storage drive adapter, using your labels, connect the signal cables to the adapter before inserting the PCIe adapter riser into the system.
- f) Insert the PCIe riser into the chassis as shown in [Figure 28 on page 30](#).
 - i) Retract the retaining pin (**B**) so the arrow points to the system.
 - ii) Insert the riser, using the slots and alignment pins to properly insert the riser. Push the riser firmly into the system backplane.
 - iii) Set the retaining pin (**B**) to secure the riser.
 - iv) If the system has a thumbscrew near the front of the riser, tighten that thumbscrew.



P9EIP622-0

Figure 28. Inserting the position 0, 1, and 2 riser

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 3, 5, 6, and 7.

For instructions, see step “5” on page 24 of [“Removing a PCIe adapter from the 5104-22C or 9006-22C system”](#) on page 20. Then insert the small riser. Replace the riser for positions 3, 5, 6, and 7.

- 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 29 on page 31](#), then reset the retaining pin.

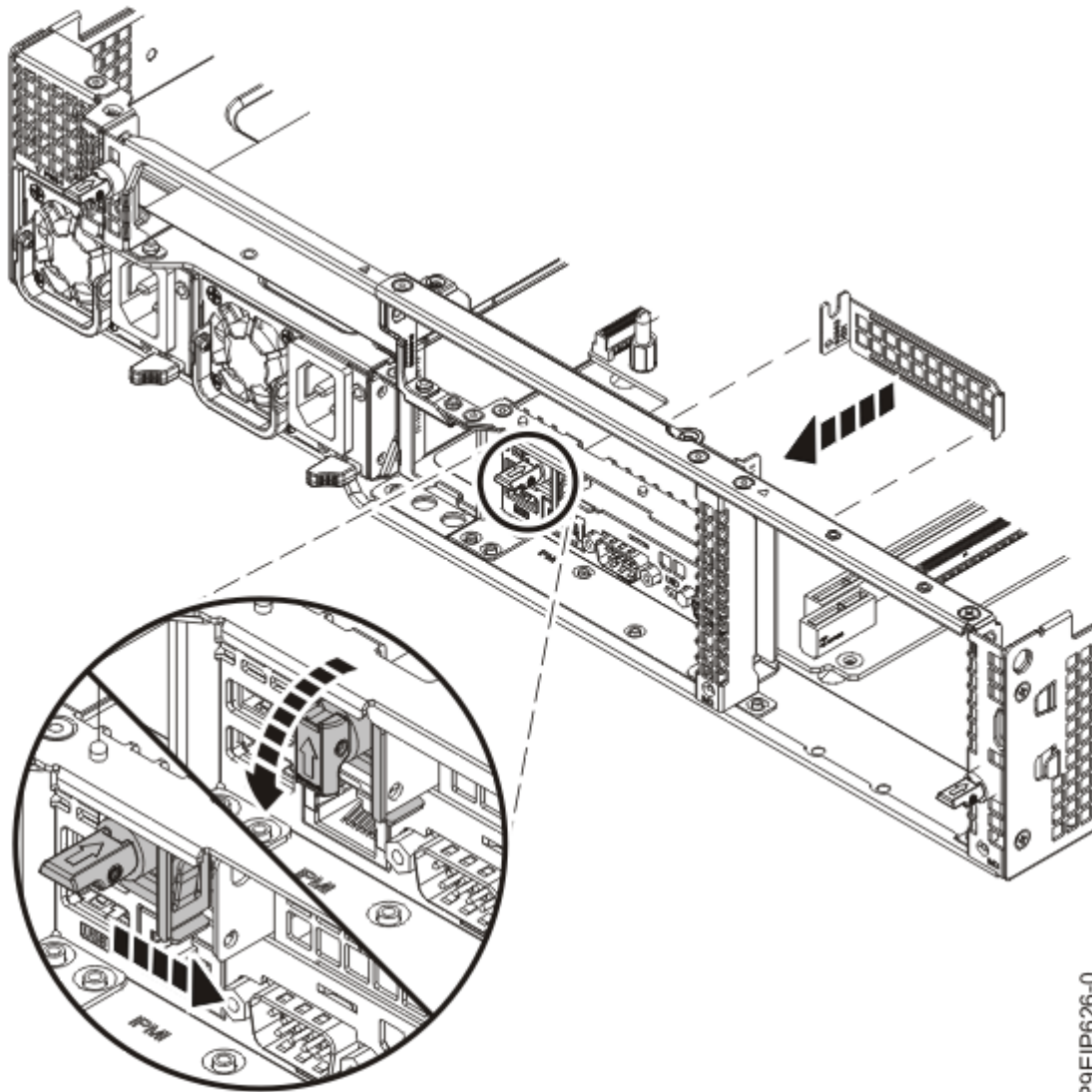


Figure 29. Sliding the tail-stock retainer to the closed position

5. If the riser card for positions 3, 5, 6, or 7 needs replacing, replace it into the riser support.
Replace the two screws that secure the riser card **(A)** to the riser support **(B)** as shown in [Figure 30](#) on [page 32](#).

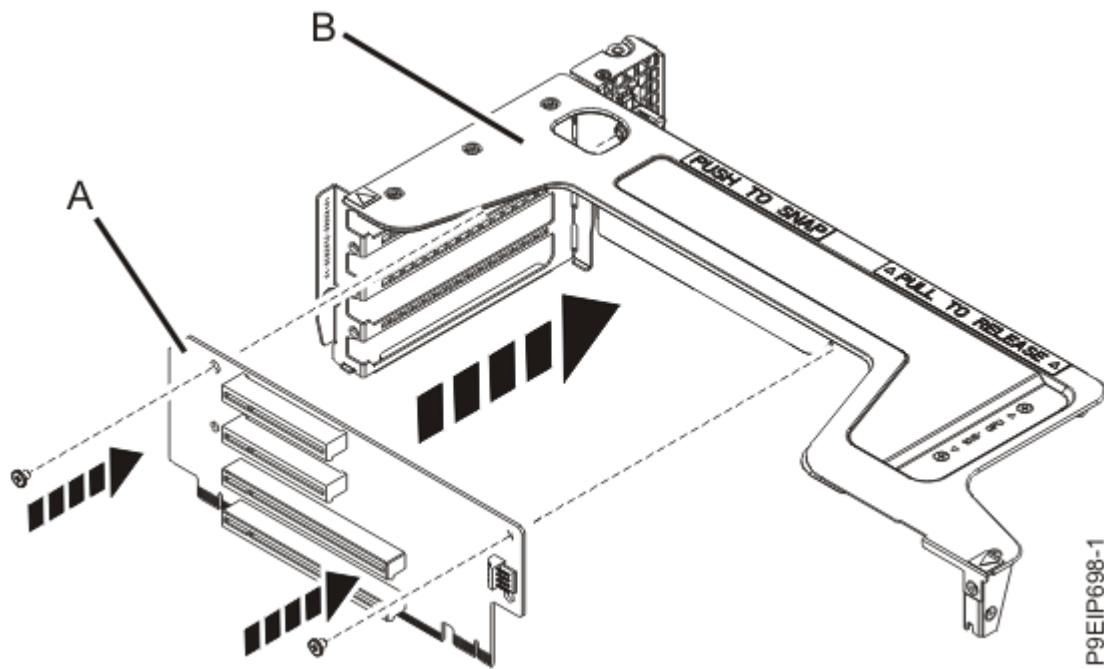


Figure 30. Replacing position 3, 5, 6, and 7 riser card

6. For an adapter in position 3, 5, 6 or 7, complete the following steps:

- a) Plug the adapter **(A)** into the proper slot in the PCIe adapter riser **(B)** as shown in [Figure 31](#) on page 32.

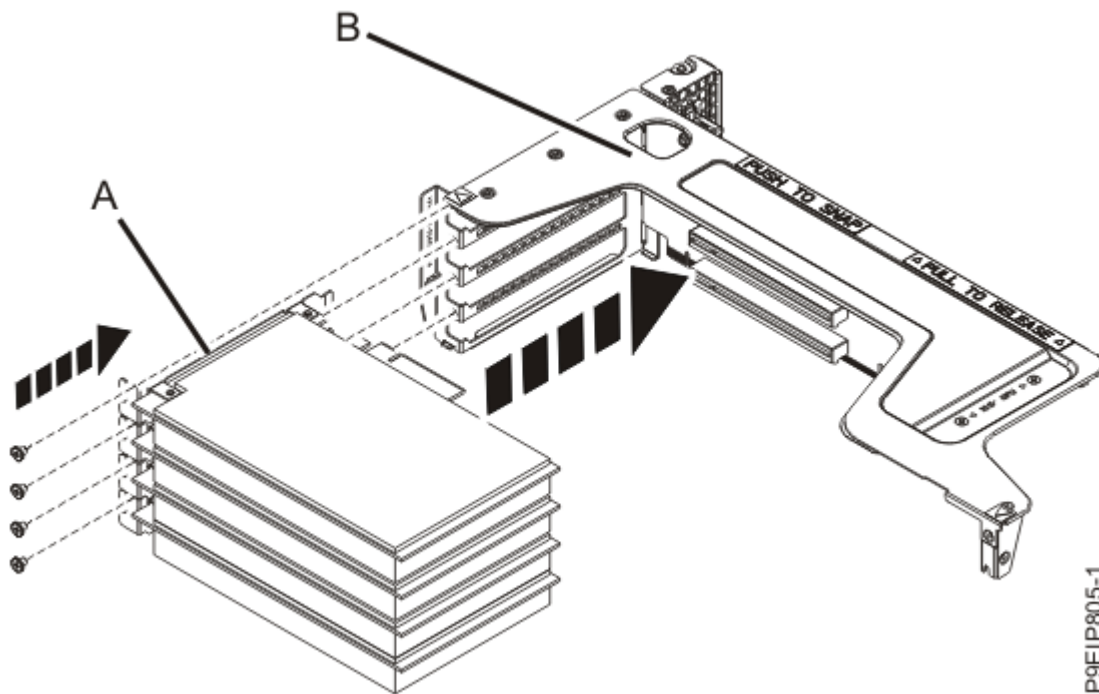


Figure 31. Inserting a PCIe adapter into the riser

- b) Replace the screw to secure the tail-stock.
- c) If you are inserting a storage drive adapter, using your labels, connect the signal cables to the adapter before inserting the PCIe adapter riser into the system.
- d) Insert the PCIe riser as shown in [Figure 32](#) on page 33.
 - i) Retract the retaining pin **(B)** so the arrow points to the system.

- ii) Insert the riser, using the slots and alignment pins **(A)** to properly insert the riser. Push the riser firmly into the system backplane.
- iii) Set the retaining pin **(B)** to secure the riser.
- iv) Replace screw **(C)** in the side of the system.

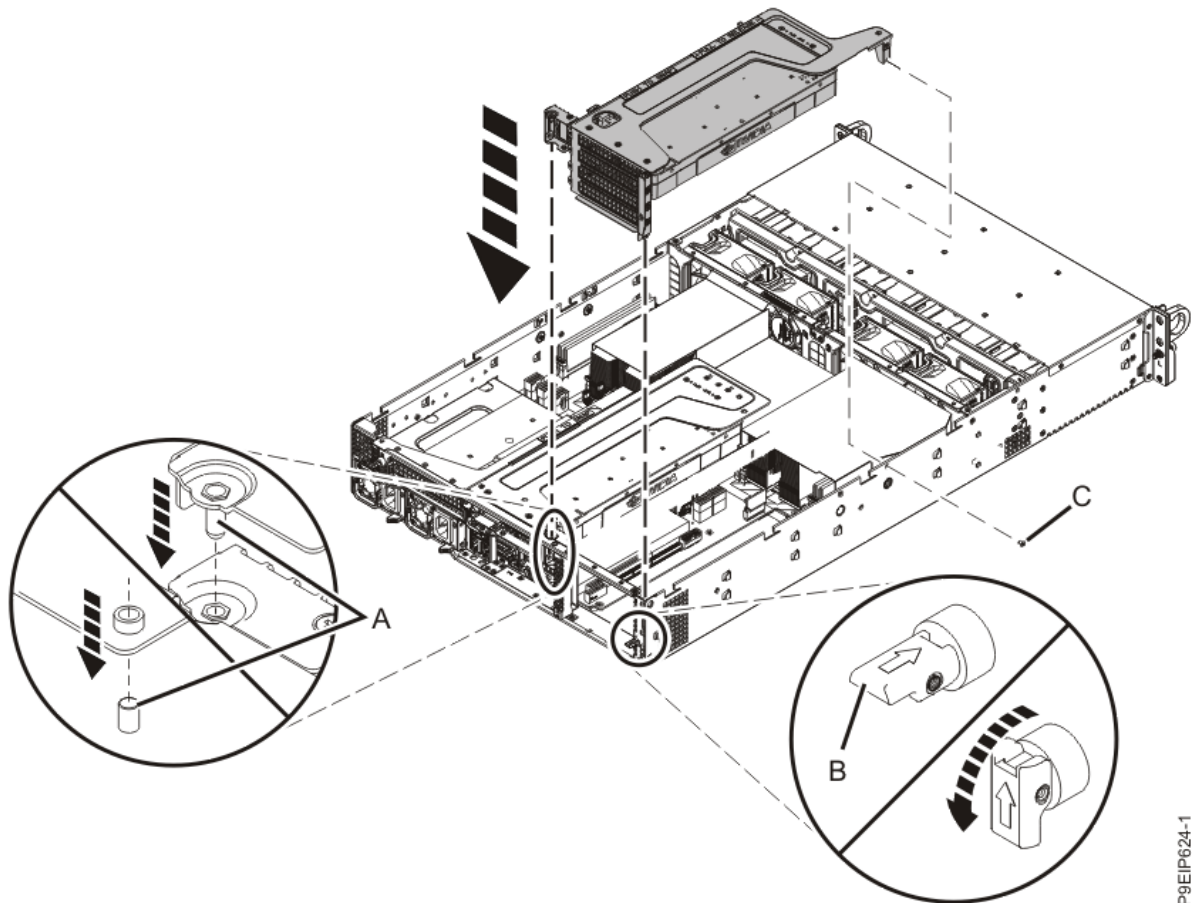


Figure 32. Inserting the PCIe adapter riser

What to do next

Prepare the system for operation. For instructions, see “Preparing the 5104-22C, 9006-22C, or 9006-22P system for operation after you remove and replace internal parts” on page 80.

PCIe adapter information by feature type for the 5104-22C or 9006-22C

Find information about the Peripheral Component Interconnect Express® (PCIe) adapters that are supported for the 5104-22C or 9006-22C system.

The table shows the available adapters by feature code (FC), description, and adapter part number.

Important: This document does not replace the latest sales and marketing publications and tools that document supported features.

Table 1. PCIe adapters supported for the 5104-22C or 9006-22C system	
Feature code	Description
EKA2	Intel 82599ES Ethernet Converged Network Adapter x520-DA2 Dual-port 10G/1G SFP+ PCIe2.0 x8 LP; Adapter part number: 01EM697 (AOC-STGN-I2S)
EKAM	Mellanox MCX415A-CCAT ConnectX-4 EN 100 GbE Single-port QSFP28 PCIe3.0 x16 LP; Adapter part number: 01EM687 (AOC-MCX415A-CCAT-IB001)

<i>Table 1. PCIe adapters supported for the 5104-22C or 9006-22C system (continued)</i>	
Feature code	Description
EKAQ	Qlogic QLE2692OP Dual-port 16 Gb Fibre Channel adapter PCIe3 x8 LP; Adapter part number: 01EM692 (AOC-QLE2692SR-IB001)
EKAY	Mellanox MCX556A-EDAT ConnectX-5 VPI EDR InfiniBand 100 Gb/s and 100 GbE Dual-port QSFP28 PCIe4.0 x16 LP; Adapter part number: 01EM691 (AOC-MCX556A-EDAT-IB001)
	Microsemi NV1604 Flash DRAM PCIe 3.0 x8 LP with Supercap card with SMC tailstock; Adapter part number: 01EM748 (HDS-KIT-MS2285400R-IB001)
EKGC	Broadcom (LSI) 9305-16E SAS3 HBA PCIe3.0 x8 LP; Adapter part number: 01EM701 (AOC-SAS3-9305-16E)

Removing and replacing a power supply in the 5104-22C or 9006-22C

To remove and replace power supplies in the system, complete the steps in this procedure.

Removing a power supply from the 5104-22C or 9006-22C

To remove power supplies in the system, complete the steps in this procedure.

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.

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



Attention:

- Attach an electrostatic discharge (ESD) wrist strap to the front ESD jack, to the rear ESD jack, or to an unpainted metal surface of your hardware to prevent the electrostatic discharge from damaging your hardware.
 - When you use an ESD wrist strap, follow all electrical safety procedures. An ESD wrist strap is used for static control. It does not increase or decrease your risk of receiving electric shock when using or working on electrical equipment.
 - If you do not have an ESD wrist strap, just prior to removing the product from ESD packaging and installing or replacing hardware, touch an unpainted metal surface of the system for a minimum of 5 seconds. If at any point in this service process you move away from the system, it is important to again discharge yourself by touching an unpainted metal surface for at least 5 seconds before you continue with the service process.
2. Label and remove the power cord from the power supply to remove.
For instructions, see [“Disconnecting the power cords from an 5104-22C, 9006-22C, or 9006-22P system” on page 91.](#)
 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 33 on page 35.](#)
 - 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.

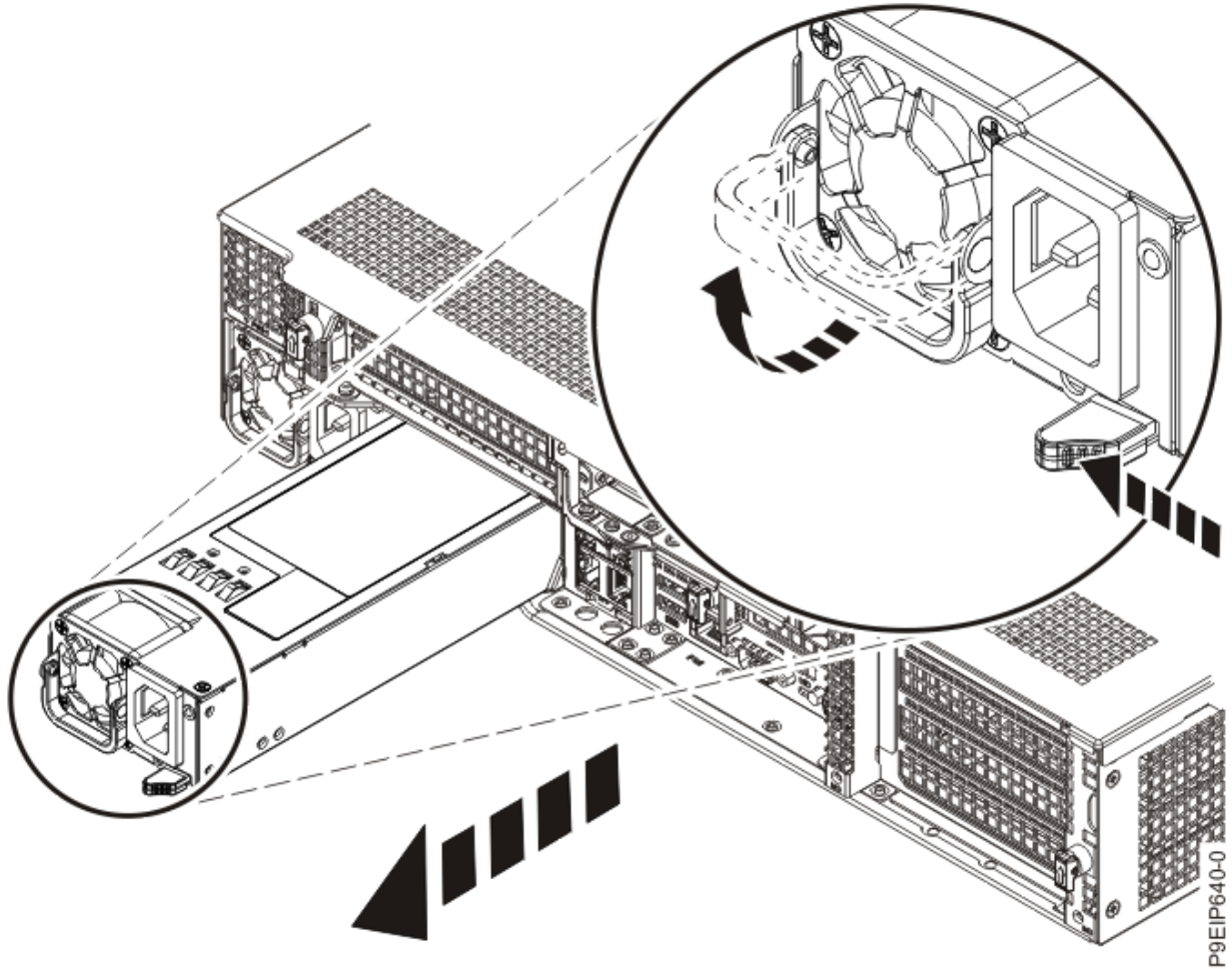


Figure 33. Removing a power supply from the system

Replacing a power supply in the 5104-22C or 9006-22C

To replace power supplies in the system, complete the steps in this procedure.

Procedure

1. Ensure that you have the electrostatic discharge (ESD) wrist strap on and that the ESD clip is plugged into a ground jack or connected to an unpainted metal surface. If not, do so now.
2. Align the power supply with the bay as shown in Figure 34 on page 36. 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.

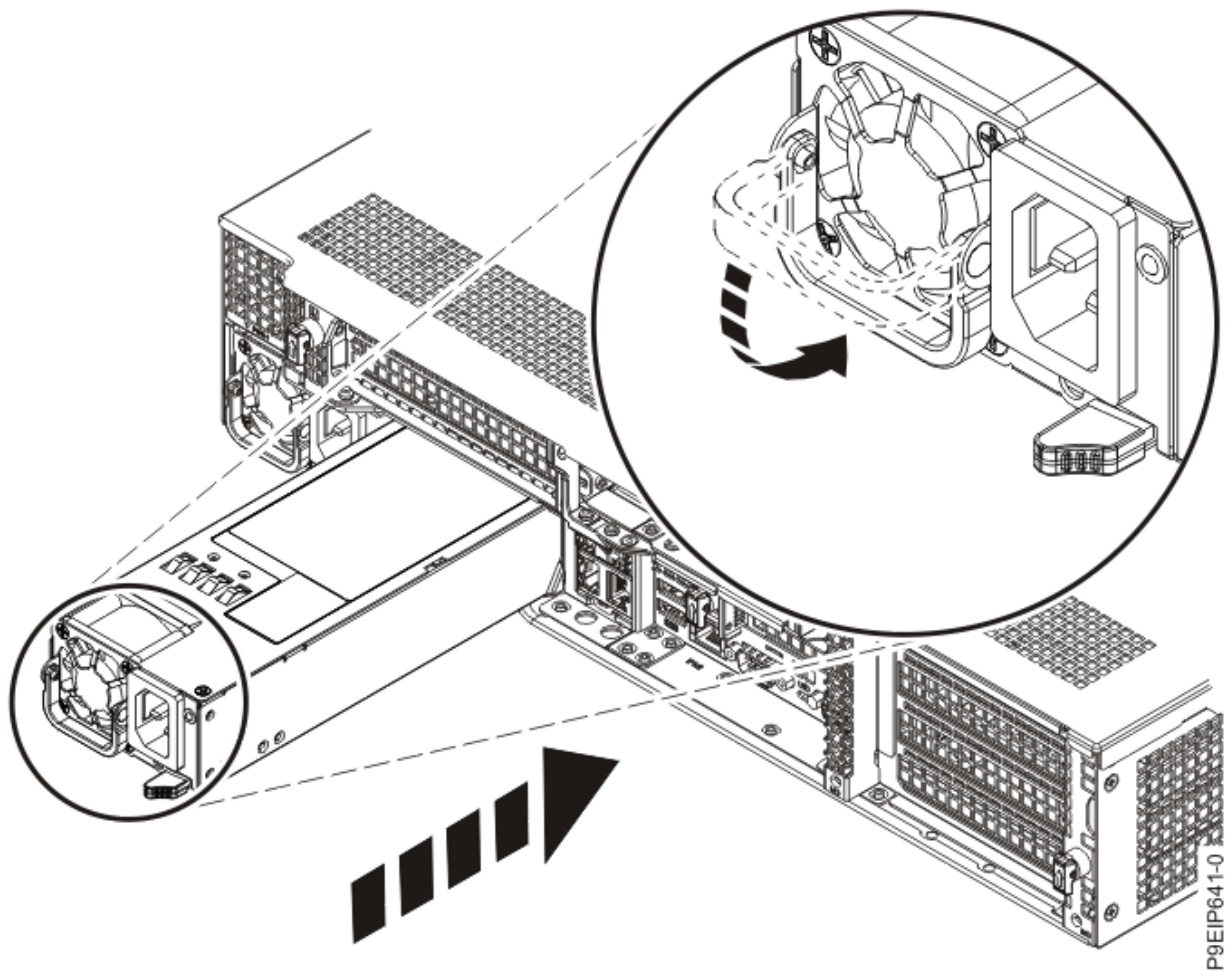


Figure 34. Replacing a power supply in the system

3. Reconnect the power cord.

For instructions, see [“Connecting the power cords to an 5104-22C, 9006-22C, or 9006-22P system” on page 92.](#)

Removing and replacing the system backplane in the 5104-22C or 9006-22C

Learn how to remove and replace the system backplane in the system.

About this task

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

Removing the system backplane in the 5104-22C or 9006-22C

To remove the system backplane in the system, complete the steps in this procedure.

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 5104-22C, 9006-22C, or 9006-22P system to remove and replace internal parts” on page 77.](#)

Parts must be replaced with the identical part in the exact same place.

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.

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



Attention:

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

2. Remove the processor air baffle.

Carefully unsnap and lift the processor air baffle from the system.

3. Remove both PCIe risers.

Label and disconnect the cables from the PCIe adapters. Keep the PCIe adapters in the risers. For instructions, see [“Removing a PCIe adapter from the 5104-22C or 9006-22C system” on page 20.](#)

4. Unplug the four fan power cables from the system backplane as shown in [Figure 35 on page 38.](#)

Release the connector clip **(B)** and carefully pull up the connector **(A)** from the system backplane. Do not pull on the wires.

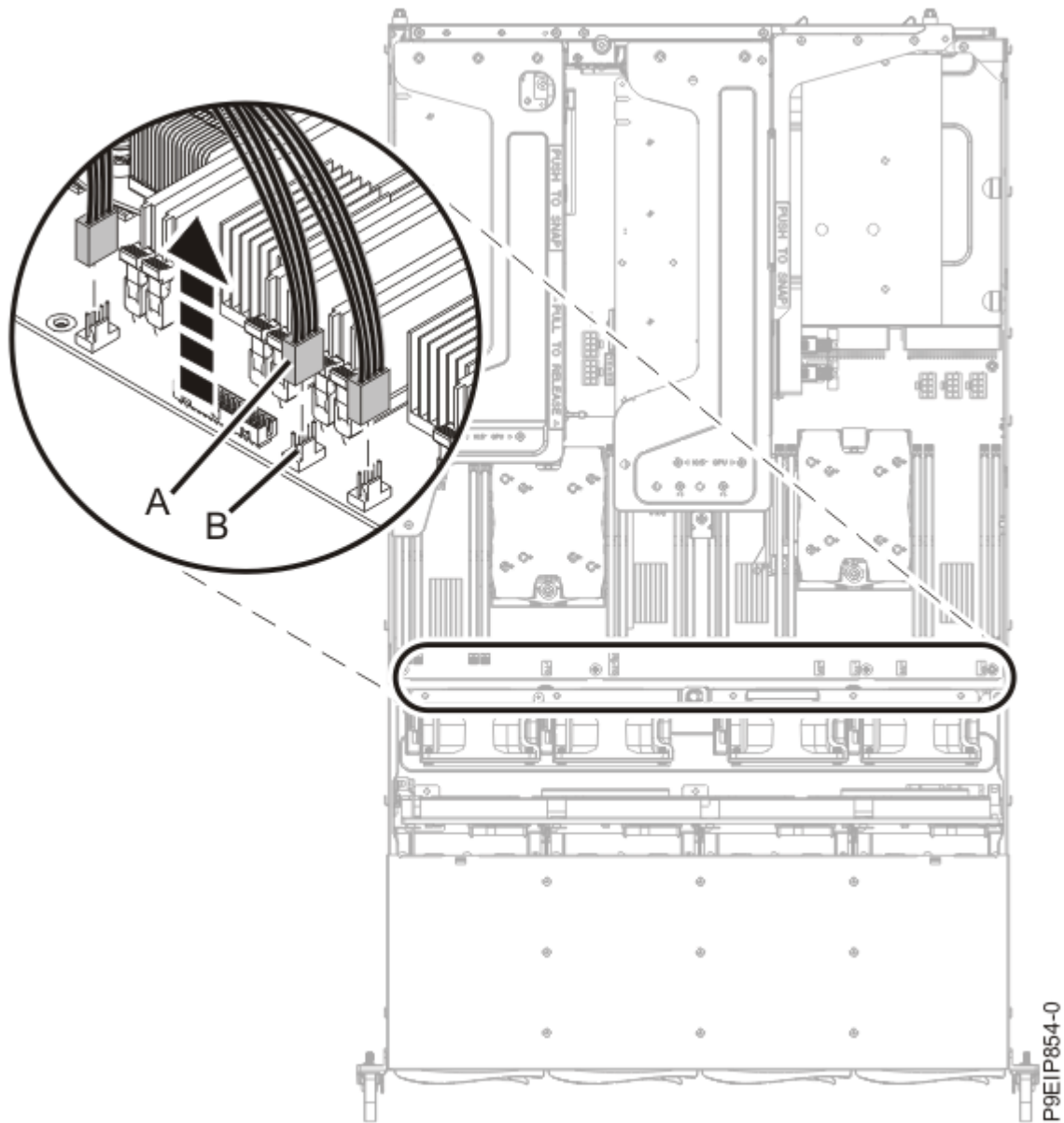


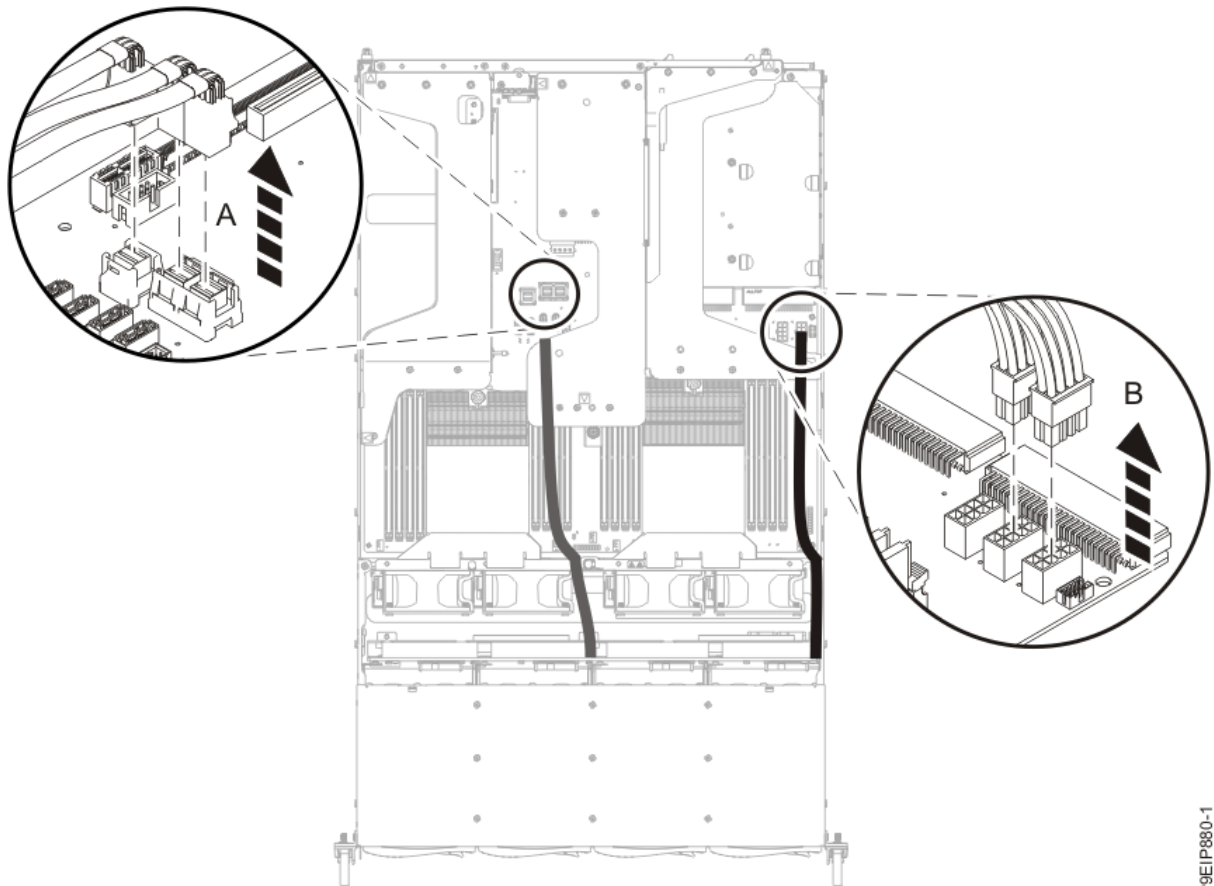
Figure 35. Disconnecting the fan cables

5. Remove the fans.

For instructions, see [“Removing a system fan from the 5104-22C or 9006-22C”](#) on page 14.

6. As appropriate, label and remove the drive signal cables **(A)** and **(D)** as shown in [Figure 36](#) on page 39. Label and remove the drive power cables **(C)** from the system backplane.

Using your thumb, press the release latch on the connector to unplug the cable.



P9EIP880-1

Figure 36. Disconnecting the drive signal cables the drive power cables
7. Remove the operator panel cable from the system backplane as shown in [Figure 37](#) on page 40.

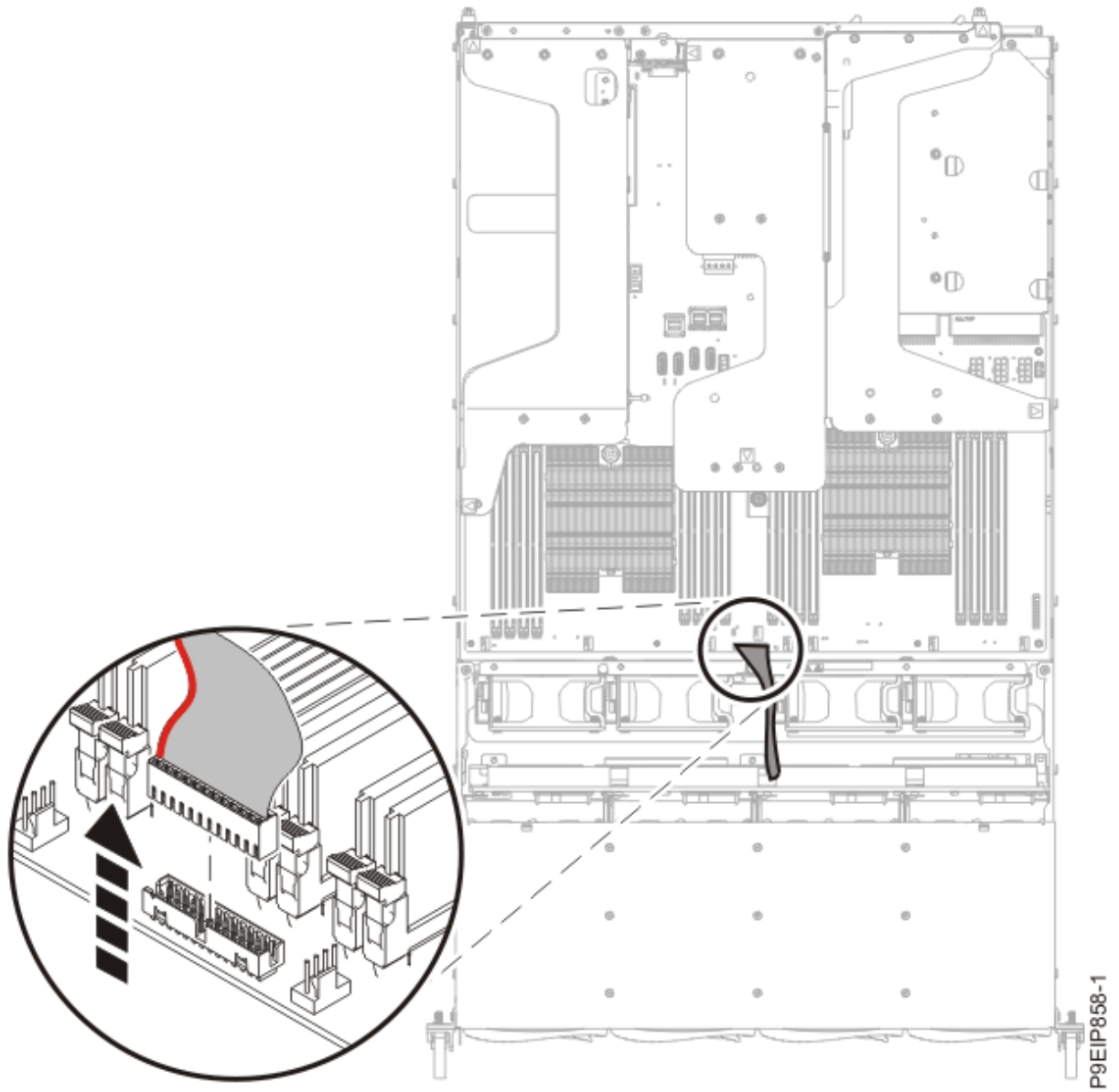


Figure 37. Removing the operator panel cable

8. Carefully pass the operator panel cable and the disk drive signal cables through the bulkhead into the fan area.
9. Note the position and orientation of the cover switch cable. Remove the cover switch cable from the system backplane as shown in [Figure 38 on page 41](#).

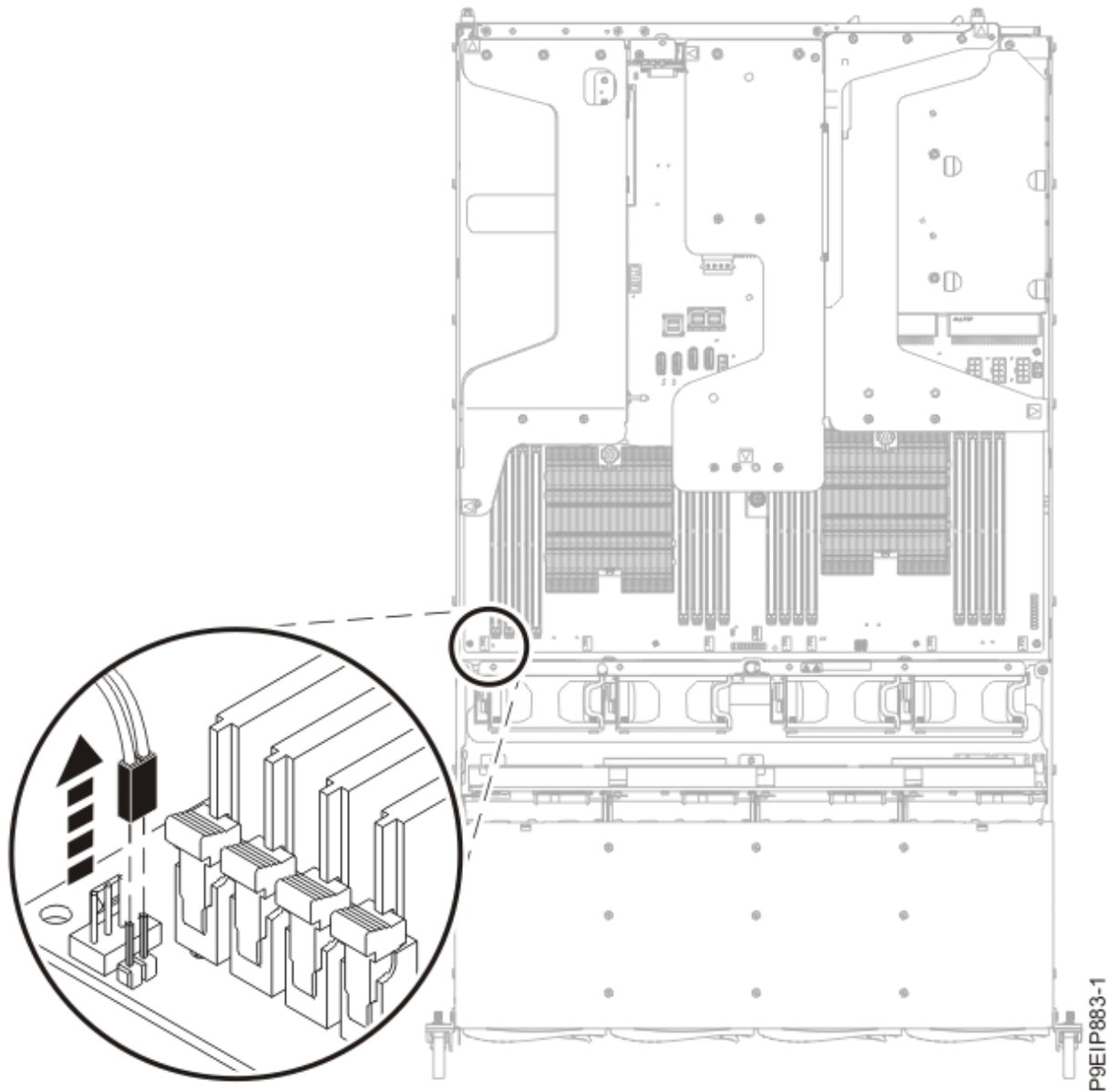


Figure 38. Removing the cover switch cable

10. Remove the 14 screws from the system backplane.
The screw locations are shown in [Figure 39 on page 42](#).

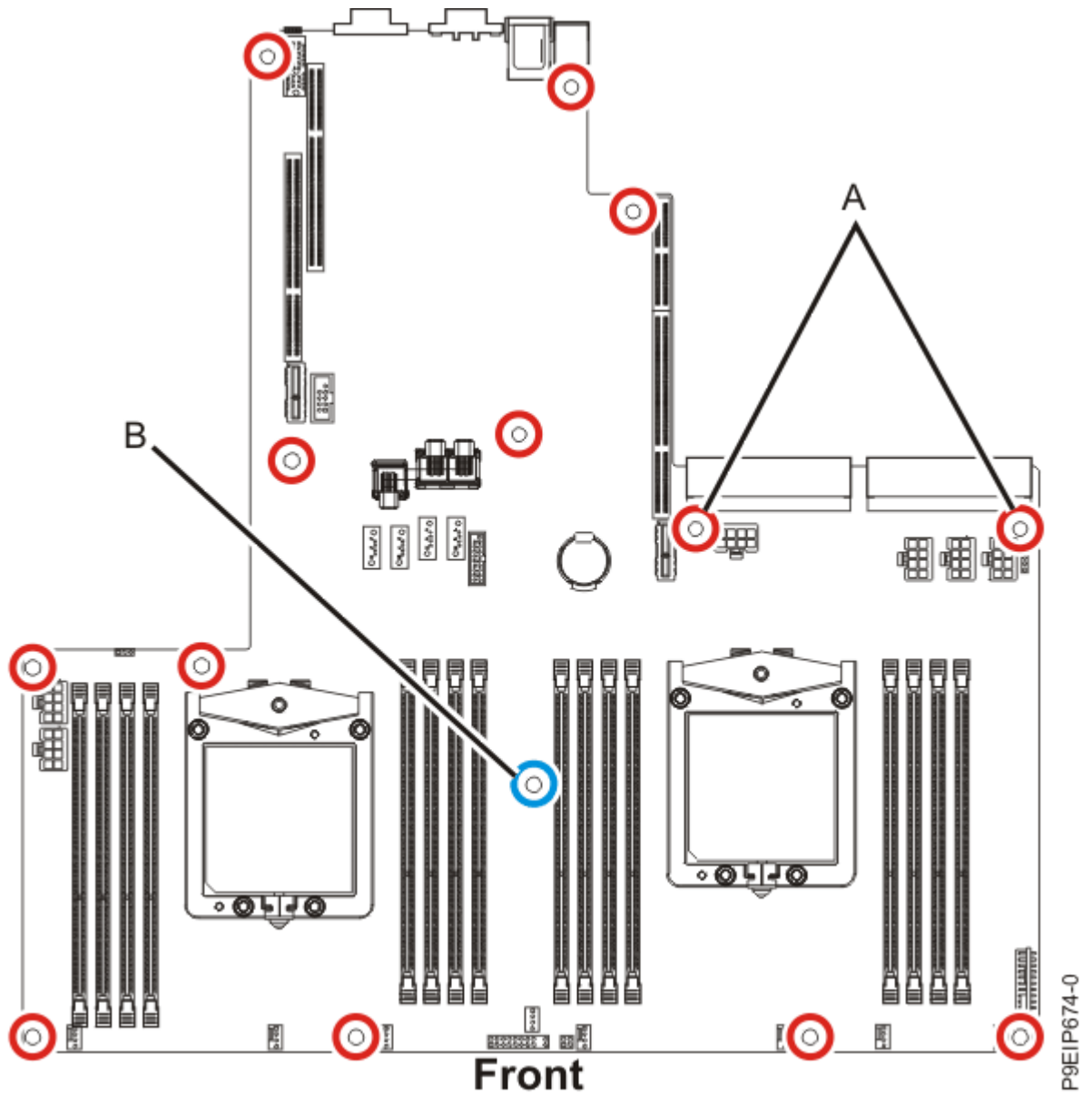
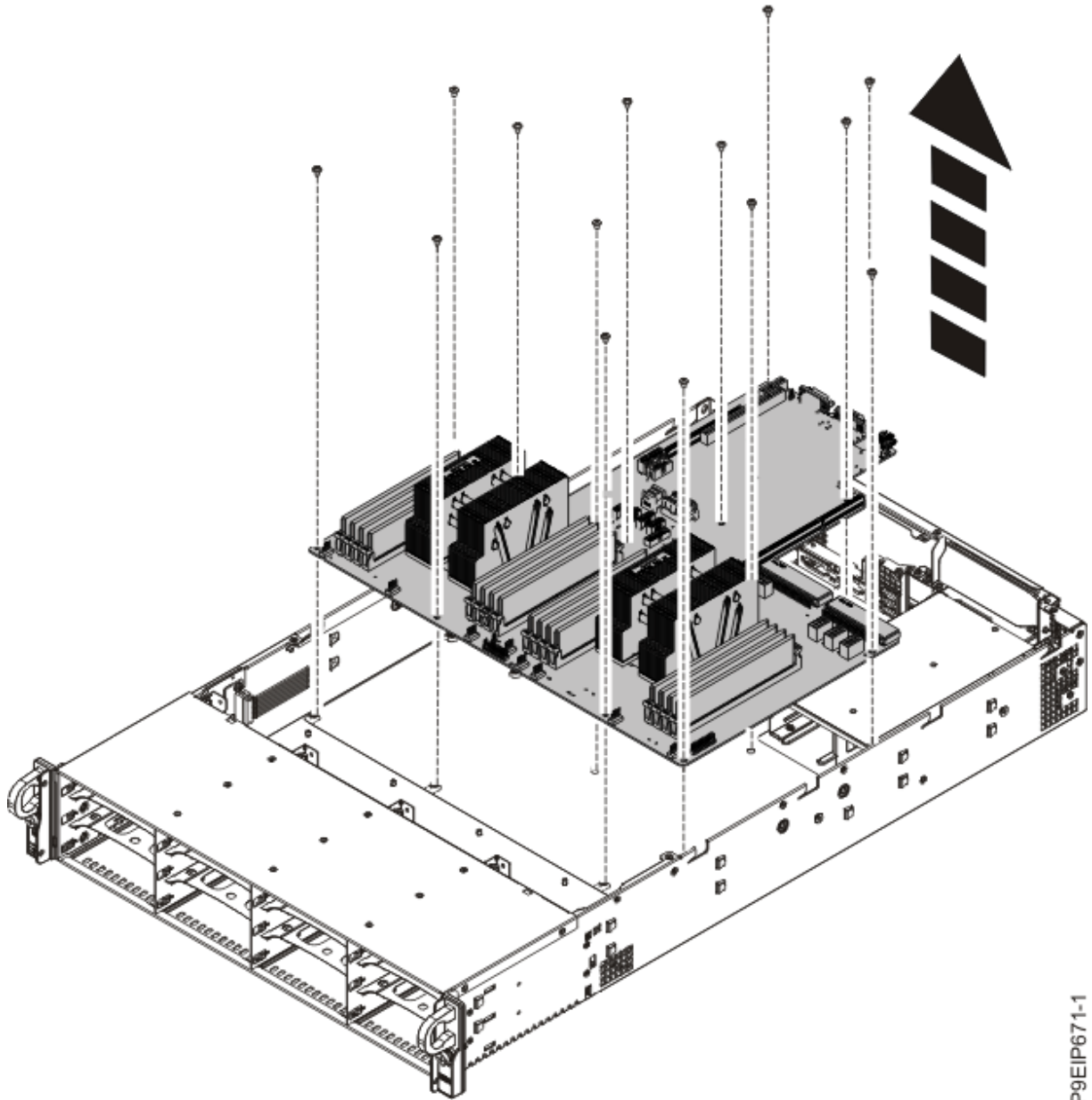


Figure 39. Screw locations

11. 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 40 on page 43](#).



P9EIP671-1

Figure 40. Lifting out the system backplane

12. Place the system backplane on an ESD mat.
13. Turn the system backplane upside down. Remove the two system processor reinforcing plates. They have 6 screws each. Save the plates and the screws for installing on the replacement system backplane.
After removing the reinforcing plates, turn the system backplane right side up.

Replacing the system backplane in the 5104-22C or 9006-22C

To replace the system backplane in the system, complete the steps in this procedure.

Procedure

1. Ensure that you have the electrostatic discharge (ESD) wrist strap on and that the ESD clip is plugged into a ground jack or connected to an unpainted metal surface. If not, do so now.
2. Remove the replacement system backplane from the static-protective package and place it on an ESD mat.

3. Turn the system backplane upside down. Install the two system processor reinforcing plates that you removed from the old system backplane. They have 6 screws each.

After replacing the reinforcing plates, turn the system backplane right side up.

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

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 41](#) on page 44.

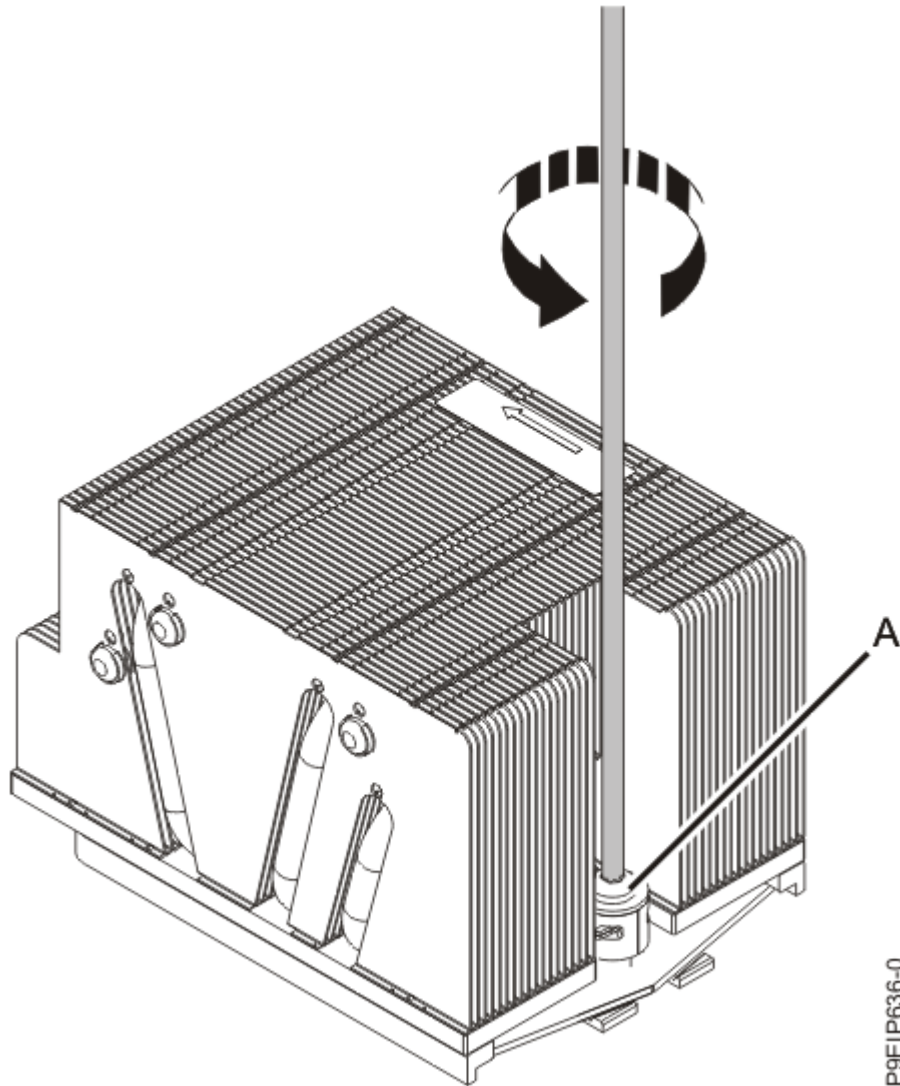


Figure 41. Loosening the load arm screw of the heat sink

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 42](#) on page 45.

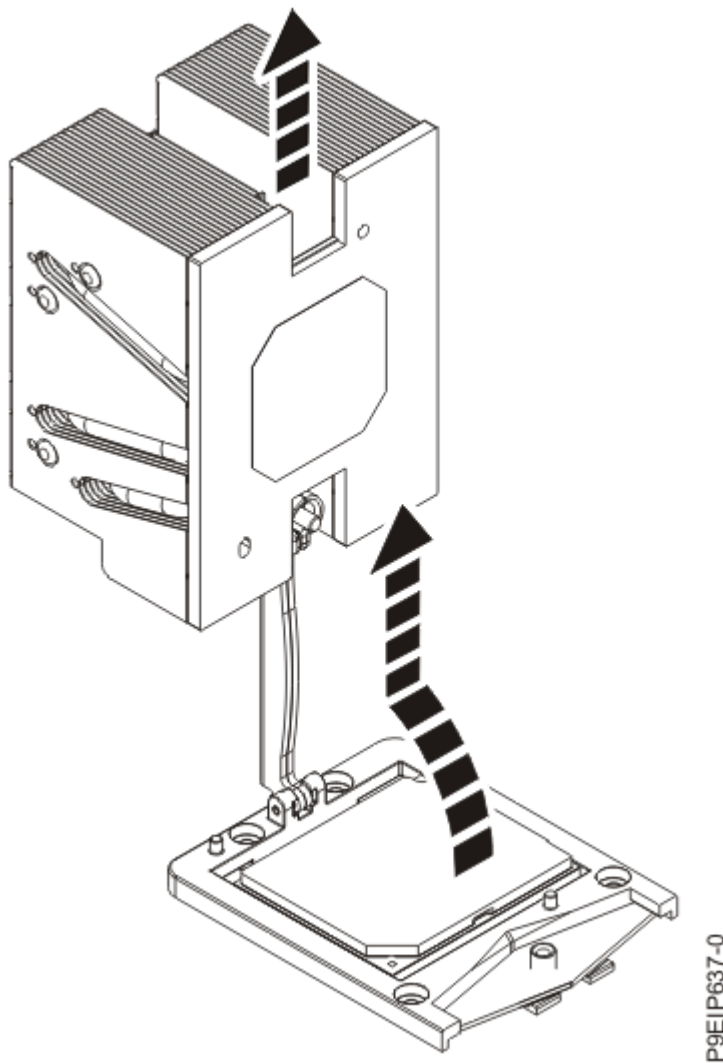
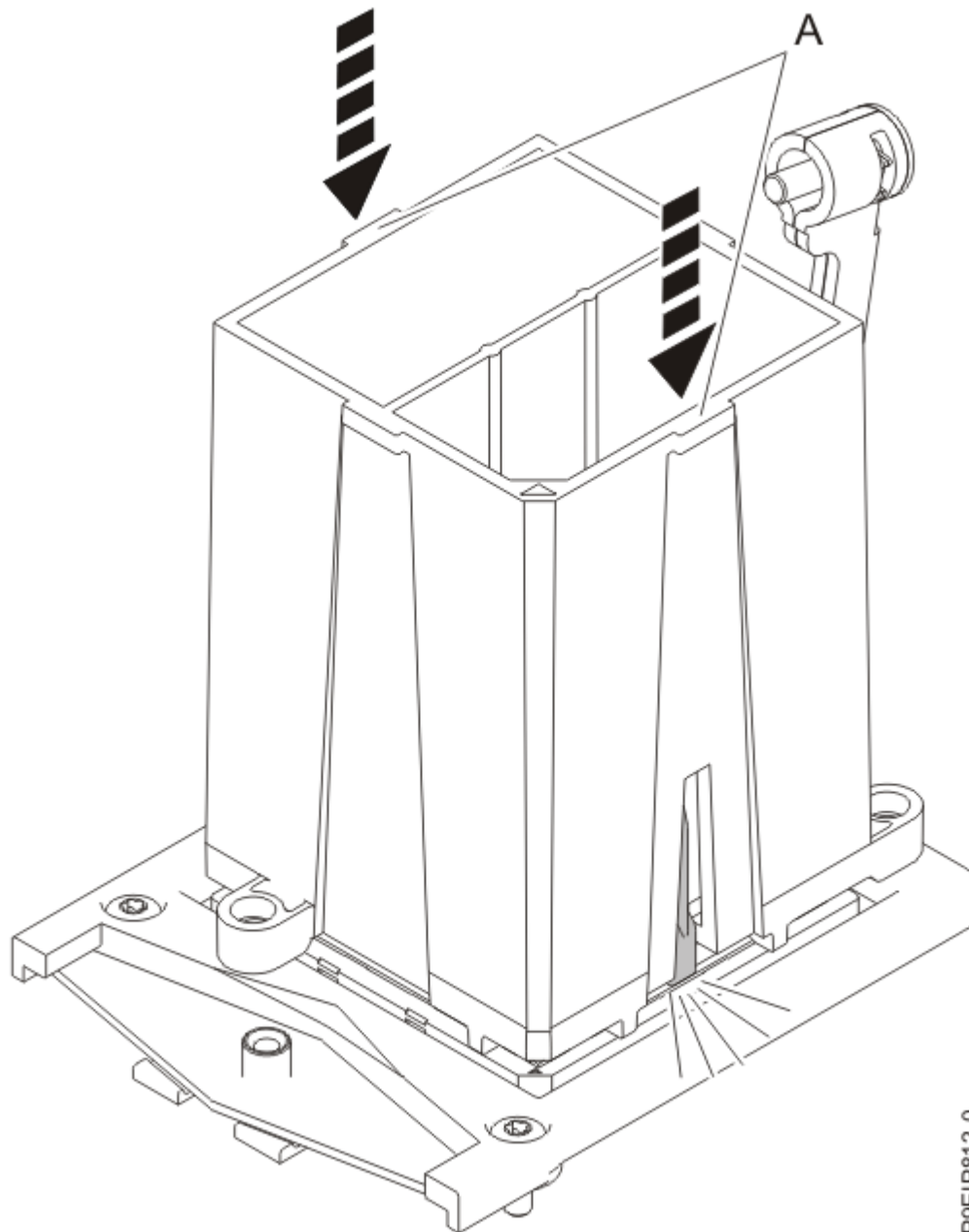


Figure 42. Lifting the heat sink from the load arm

6. Place the heat sink upside down on a clean surface.
7. Inspect the thermal interface material (TIM) for visible signs of damage. If you see folds, tears, bends, or if you have doubts about the TIM, replace the heat sink and the TIM.
8. Inspect the system processor socket area and remove any dust or debris (use a can of compressed air).
9. With the removal tool **(A)** sitting on top of the system processor module, push down on the tool to lock the system processor module into the tool as shown in [Figure 43](#) on page 46.

The tool drops slightly when you push down on the processor module so that the jaws can grab the bottom of the module. Make sure that both of the tool jaws are locked on the system processor module. Do not press the blue release tabs until directed to do so later.

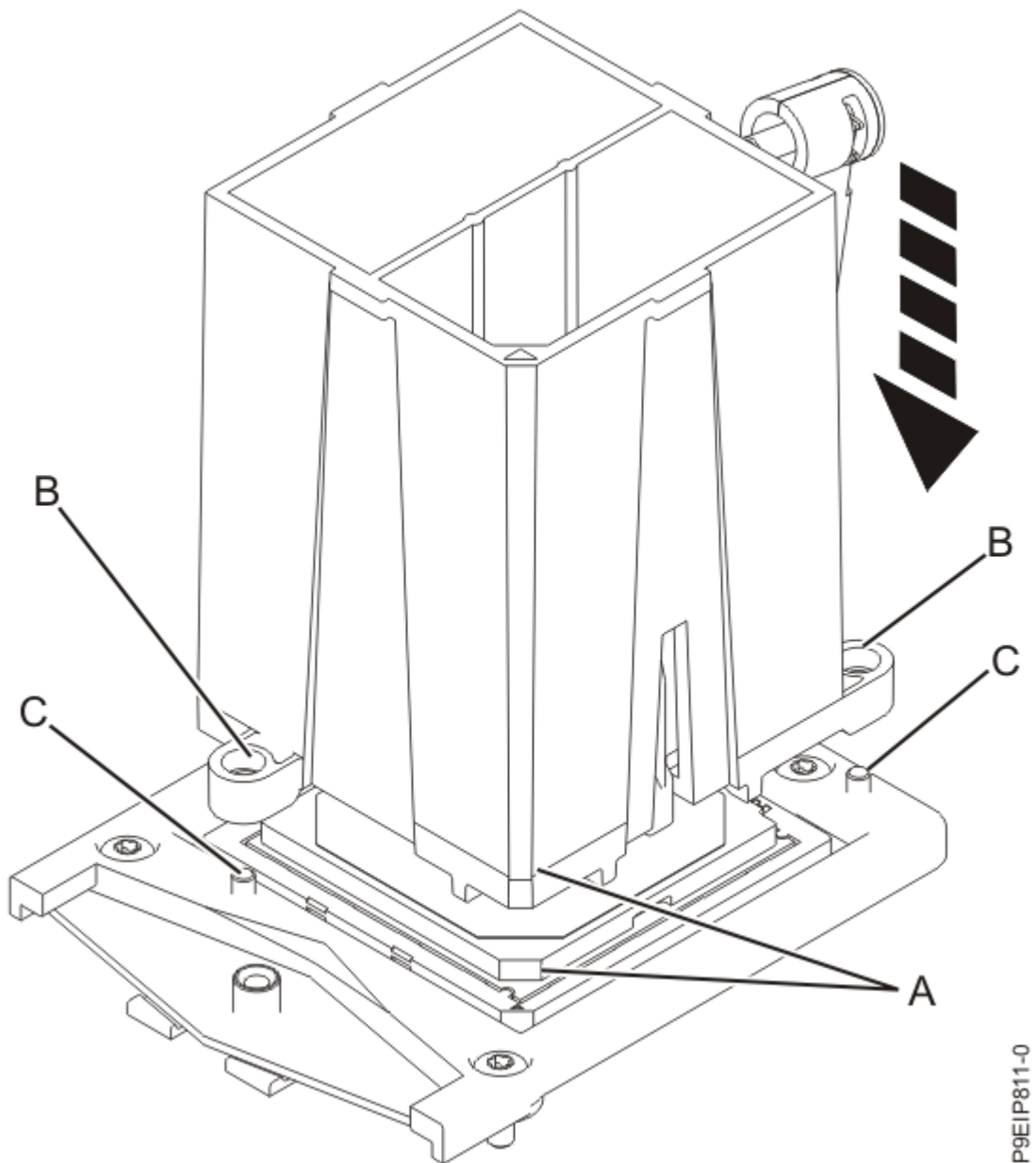


P9EIP812-0

Figure 43. Locking the system processor module into the tool

10. Holding the tool, lift the tool and system processor module from the old system backplane socket to transfer it to the new system backplane socket.
11. Lower the tool and system processor module onto the socket. Align the beveled corner (**A**) of the tool with the beveled corner on the socket as shown in [Figure 44 on page 47](#). Ensure that the two guide pins (**C**) are inserted into the alignment holes (**B**) on each side of the tool.

Use care to lower the tool evenly without tilting the tool. Do not attempt to slide the tool and the system processor module in any direction while the system processor module is touching the socket. If the tool and the system processor module are not aligned with the guide pins, lift the tool and the system processor module and reposition them.



P9EIP811-0

Figure 44. Installing the system processor module

12. After the tool and system processor module holes and guide pins are properly aligned, squeeze and hold the two blue release tabs **(A)** together until a firm stop is reached as shown in [Figure 45](#) on page [48](#). Then, lift the tool off the system processor module.

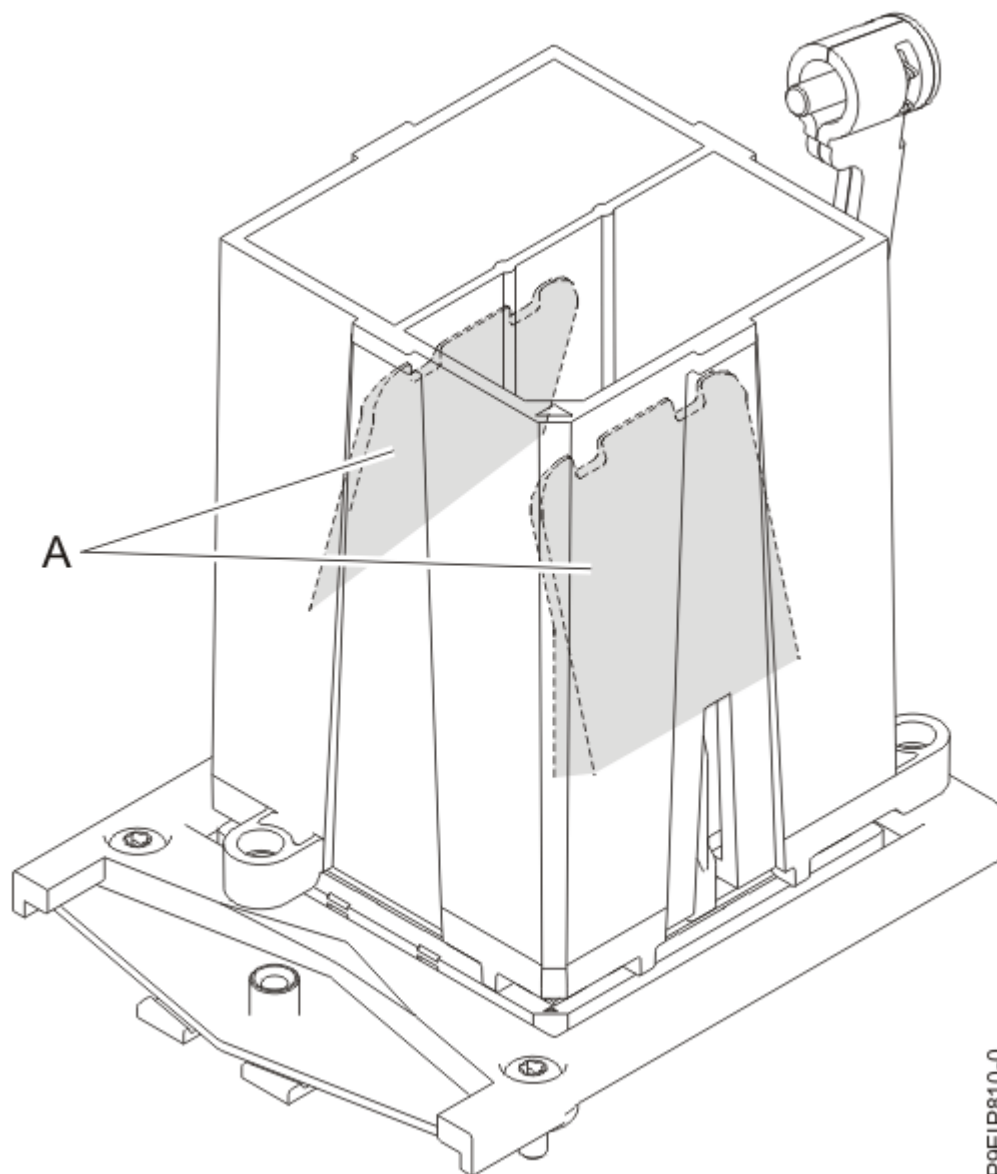


Figure 45. Removing the system processor module tool

13. Move the processor heat sink to the system processor module. If either the TIM or the heat sink is damaged, replace both the TIM and the heat sink. Carefully lower the heat sink over the system processor module, shelf or notch side down. Pass the load arm through the heat sink. Ensure that the holes in the heat sink **(A)** align with the alignment pins **(B)** on the socket, as shown in [Figure 46](#) on [page 49](#).

Gently and slightly twist the heat sink to ensure that both alignment pins in the socket engage with both of the guide holes in the heat sink.



CAUTION: If only one pin is aligned, or if neither pin is aligned, the heat sink will not contact the CPU properly.

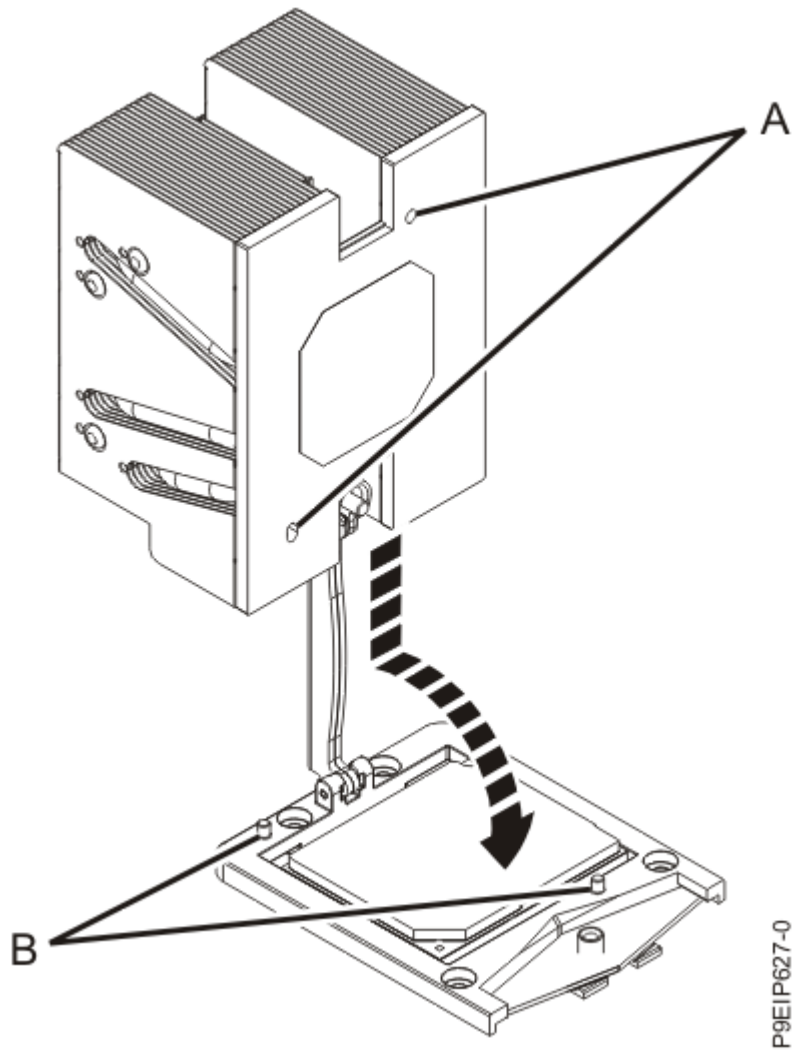


Figure 46. Installing the heat sink

14. Tighten the load arm **(A)** screw with a #3 Phillips screw driver, as shown in [Figure 47](#) on page 50.

Note: Do not overtighten the load arm screw.

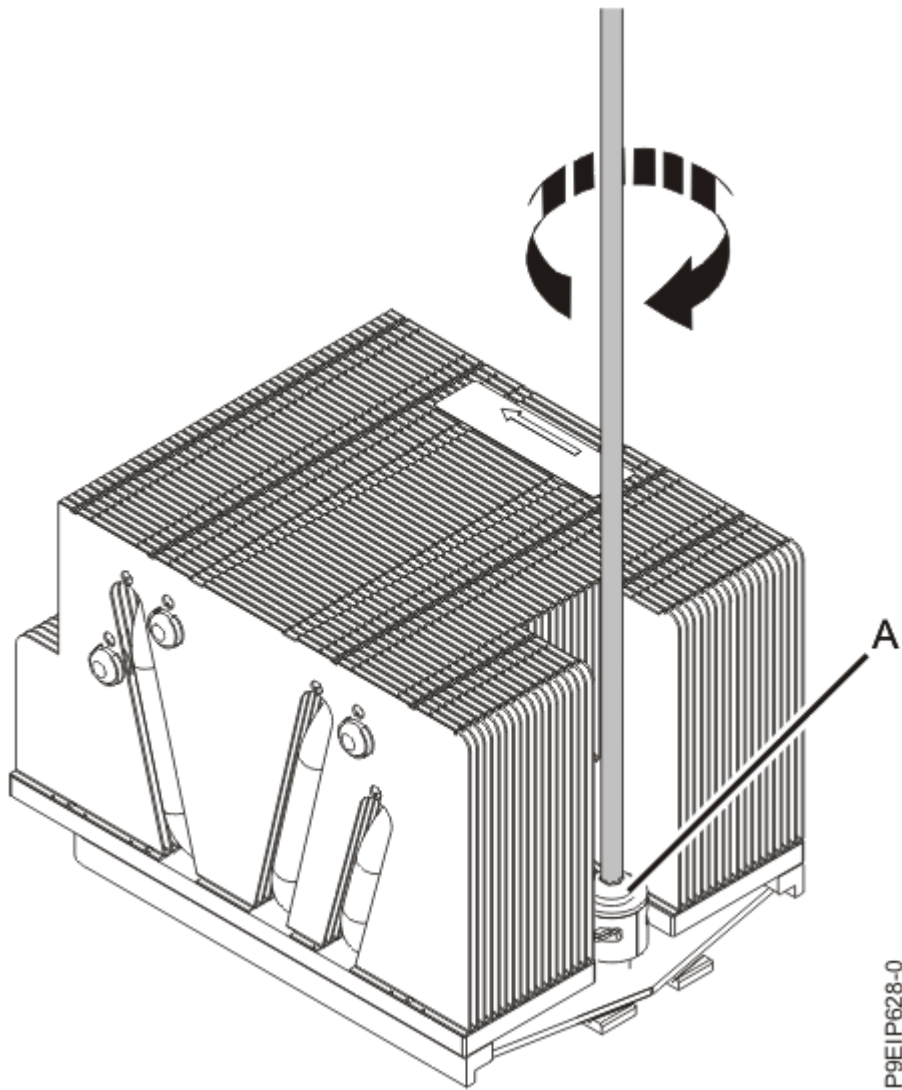
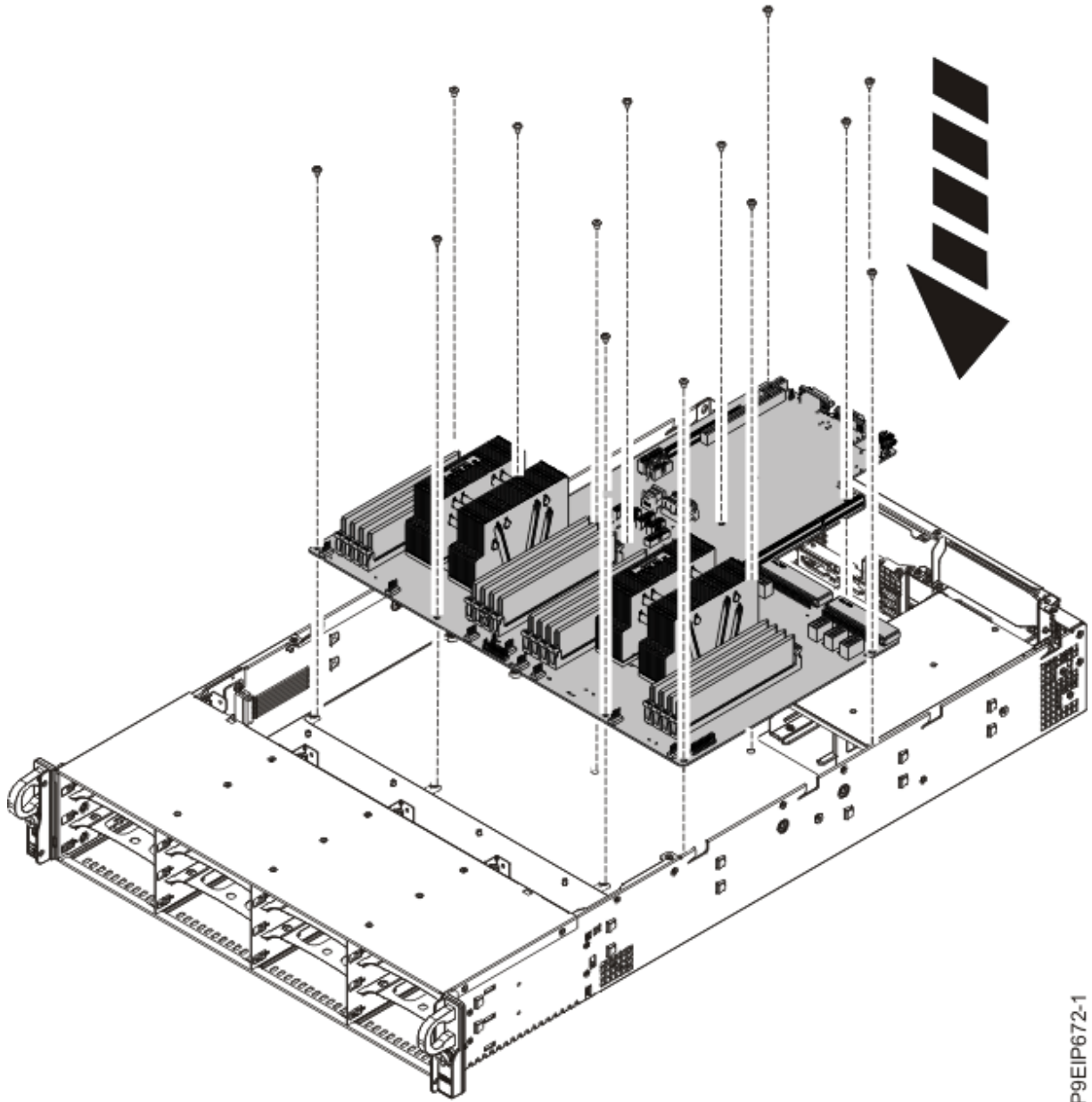


Figure 47. Tightening the load arm screw

The following steps continue installing components into the new system backplane:

15. 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 48 on page 51](#).



P9EIP672-1

Figure 48. Replacing the system backplane

16. Align and screw the 14 screws into the system backplane.
The screw locations are shown in [Figure 49](#) on page 52.

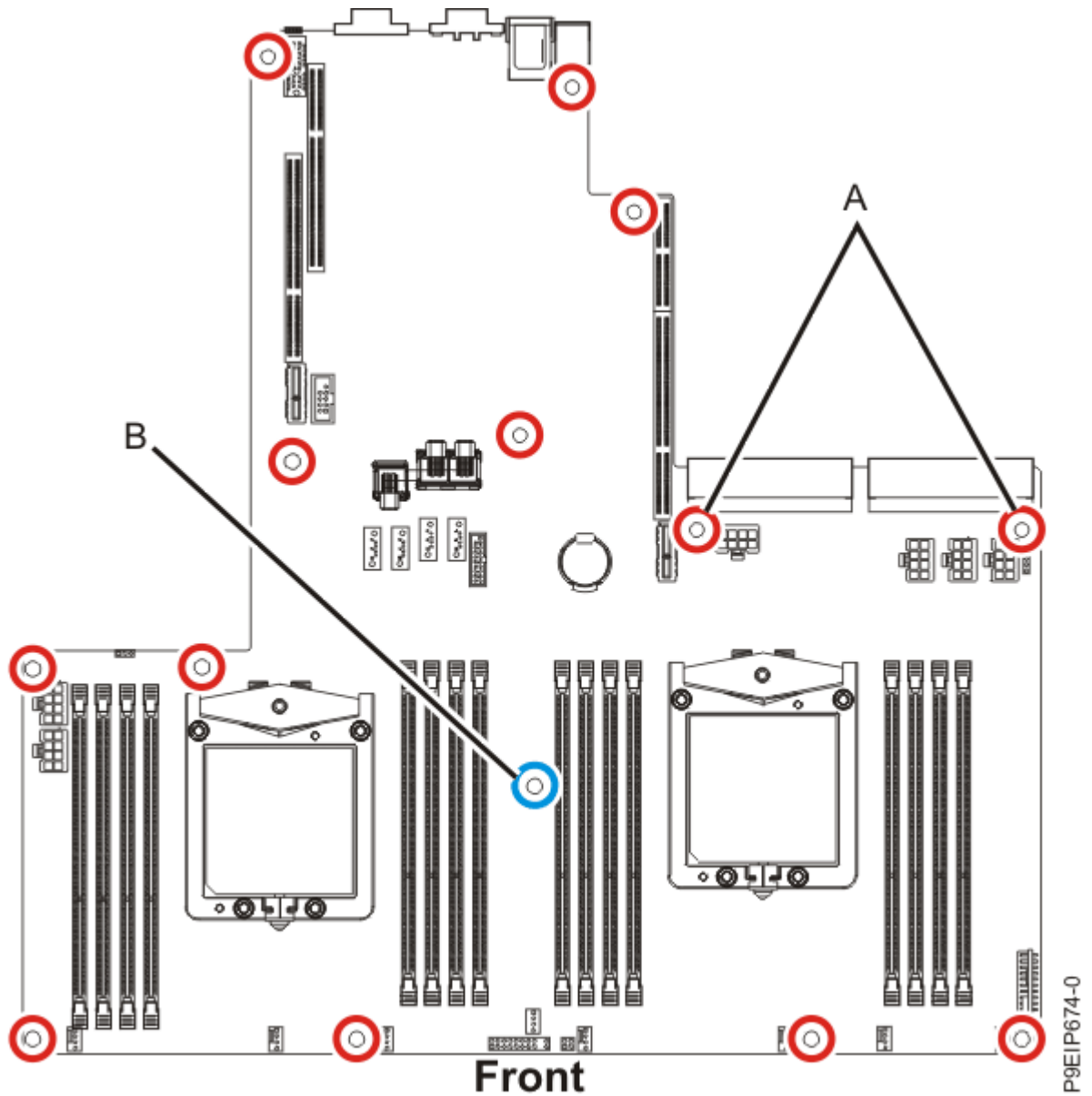


Figure 49. Screw locations

17. Carefully pass the operator panel cable and the disk drive signal cables through the bulkhead from the fan area to the system backplane area.
18. Using your label, replace the operator panel cable into the system backplane.
19. Replace the cover switch cable into the system backplane as shown in [Figure 50 on page 53](#).

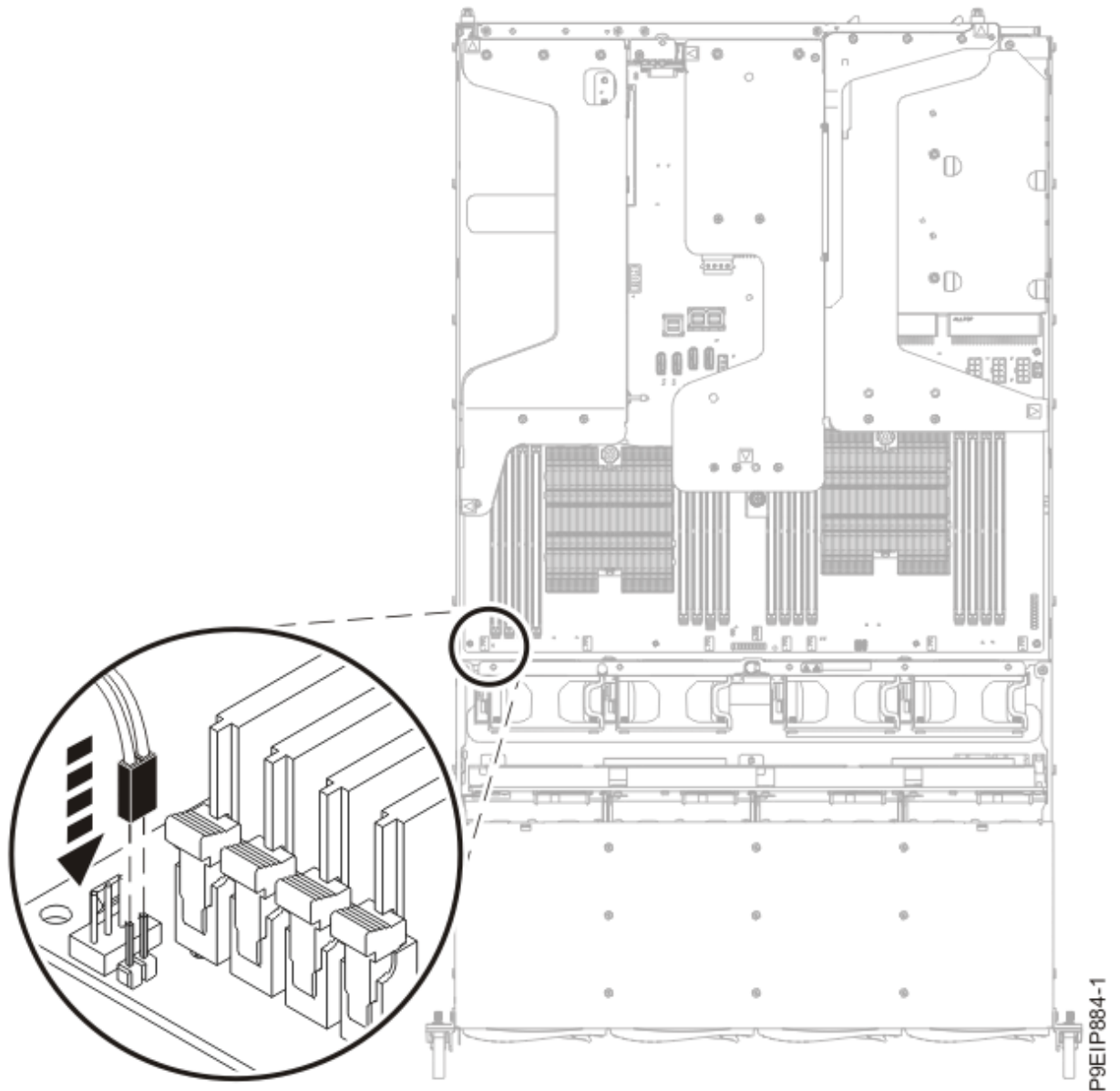
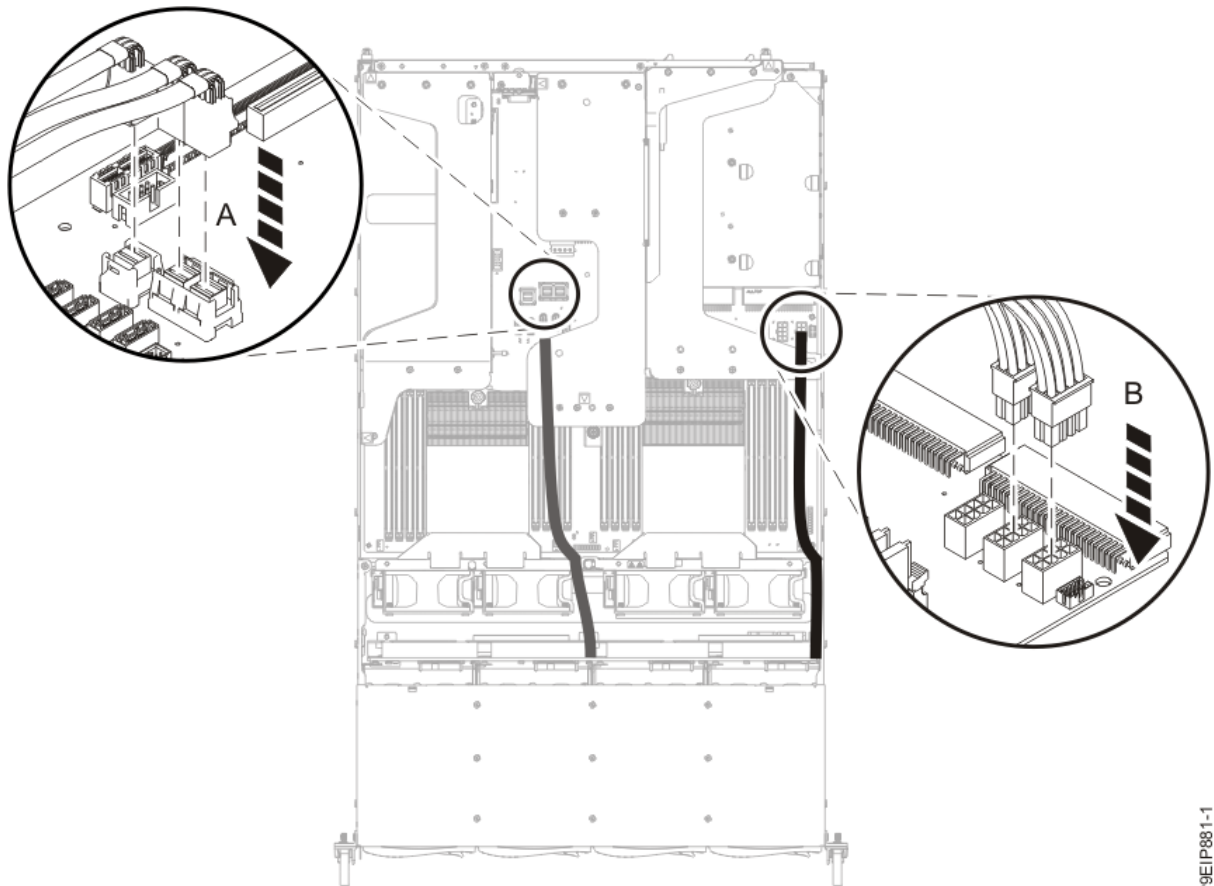


Figure 50. Replacing the cover switch cable

20. Using your labels, replace the drive signal cables **(A)** and **(D)** as shown in [Figure 51](#) on page 54. Using your labels, replace, the drive power cables **(C)**, into the system backplane .



P9EIP881-1

Figure 51. Connecting the drive signal cables and the drive power cables

21. Connect the four fan power cables to the system backplane as shown in [Figure 52 on page 55](#). Do not pull on the wires.

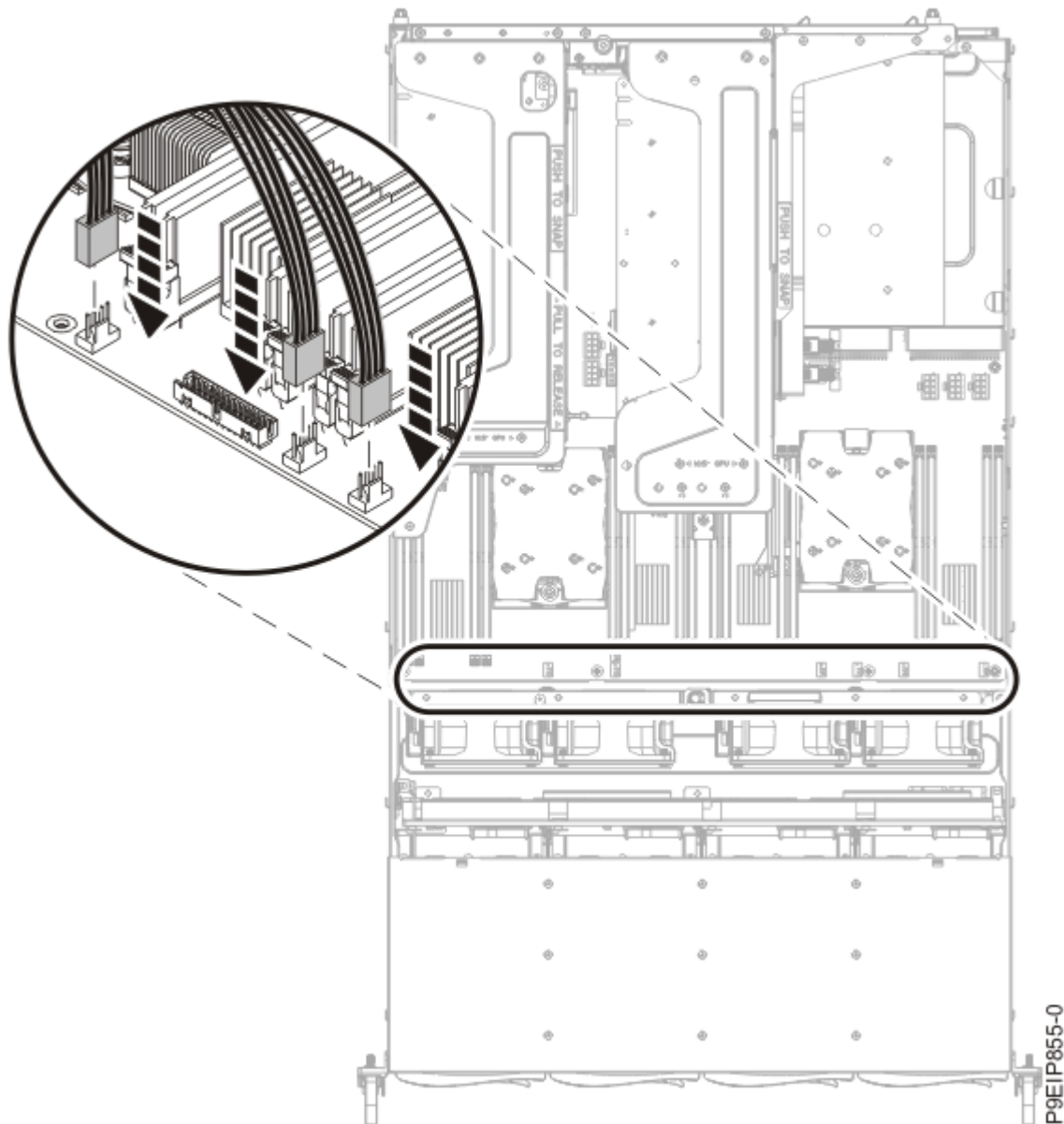


Figure 52. Connecting the fan cables

22. Transfer the memory DIMMs from the old system backplane to the new system backplane.

For instructions, see [“Removing and replacing memory in the 5104-22C or 9006-22C”](#) on page 17.

23. Replace both PCIe risers.

Using your labels, connect the cables to the PCIe adapters. For instructions, see [“Replacing a PCIe adapter in the 5104-22C or 9006-22C system”](#) on page 27.

24. Replace the fans.

For instructions, see [“Replacing a system fan in the 5104-22C or 9006-22C”](#) on page 16.

25. Install the processor air baffle.

Insert the edge of the air baffle into the fan support. Then, carefully press the air baffle down into place.

What to do next

Prepare the system for operation. For instructions, see [“Preparing the 5104-22C, 9006-22C, or 9006-22P 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 \(www-304.ibm.com/support/customer/sas/f/lopdiags/scaleOutLCdebugtool.html\)](http://www-304.ibm.com/support/customer/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 5104-22C or 9006-22C

Learn how to remove and replace a system processor module in the system.

Removing a system processor module from the 5104-22C or 9006-22C system

To remove a system processor module from the system, complete the steps in this procedure.

Before you begin

Power off the system and place it in the service position. For instructions, see [“Preparing the 5104-22C, 9006-22C, or 9006-22P system to remove and replace internal parts” on page 77.](#)

Parts must be replaced with the identical part in the exact same place.

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.

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



Attention:

- Attach an electrostatic discharge (ESD) wrist strap to the front ESD jack, to the rear ESD jack, or to an unpainted metal surface of your hardware to prevent the electrostatic discharge from damaging your hardware.
 - When you use an ESD wrist strap, follow all electrical safety procedures. An ESD wrist strap is used for static control. It does not increase or decrease your risk of receiving electric shock when using or working on electrical equipment.
 - If you do not have an ESD wrist strap, just prior to removing the product from ESD packaging and installing or replacing hardware, touch an unpainted metal surface of the system for a minimum of 5 seconds. If at any point in this service process you move away from the system, it is important to again discharge yourself by touching an unpainted metal surface for at least 5 seconds before you continue with the service process.
2. Open the packaging of the new system processor module and place the cover upside down next to the tray, as shown in [Figure 53 on page 57](#). The cover is used for the system processor module that you are replacing.

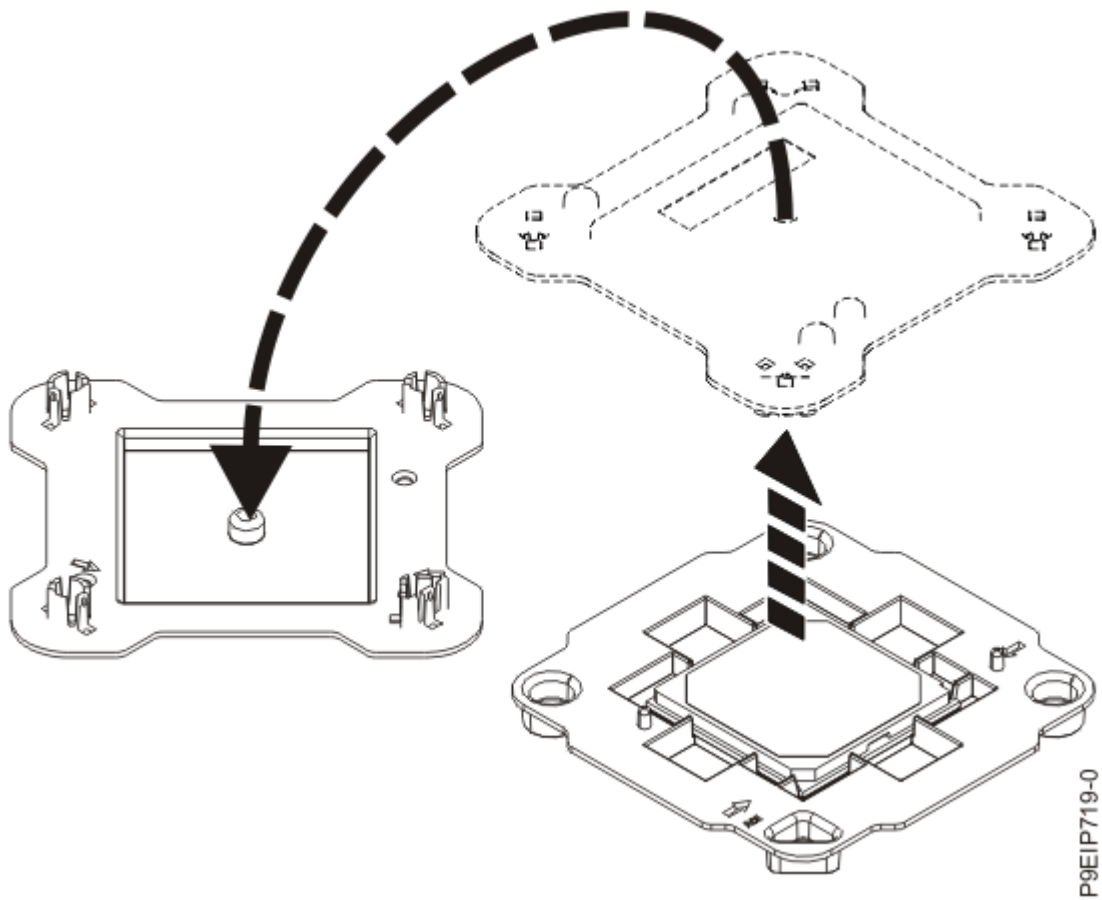
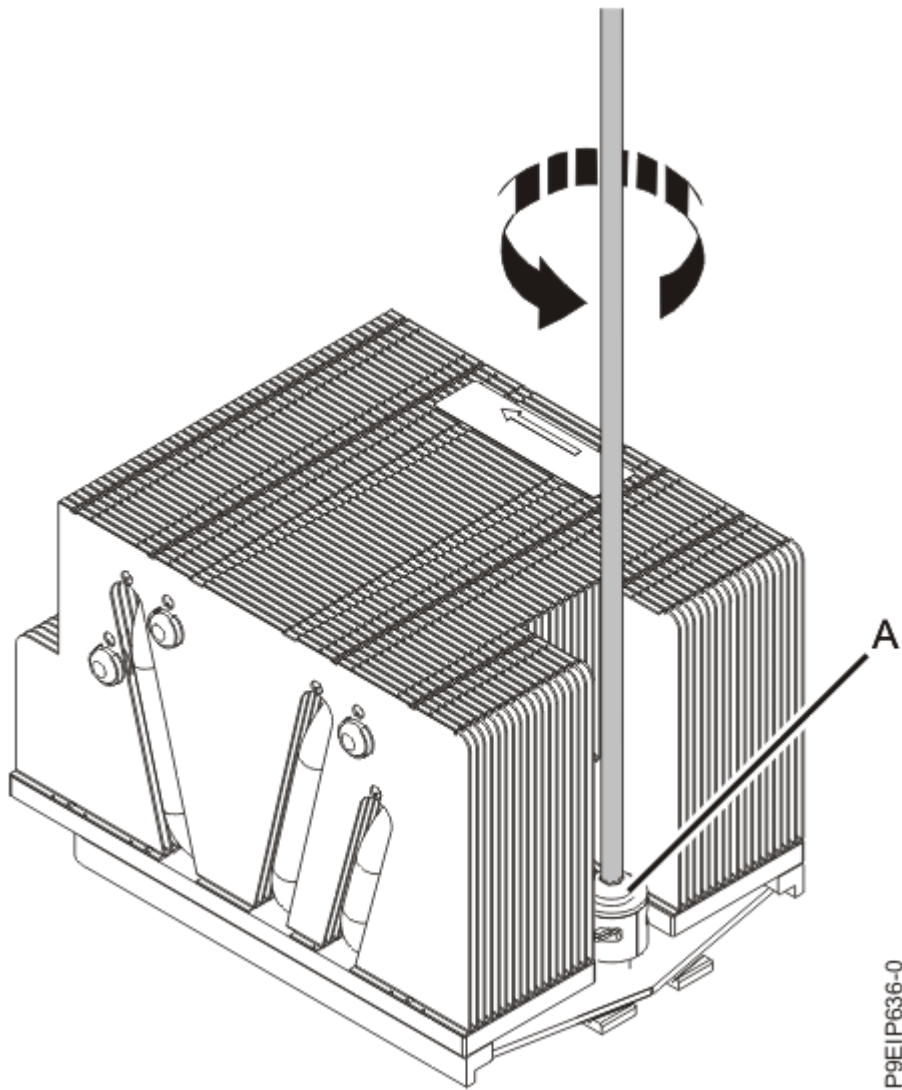


Figure 53. Opening the system processor module packaging

3. Remove the processor air baffle.

Carefully unsnap and lift the processor air baffle from the system.

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 54](#) on page 58.



P9EIP636-0

Figure 54. 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 55](#) on page 59.

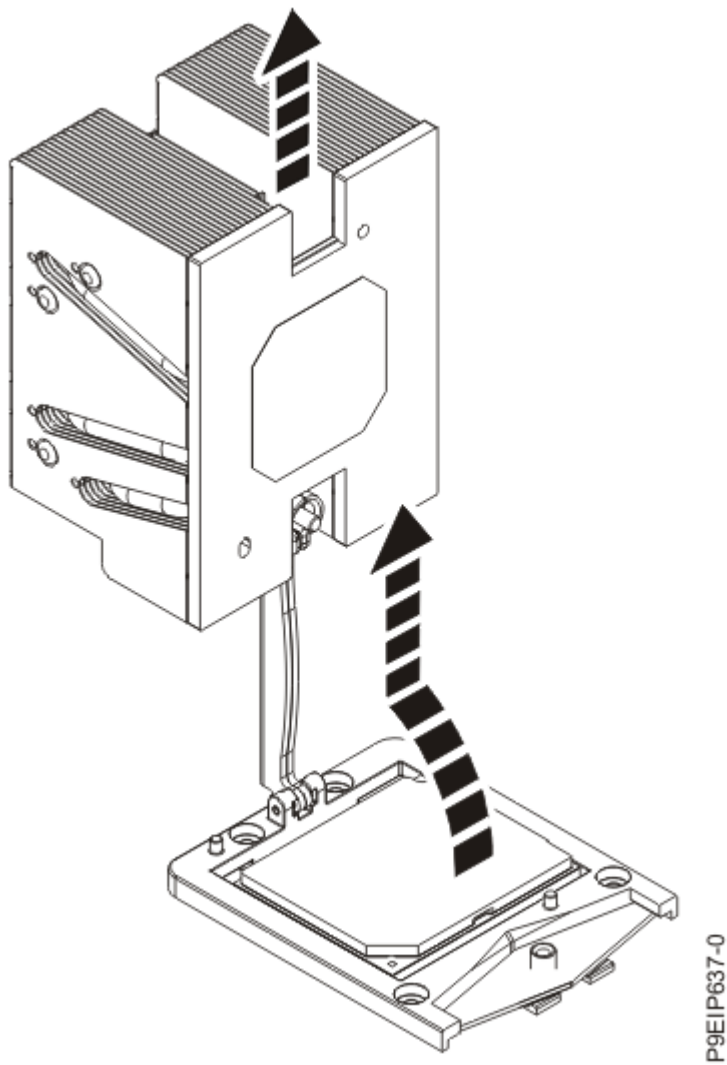
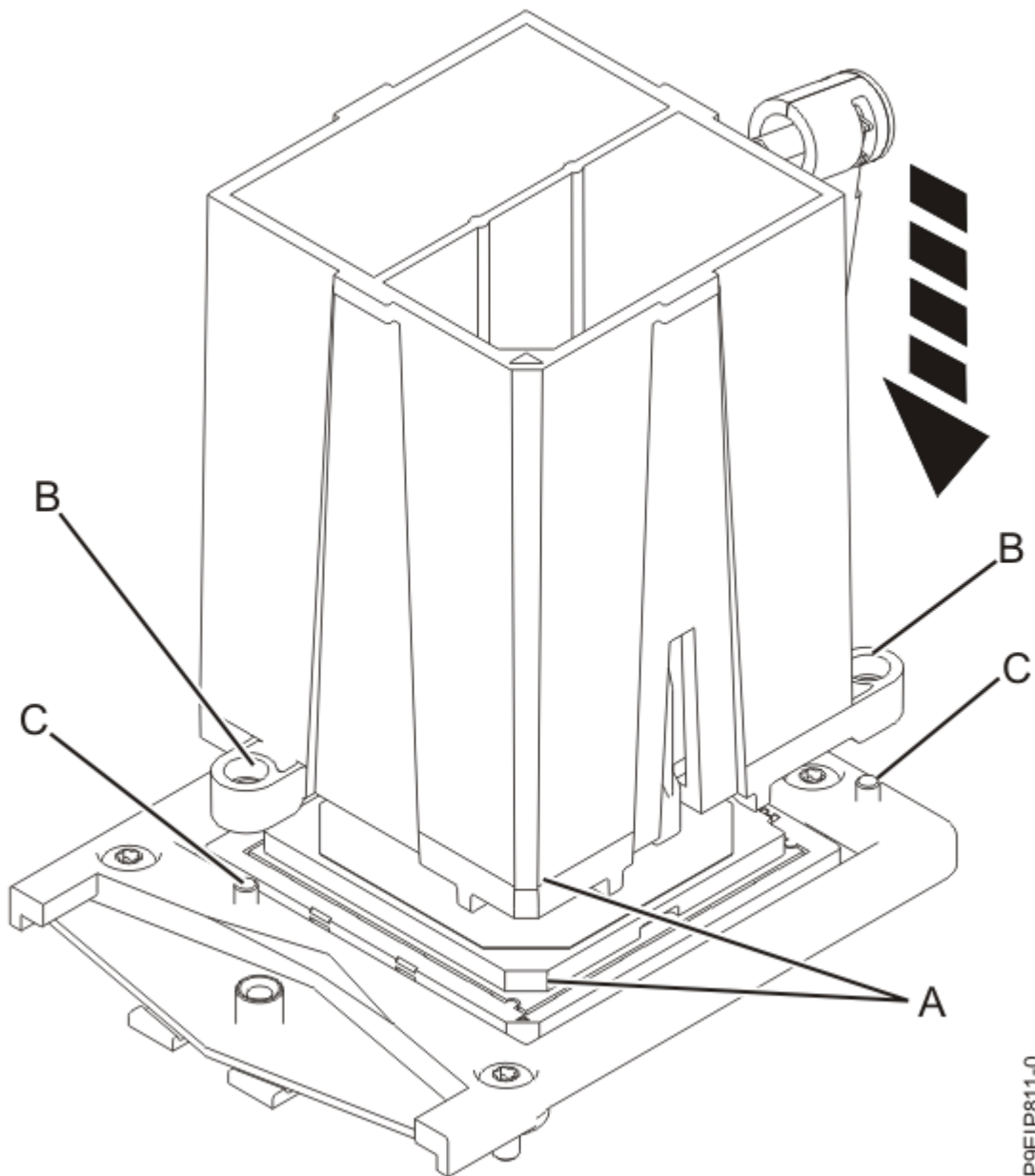


Figure 55. Lifting the heat sink from the load arm

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. Align the tool with the beveled edge **(A)** of the system processor module. Lower the tool over the system processor module by ensuring the two guide pins **(C)** are inserted into the alignment holes **(B)** on each side of the tool.

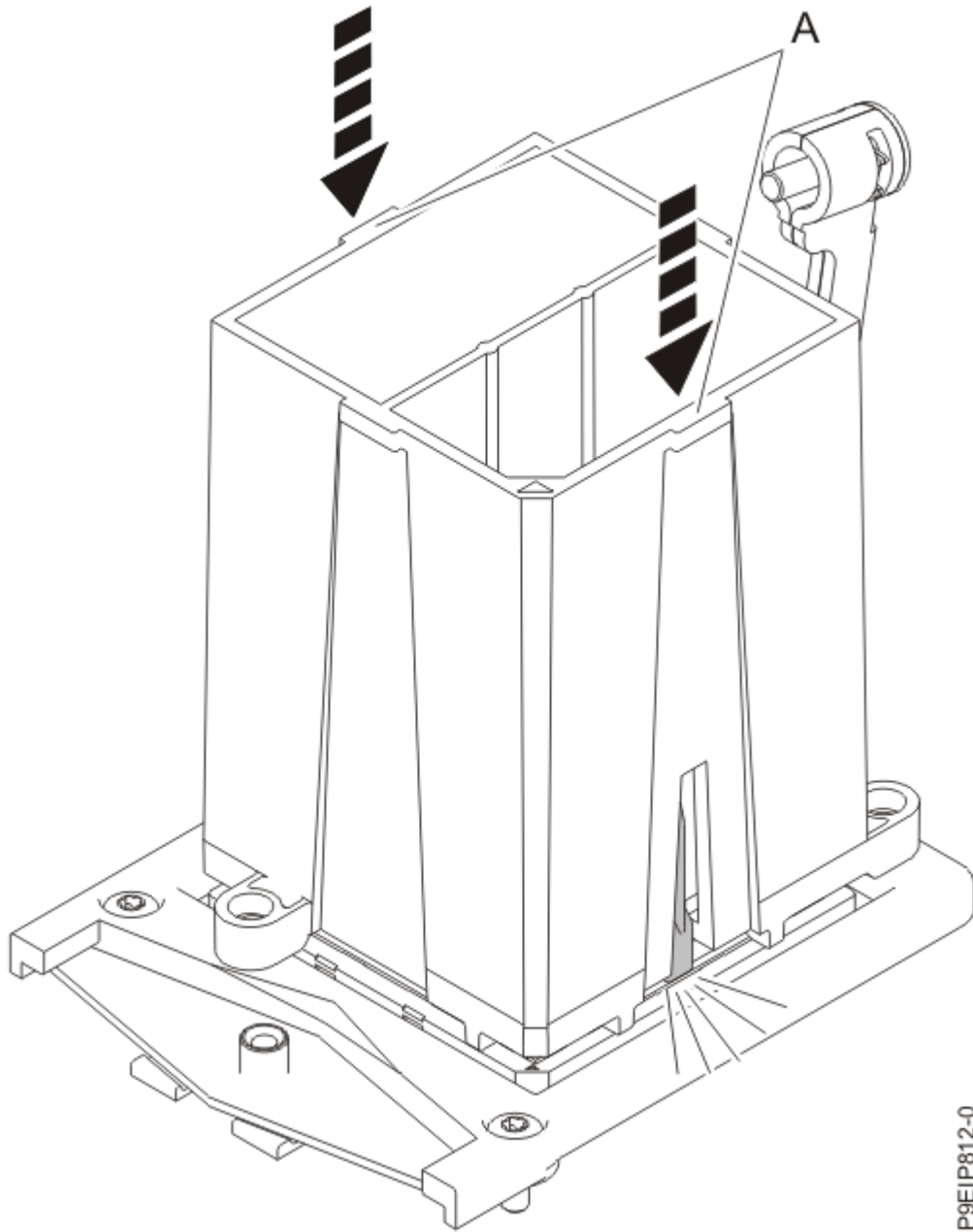


P9EIP811-0

Figure 56. Lowering the removal tool onto the system processor module

9. With the removal tool **(A)** sitting on top of the system processor module, push down on the tool to lock the system processor module into the tool as shown in the following figure.

The tool drops slightly when you push down on the processor module so that the jaws can grab the bottom of the module. Make sure that both of the tool jaws are locked on the system processor module. Do not press the blue release tabs until directed to do so later.



P9EIP812-0

Figure 57. Locking the system processor module into the tool

10. Hold the outside of the tool and lift the tool 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 the following figure.

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.

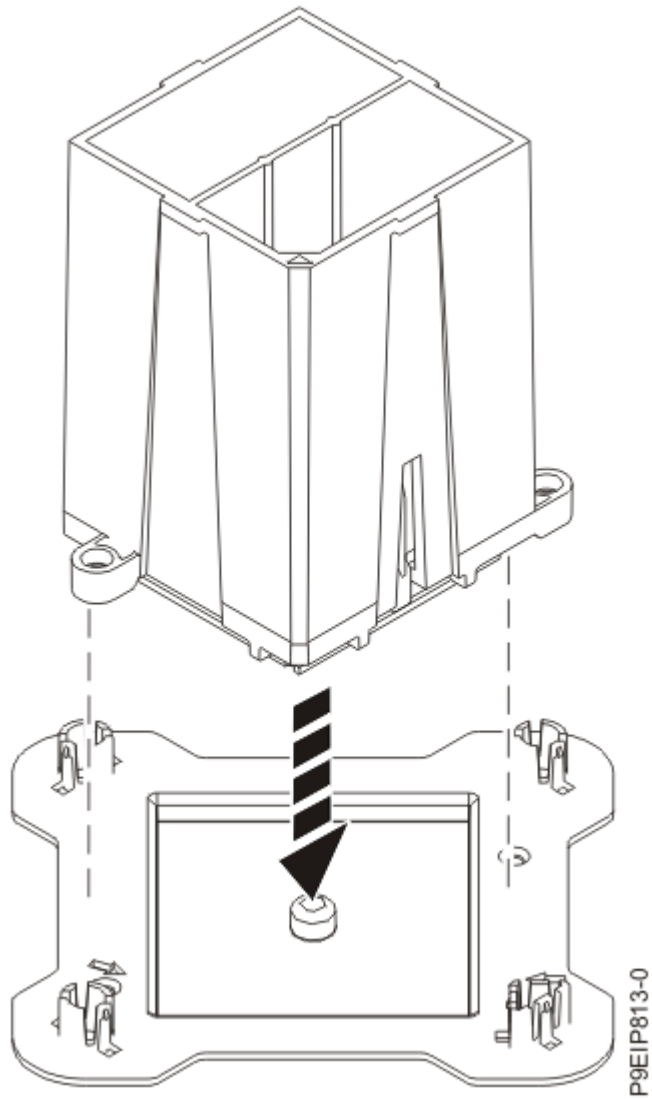


Figure 58. Placing the processor at an angle on the top cover of the packaging

11. Squeeze the two blue tabs to release the system processor module from the tool as shown in the following figure.

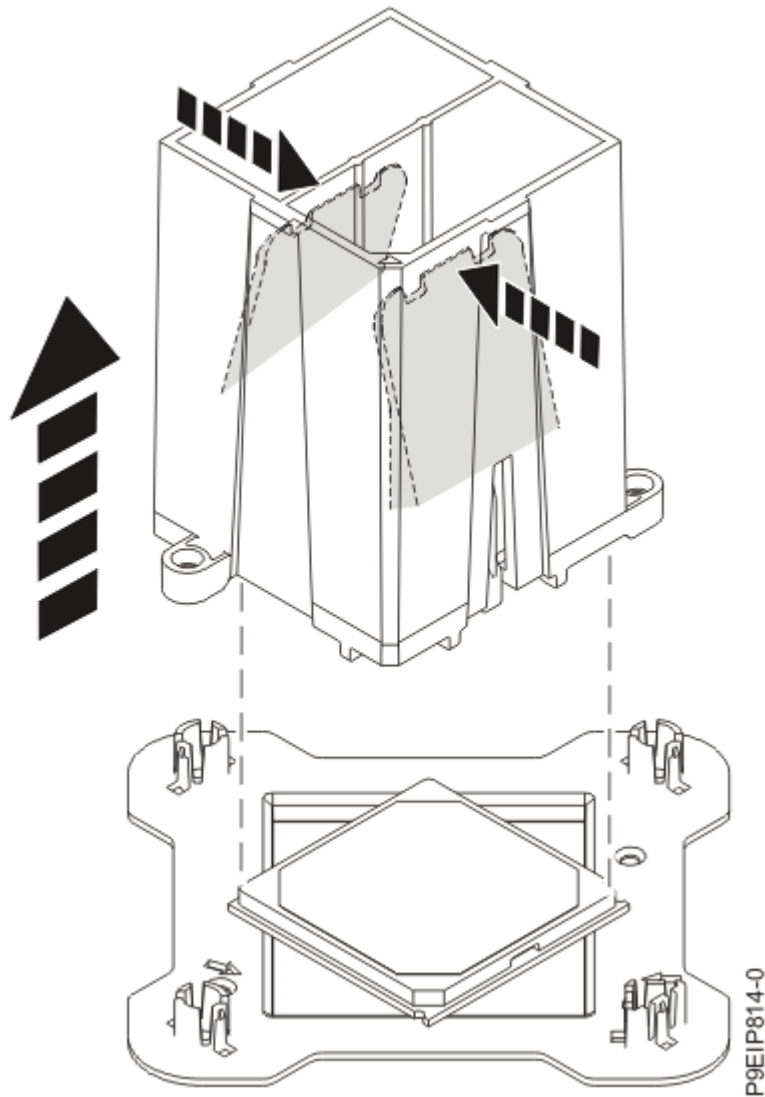


Figure 59. Releasing the system processor module from the tool

Replacing a system processor module for the 5104-22C or 9006-22C

To replace a system processor module in the system, complete the steps in this procedure.

Procedure

1. Ensure that you have the electrostatic discharge (ESD) wrist strap on and that the ESD clip is plugged into a ground jack or connected to an unpainted metal surface. If not, do so now.
2. Inspect the system processor socket area and remove any dust or debris (use a can of compressed air).
3. Use your fingers to carefully remove the replacement processor module from the shipping tray. With the top of the module towards the inside of the processor replacement tool (pins out), align the beveled corner of the processor module with the beveled corner of the tool. Gently push the processor module into the tool until the latches click around the module.

Ensure that you do not touch the pins on the bottom of the module.

4. Lower the tool and system processor module onto the socket. Align the beveled corner **(A)** of the tool with the beveled corner on the socket as shown in [Figure 60 on page 64](#). Ensure that the two guide pins **(C)** are inserted into the alignment holes **(B)** on each side of the tool.

Use care to lower the tool evenly without tilting the tool. Do not attempt to slide the tool and the system processor module in any direction while the system processor module is touching the socket. If the tool and the system processor module are not aligned with the guide pins, lift the tool and the system processor module and reposition them.

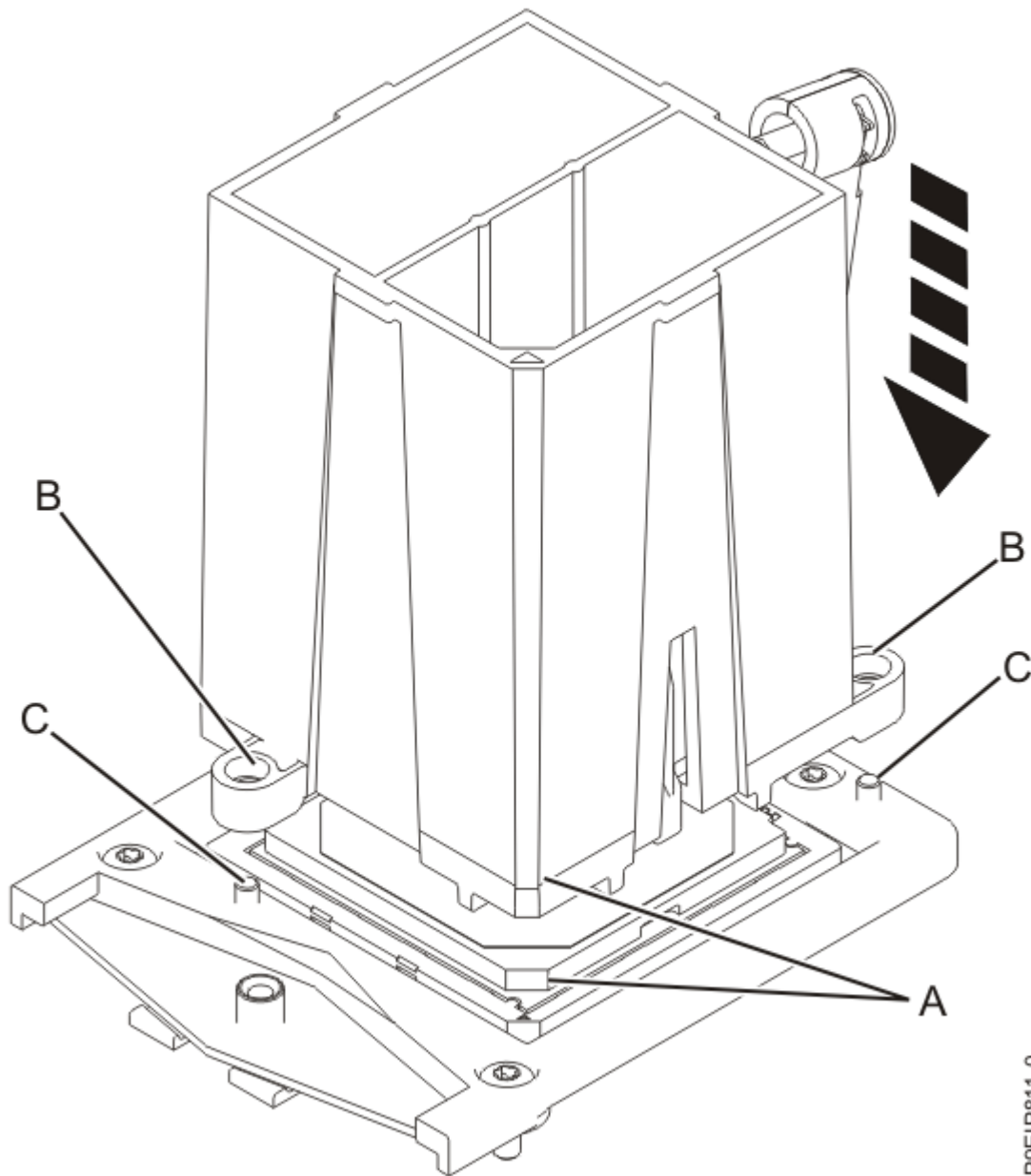


Figure 60. Installing the system processor module

5. After the tool and system processor module holes and guide pins are properly aligned, squeeze and hold the two blue release tabs **(A)** together until a firm stop is reached as shown in [Figure 61 on page 65](#). Then, lift the tool off the system processor module.

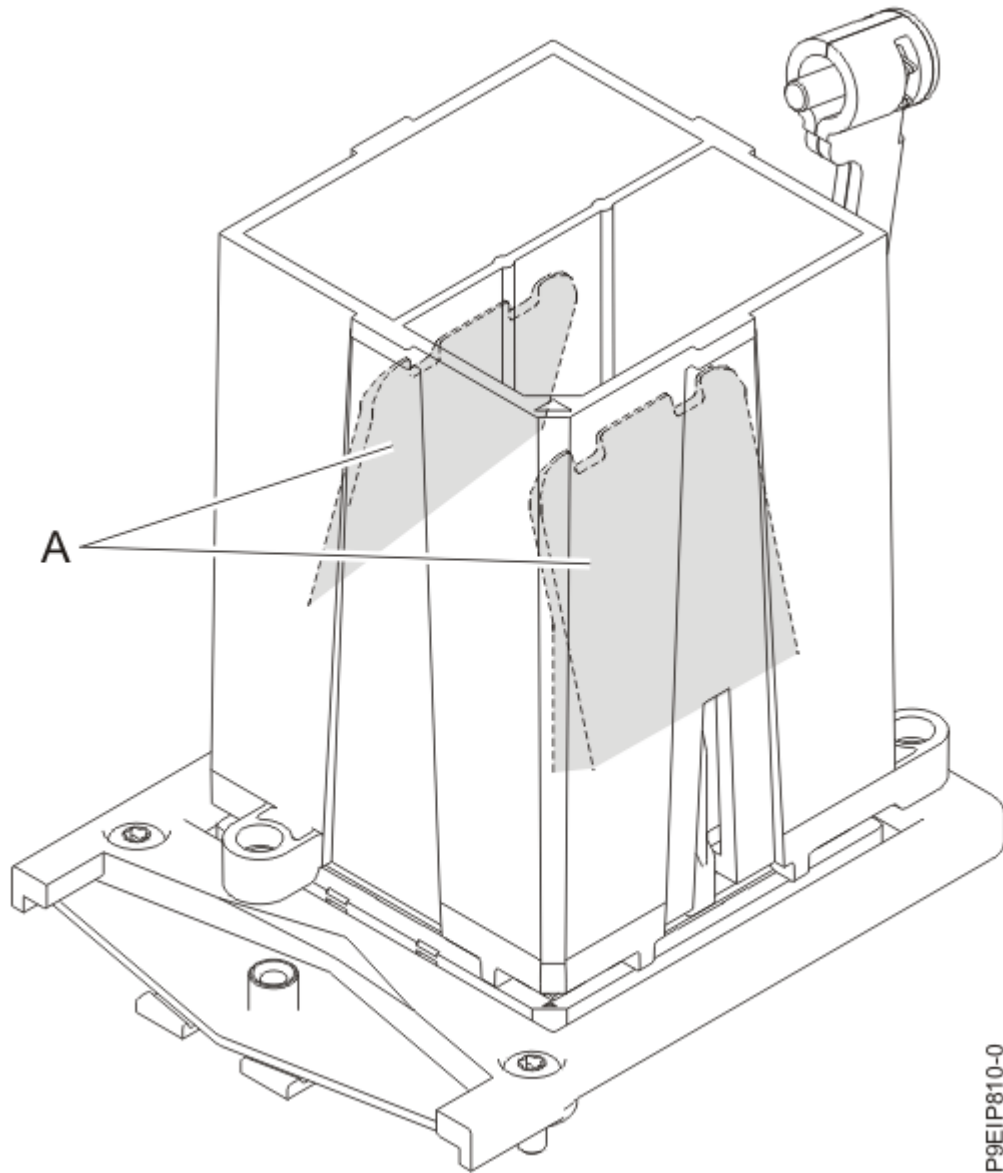


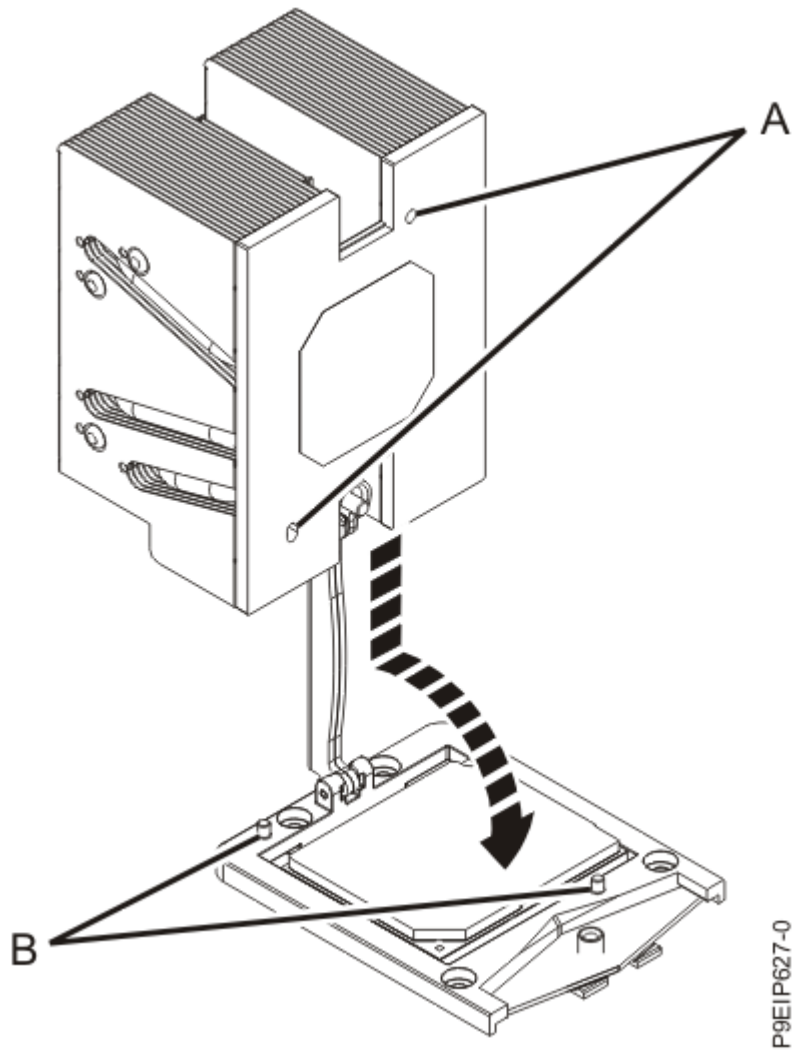
Figure 61. Removing the system processor module tool

6. 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, shelf or notch side down. Pass the load arm through the heat sink. Ensure that the holes in the heat sink **(A)** align with the alignment pins **(B)** on the socket, as shown in [Figure 62 on page 66](#).

Gently and slightly twist the heat sink to ensure that both alignment pins in the socket engage with both of the guide holes in the heatsink.



CAUTION: If only one pin is aligned, or if neither pin is aligned, the heat sink will not contact the CPU properly.



P9EIP627-0

Figure 62. Installing the heat sink

7. Tighten the load arm **(A)** screw with a #3 Phillips screw driver, as shown in [Figure 63 on page 67](#).

Note: Do not overtighten the load arm screw.

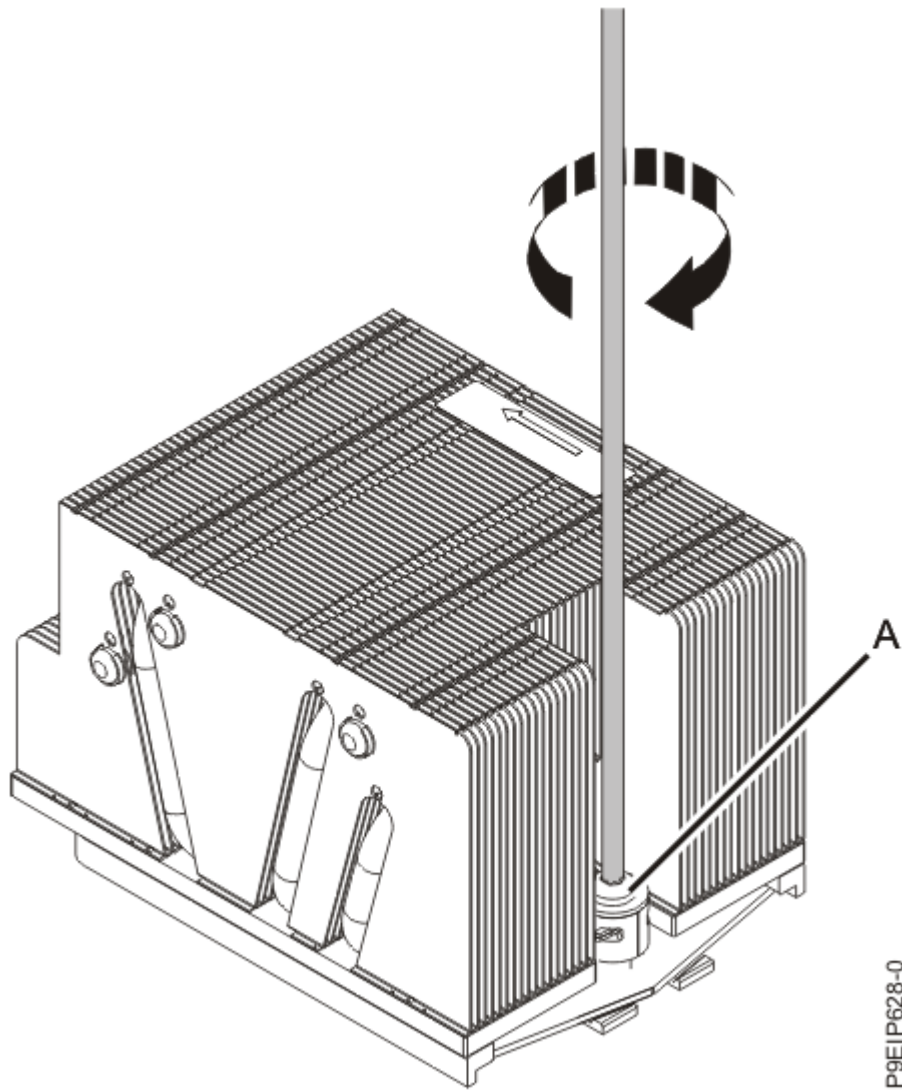


Figure 63. Tightening the load arm screw

8. Install the processor air baffle.

Insert the edge of the air baffle into the fan support. Then, carefully press the air baffle down into place.

9. Lightly grip the system processor module that you replaced by the edges and lift it off the shipping cover. Align the beveled corner of the module **(A)** to the corner of the tray with the triangle **(B)** and place it in the tray, as shown in [Figure 64 on page 68](#).

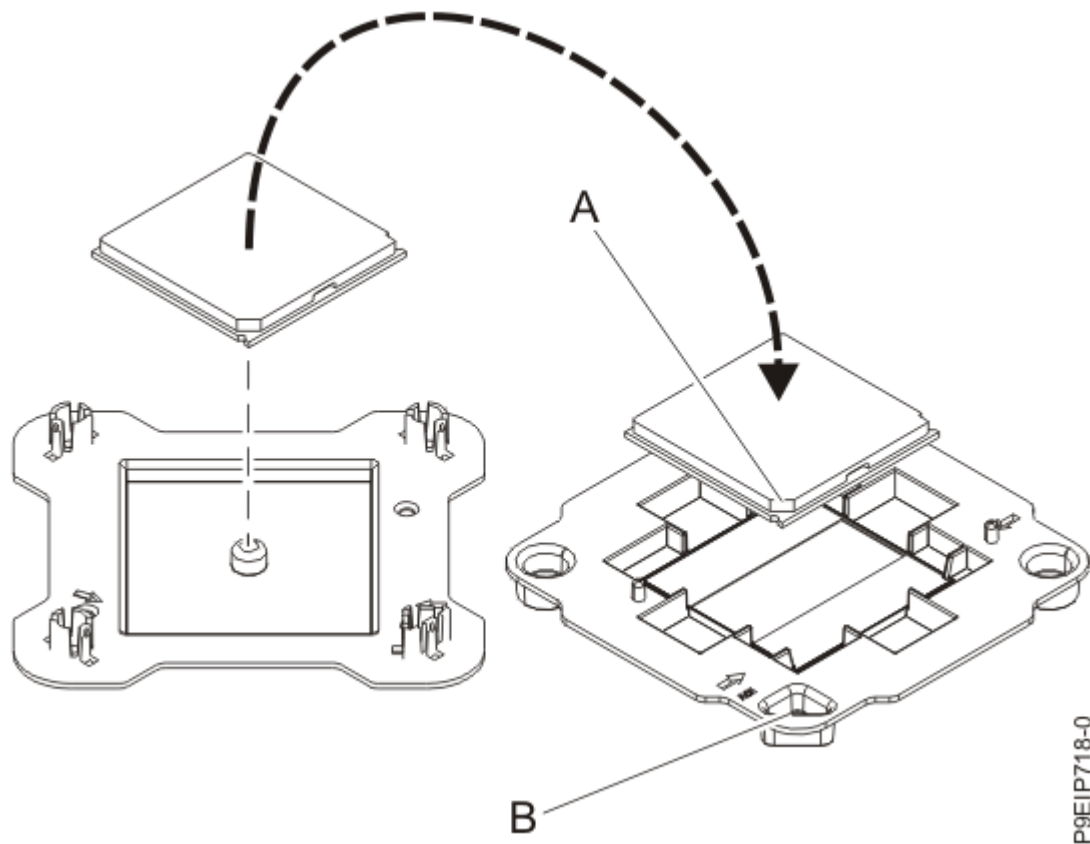


Figure 64. Placing the system processor module into the shipping tray

What to do next

Prepare the system for operation. For instructions, see [“Preparing the 5104-22C, 9006-22C, or 9006-22P system for operation after you remove and replace internal parts” on page 80.](#)

Removing and replacing the time-of-day battery in the 5104-22C or 9006-22C

To remove and replace the time-of-day battery in the system, complete the steps in this procedure.

Before you begin

Power off the system and place it in the service position. For instructions, see [“Preparing the 5104-22C, 9006-22C, or 9006-22P system to remove and replace internal parts” on page 77.](#)

Procedure

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

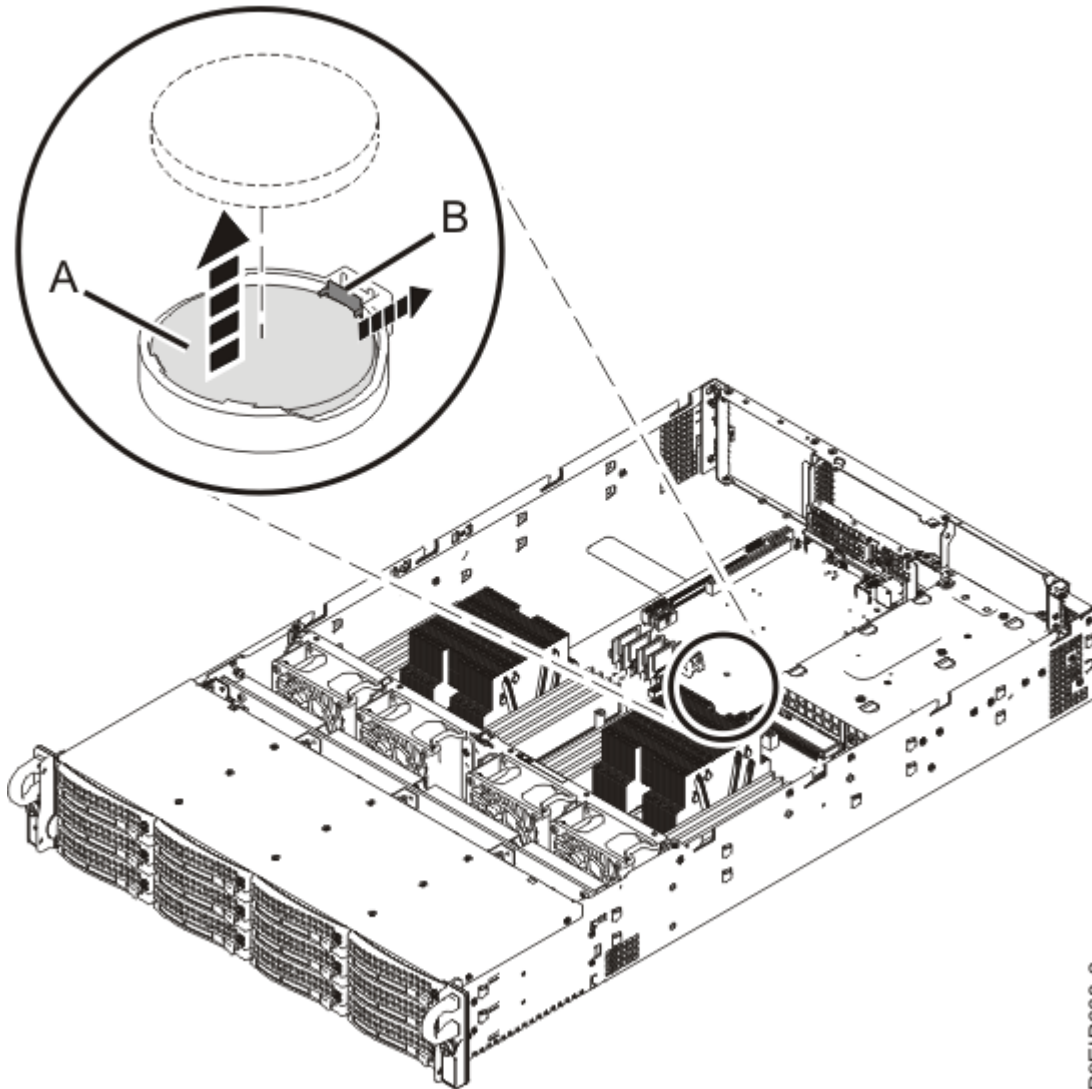
The ESD wrist strap must be connected to an unpainted metal surface until the service procedure is completed, and if applicable, until the service access cover is replaced.



Attention:

- Attach an electrostatic discharge (ESD) wrist strap to the front ESD jack, to the rear ESD jack, or to an unpainted metal surface of your hardware to prevent the electrostatic discharge from damaging your hardware.

- When you use an ESD wrist strap, follow all electrical safety procedures. An ESD wrist strap is used for static control. It does not increase or decrease your risk of receiving electric shock when using or working on electrical equipment.
 - If you do not have an ESD wrist strap, just prior to removing the product from ESD packaging and installing or replacing hardware, touch an unpainted metal surface of the system for a minimum of 5 seconds. If at any point in this service process you move away from the system, it is important to again discharge yourself by touching an unpainted metal surface for at least 5 seconds before you continue with the service process.
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 5104-22C or 9006-22C system”](#) on page 20.
 3. Remove the time-of-day battery **(A)** as shown in Figure 65 on page 69.
When you remove the battery, do not use a metallic tool to disengage it from its slot.



P9EIP668-2

Figure 65. 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 5104-22C or 9006-22C system”](#) on page 27.

What to do next

Prepare the system for operation. For instructions, see [“Preparing the 5104-22C, 9006-22C, or 9006-22P system for operation after you remove and replace internal parts” on page 80.](#)

You need to set the system's time after replacing the battery. You can set the time after the system is running by logging into the web GUI.

Common procedures for servicing or installing features in the 5104-22C, 9006-22C, or 9006-22P system

Learn about the common procedures related to installing, removing, and replacing features in the system.

Before you begin servicing the 5104-22C, 9006-12P, 9006-22C, or 9006-22P system

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.
- When performing a machine inspection: 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 attempt to switch power to the machine until all possible unsafe conditions are corrected. 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.
- Connect and disconnect cables as described in the following procedures when installing, moving, or opening covers on this product or attached devices.

To Disconnect: 1) Turn off everything (unless instructed otherwise). 2) For AC power, remove the power cords from the outlets. 3) For racks with a DC power distribution panel (PDP), turn off the circuit

breakers located in the PDP and remove the power from the Customer's DC power source. 4) Remove the signal cables from the connectors. 5) Remove all cables from the devices.

To Connect: 1) Turn off everything (unless instructed otherwise). 2) Attach all cables to the devices. 3) Attach the signal cables to the connectors. 4) For AC power, attach the power cords to the outlets. 5) For racks with a DC power distribution panel (PDP), restore the power from the Customer's DC power source and turn on the circuit breakers located in the PDP. 6) Turn on the devices.



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

(R001 part 1 of 2):



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

- Heavy equipment—personal injury or equipment damage might result if mishandled.
- Always lower the leveling pads on the rack cabinet.
- Always install stabilizer brackets on the rack cabinet if provided, unless the earthquake option is to be installed.
- To avoid hazardous conditions due to uneven mechanical loading, always install the heaviest devices in the bottom of the rack cabinet. Always install servers and optional devices starting from the bottom of the rack cabinet.
- Rack-mounted devices are not to be used as shelves or work spaces. Do not place objects on top of rack-mounted devices. In addition, do not lean on rack mounted devices and do not use them to stabilize your body position (for example, when working from a ladder).



- Stability hazard:
 - The rack may tip over causing serious personal injury.
 - Before extending the rack to the installation position, read the installation instructions.
 - Do not put any load on the slide-rail mounted equipment mounted in the installation position.
 - Do not leave the slide-rail mounted equipment in the installation position.
- Each rack cabinet might have more than one power cord.
 - For AC powered racks, be sure to disconnect all power cords in the rack cabinet when directed to disconnect power during servicing.
 - For racks with a DC power distribution panel (PDP), turn off the circuit breaker that controls the power to the system unit(s), or disconnect the customer's DC power source, when directed to disconnect power during servicing.
- Connect all devices installed in a rack cabinet to power devices installed in the same rack cabinet. Do not plug a power cord from a device installed in one rack cabinet into a power device installed in a different rack cabinet.
- An electrical outlet that is not correctly wired could place hazardous voltage on the metal parts of the system or the devices that attach to the system. It is the responsibility of the customer to ensure that the outlet is correctly wired and grounded to prevent an electrical shock. (R001 part 1 of 2)

(R001 part 2 of 2):



CAUTION:

- Do not install a unit in a rack where the internal rack ambient temperatures will exceed the manufacturer's recommended ambient temperature for all your rack-mounted devices.

- Do not install a unit in a rack where the air flow is compromised. Ensure that air flow is not blocked or reduced on any side, front, or back of a unit used for air flow through the unit.
- Consideration should be given to the connection of the equipment to the supply circuit so that overloading of the circuits does not compromise the supply wiring or overcurrent protection. To provide the correct power connection to a rack, refer to the rating labels located on the equipment in the rack to determine the total power requirement of the supply circuit.
- *(For sliding drawers.)* Do not pull out or install any drawer or feature if the rack stabilizer brackets are not attached to the rack or if the rack is not bolted to the floor. Do not pull out more than one drawer at a time. The rack might become unstable if you pull out more than one drawer at a time.



- *(For fixed drawers.)* This drawer is a fixed drawer and must not be moved for servicing unless specified by the manufacturer. Attempting to move the drawer partially or completely out of the rack might cause the rack to become unstable or cause the drawer to fall out of the rack. (R001 part 2 of 2)

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.

Identifying the 5104-22C, 9006-12P, 9006-22C, or 9006-22P system that contains the part to replace

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

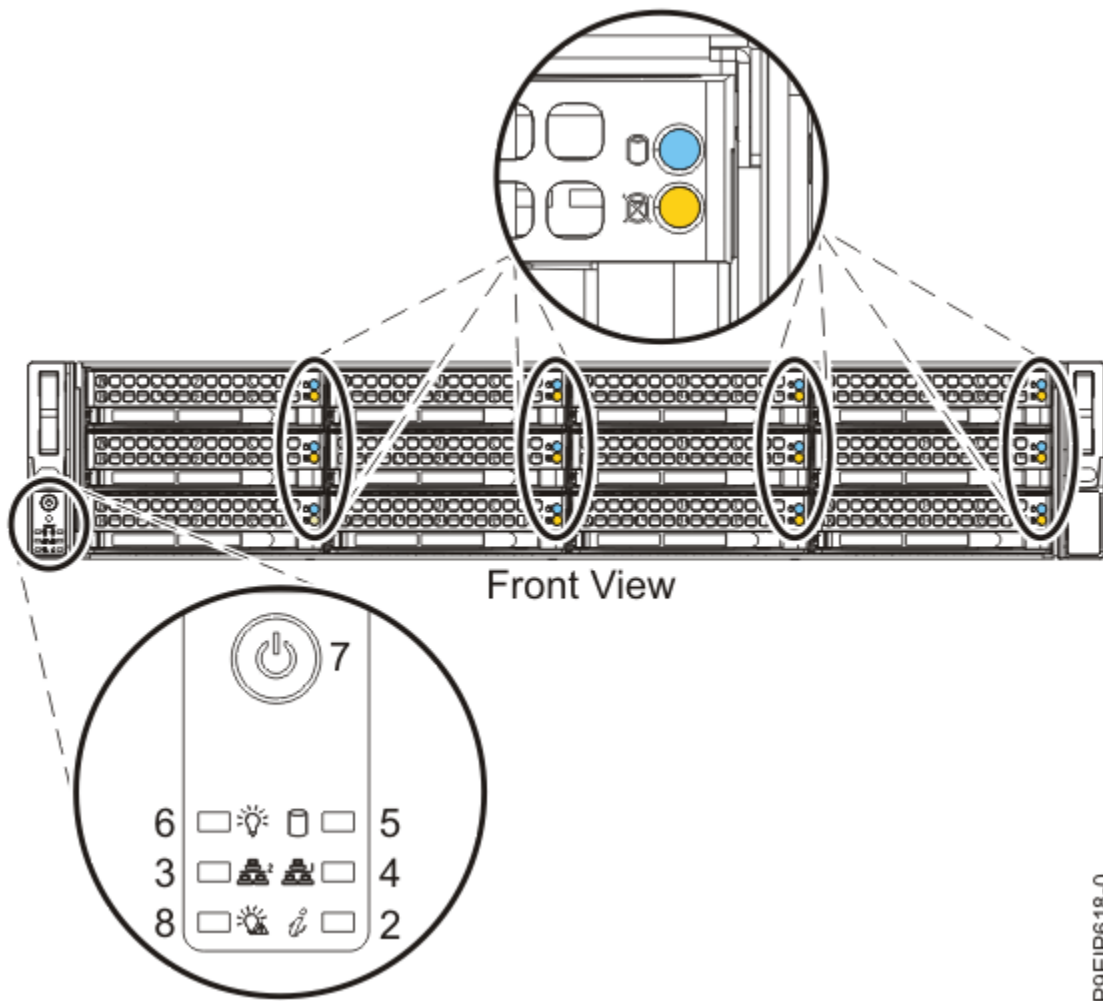
LEDs on the 5104-22C, 9006-22C, or 9006-22P system

Use this information as a guide to the LEDs on the 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 66 on page 75](#).

- 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.



P9EIP618-0

Figure 66. LEDs on the front of the system

LEDs are also on the rear of the system; see [Figure 67](#) on page 76.

The identify LED is at **(2)**. Turn it on by using a system identify command.

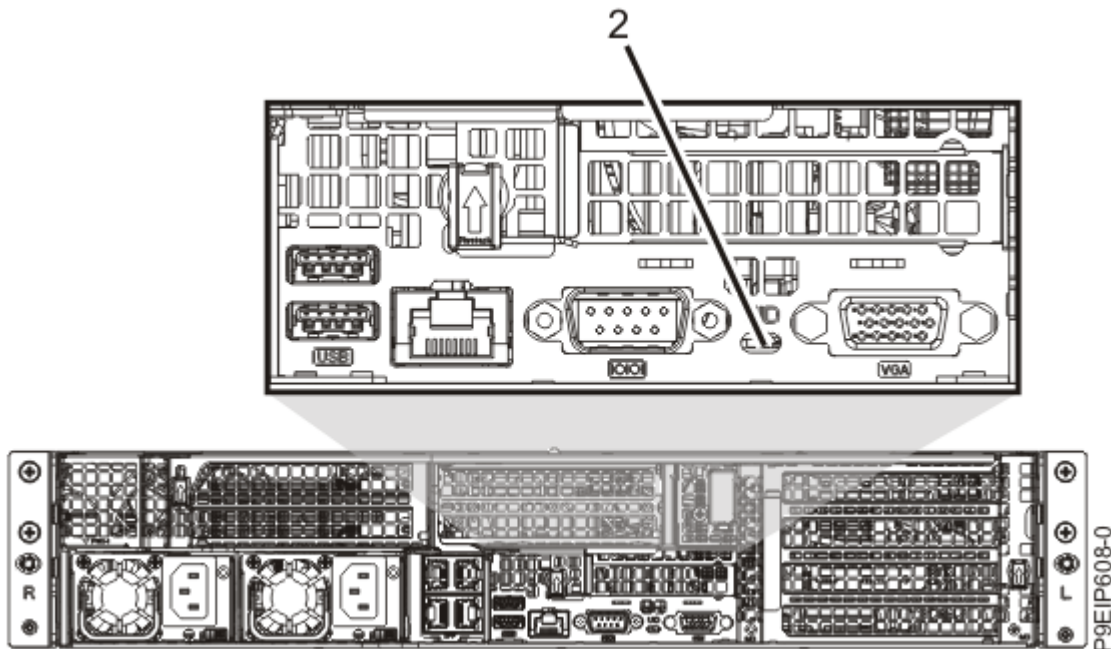


Figure 67. LEDs on the rear of the system

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
- Flashing green indicates that AC is applied, but the system is powered off.
- Steady amber indicates that AC is not applied, or a power fault occurred
- Flashing amber indicates that the power supply is overheating

Identifying the 5104-22C, 9006-12P, 9006-22C, or 9006-22P that needs servicing

Learn how to turn on the blue identify LED to help you find the 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 5104-22C, 9006-22C, or 9006-22P system to remove and replace internal parts

To prepare the system to remove and replace internal parts, complete the steps in this procedure.

Procedure

1. Complete the prerequisite tasks. For instructions, see [“Before you begin servicing the 5104-22C, 9006-12P, 9006-22C, or 9006-22P system”](#) on page 71.
2. Identify the part and the system that you will be working on. For instructions, see [“Identifying the 5104-22C, 9006-12P, 9006-22C, or 9006-22P system that contains the part to replace”](#) on page 74.
3. Attach the electrostatic discharge (ESD) wrist strap.

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

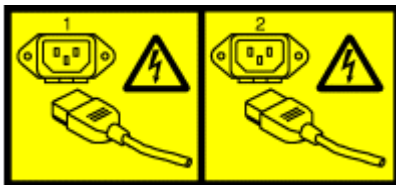


Attention:

- Attach an electrostatic discharge (ESD) wrist strap to the front ESD jack, to the rear ESD jack, or to an unpainted metal surface of your hardware to prevent the electrostatic discharge from damaging your hardware.
 - When you use an ESD wrist strap, follow all electrical safety procedures. An ESD wrist strap is used for static control. It does not increase or decrease your risk of receiving electric shock when using or working on electrical equipment.
 - If you do not have an ESD wrist strap, just prior to removing the product from ESD packaging and installing or replacing hardware, touch an unpainted metal surface of the system for a minimum of 5 seconds. If at any point in this service process you move away from the system, it is important to again discharge yourself by touching an unpainted metal surface for at least 5 seconds before you continue with the service process.
4. Stop the system. For instructions, see [“Stopping the 5104-22C, 9006-12P, 9006-22C, or 9006-22P system”](#) on page 82.
 5. Disconnect the power source from the system by unplugging the system. For instructions, see [“Disconnecting the power cords from an 5104-22C, 9006-22C, or 9006-22P system”](#) on page 91.

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)



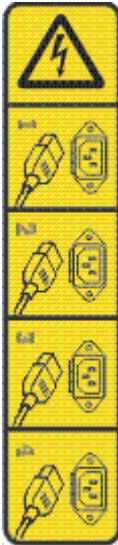
or



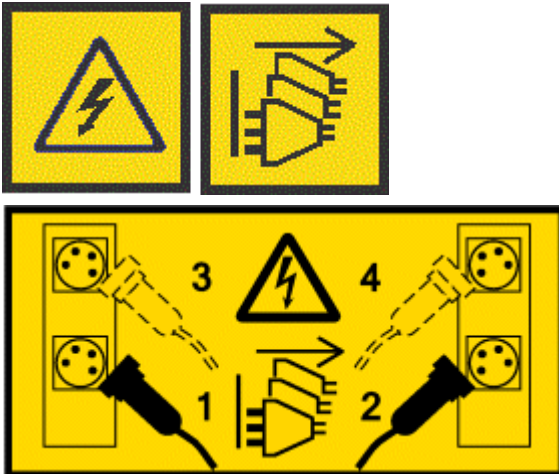
or

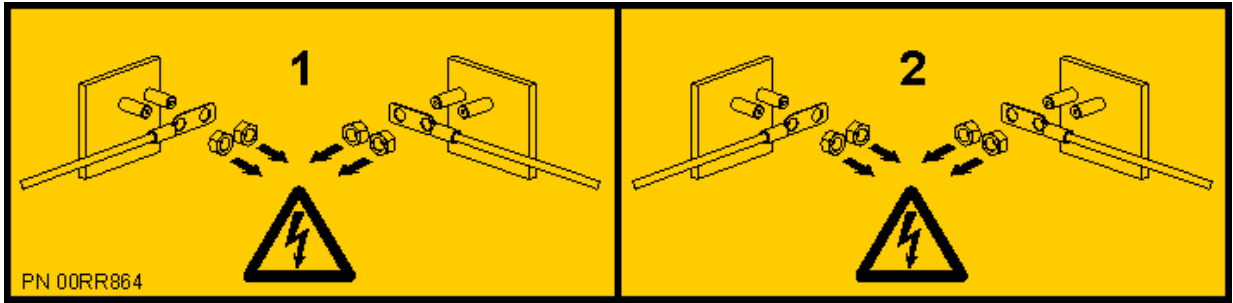



or



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)

- Place the system into the service position. For instructions, see [“Placing an 5104-22C, 9006-22C, or 9006-22P system into the service position” on page 89.](#)

 **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)



 **CAUTION:** Pinch hazard. (L012)

- Remove the service access cover. For instructions, see [“Removing the service access cover from an 5104-22C, 9006-22C, or 9006-22P system” on page 87.](#)

Preparing the 5104-22C, 9006-22C, or 9006-22P system for operation after you remove and replace internal parts

To prepare the system for operation after you remove and replace internal parts, complete the steps in this procedure.

Procedure

1. Ensure that you have the electrostatic discharge (ESD) wrist strap on and that the ESD clip is plugged into a ground jack or connected to an unpainted metal surface. If not, do so now.
2. Replace the service access cover. For instructions, see [“Installing the service access cover on an 5104-22C, 9006-22C, or 9006-22P system”](#) on page 88.
3. Place the system into the operating position. For instructions, see [“Placing an 5104-22C, 9006-22C, or 9006-22P system into the operating position”](#) on page 90.

(L012)



CAUTION: Pinch hazard. (L012)

4. Reconnect the power cords to the system. For instructions, see [“Connecting the power cords to an 5104-22C, 9006-22C, or 9006-22P system”](#) on page 92.
5. Start the system. For instructions, see [“Starting the 5104-22C, 9006-12P, 9006-22C, or 9006-22P system”](#) on page 80.
6. If you installed or replaced a PCIe adapter, update the adapter firmware.
See [Getting firmware fixes for vendor I/O adapters from the vendor website \(www.ibm.com/support/knowledgecenter/POWER9/p9ei8/p9ei8_update_other_adapter.htm\)](#).
7. Verify the installed part.
For instructions, see [Verifying a repair \(www.ibm.com/support/knowledgecenter/POWER9/p9ei3/p9ei3_verifyrepair.htm\)](#).

Starting and stopping the 5104-22C, 9006-12P, 9006-22C, or 9006-22P

Learn how to start and stop the system to perform a service action or system upgrade.

Starting the 5104-22C, 9006-12P, 9006-22C, or 9006-22P system

To start the system, complete the steps in this procedure.

About this task

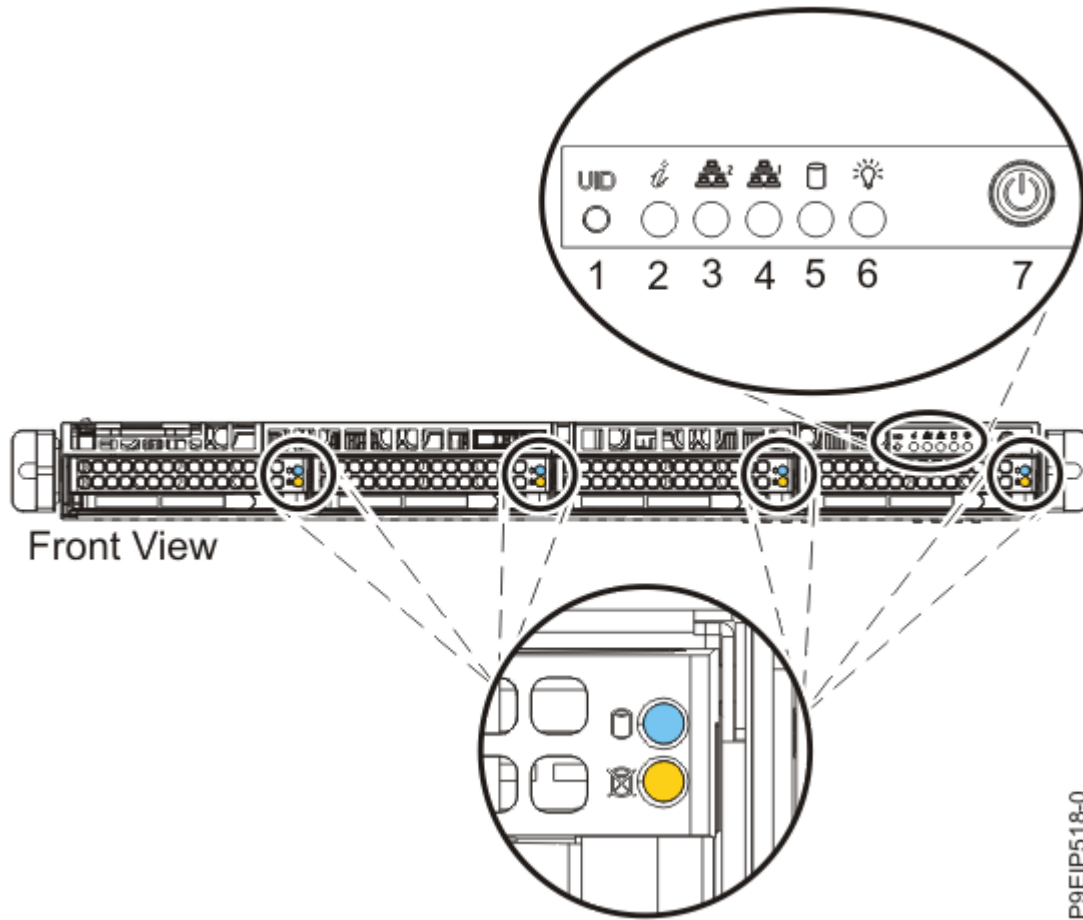


Attention: For safety, airflow purposes and thermal performance, the service access cover must be installed and fully seated before you power on the system.

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.

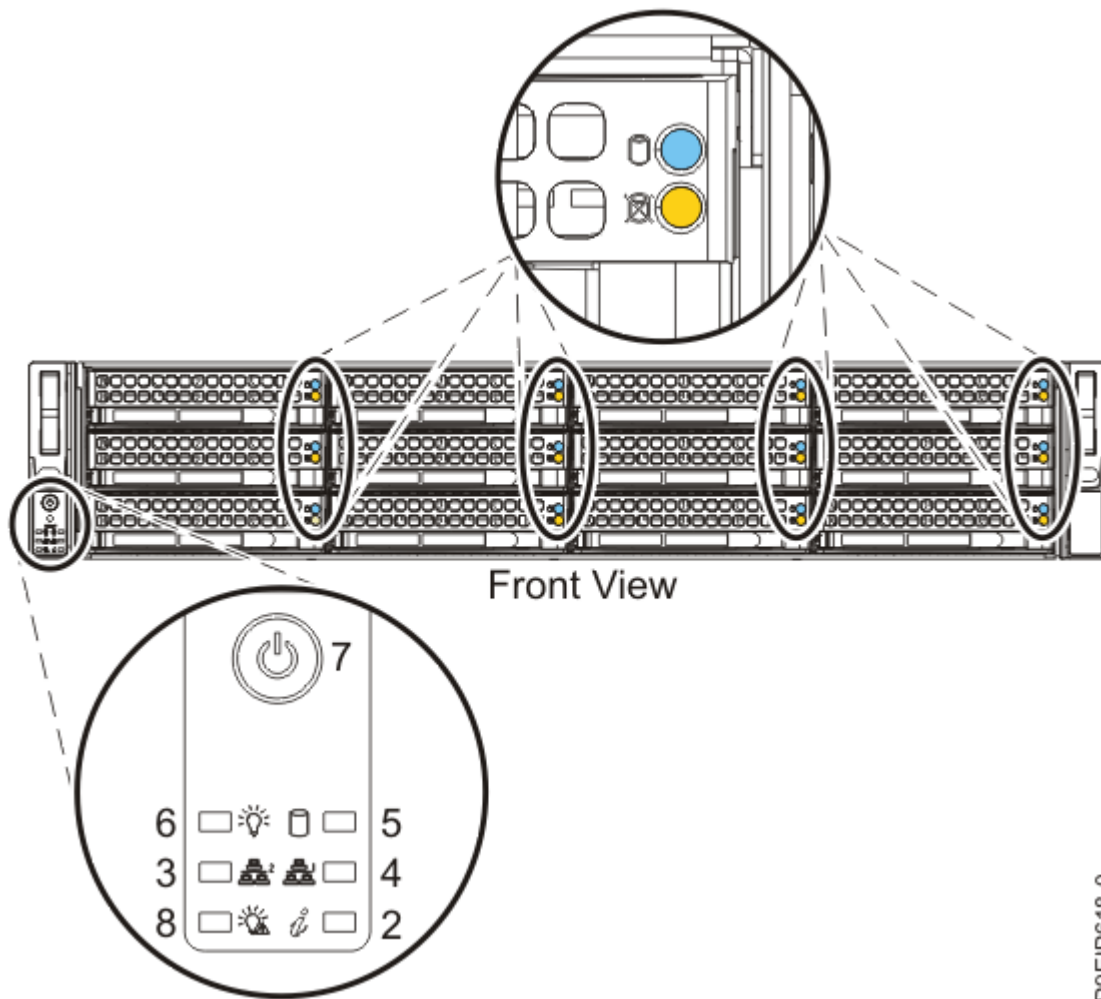
Procedure

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 69](#) on page 82.
You may have to press the switch for 0.5 to 3 seconds.



P9EIP518-0

Figure 68. Power switch for 9006-12P



P9EIP618-0

Figure 69. Power switch for 5104-22C, 9006-22C, or 9006-22P

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 5104-22C, 9006-12P, 9006-22C, or 9006-22P system

To stop the system, complete the steps in this procedure.

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 5104-22C, 9006-12P, 9006-22C, or 9006-22P

Learn about the storage drive commands for the IBM Power® System LC921 (9006-12P) or IBM Power System LC922 (9006-22P) systems.

arccnf commands

Learn about the **arccnf** 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 list the logical drives and device configurations, use the following **arccnf** command.

```
arccnf getconfig 1
```

Note the Channel and Device numbers of the desired drive. Also note the serial number of the drive. In the following example, the channel number is 0 and the device number is 11.

```
Reported Channel,Device(T:L) : 0,11(11:0)
```

Identify the fault LED on the drive using the following command:

```
arccnf identify 1 device 0 2
```

Take the drive off line. Run the following **arccnf setstate** command that uses the Channel and Device numbers from the **arccnf getconfig** command:

```
arccnf setstate 1 device 0 11 ddd
```

StorCLI commands

Learn about the StorCLI commands. They are for use with the PCIe adapter feature codes EKAA and EKEA.

If the command is not installed, download the utility from Broadcom <https://www.broadcom.com/> (www.broadcom.com). You can find the utility by searching that site for storcli. Get their latest "MegaRAID Storcli" download file. To install, follow their documentation. Unzip the file; then for:

RHEL

1. Navigate to the linux-ppc folder then to the Little Endian 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
```

Preboot / petitboot:

1. From the petitboot menu, exit to a shell.
2. Download the **storcli64** binary file into the petitboot environment `wget "ftp://ftp.supermicro.com/wdl/Firmware/Openpower/P9DSU-C/Storage/Broadcom/AOC-9361-8i (AOC-K-9361-8Is-IB001)/007.0606.0000.0000_Unified_StorCLI.zip"`.
3. Unzip the following files:
 - 007.0606.0000.0000_Unified_StorCLI.zip

- MR_SAS_Unified_StorCLI_7.6-007.0606.0000.0000-SCGCQ01639776\ \ (1\).zip

4. Type the following command.

```
cd versionChangeSet/univ_viva_cli_rel/
```

5. Unzip the **Unified_storcli_all_os.zip** file.

6. Type the following command.

```
cd Unified_storcli_all_os/Linux-PPC/LittleEndian
```

7. Unzip the **storcli64.zip** file.

8. The storcli64 file can now be invoked by specifying the current directory: `./storcli64 -h`

For details on managing RAID arrays, see Chapter 6 in the [MegaRAID SAS Software User Guide](https://docs.broadcom.com/doc/pub-005110) (<https://docs.broadcom.com/doc/pub-005110>).

Helpful StorCLI commands

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 view the adapter settings:

```
storcli64 /c0 show personality
```

To change the adapter settings:

```
storcli64 /c0 set personality=JBOD|RAID
```

To change the settings of the adapter to support the self-encrypting drive (SED) function:

```
storcli64 /c0 set personality behavior secured=off/on
```

To check the firmware level of the *MegaRAID* adapter:

```
storcli64 /c0 show all|grep "Bios Version|Firmware Package|Firmware Version"
```

To update the firmware level of the *MegaRAID* adapter:

```
storcli64 /cx download file=mrxxxxfw.rom
```

sas3ircu commands

Learn about the `sas3ircu` command. This command can be used for the feature code EKAB 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 on the drive light:

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

To turn off the drive light:

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

To view additional help for the command:

```
sas3ircu help
```

To list all adapters:

```
sas3ircu list
```

To display adapter details and drive details:

```
sas3ircu <controller_#> display
```

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 [NVMe management command line interface \(github.com/linux-nvme/nvme-cli\)](https://github.com/linux-nvme/nvme-cli). Follow the installation instructions available 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 covers on an 5104-22C, 9006-22C, or 9006-22P system

Learn how to remove and replace the covers for an 5104-22C or 9006-22C system so that you can access the hardware parts or service the system.

Removing the service access cover from an 5104-22C, 9006-22C, or 9006-22P system

Learn how to remove the service access cover from an 5104-22C or 9006-22C 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 5104-22C, 9006-22C, or 9006-22P system”](#) on page 91.

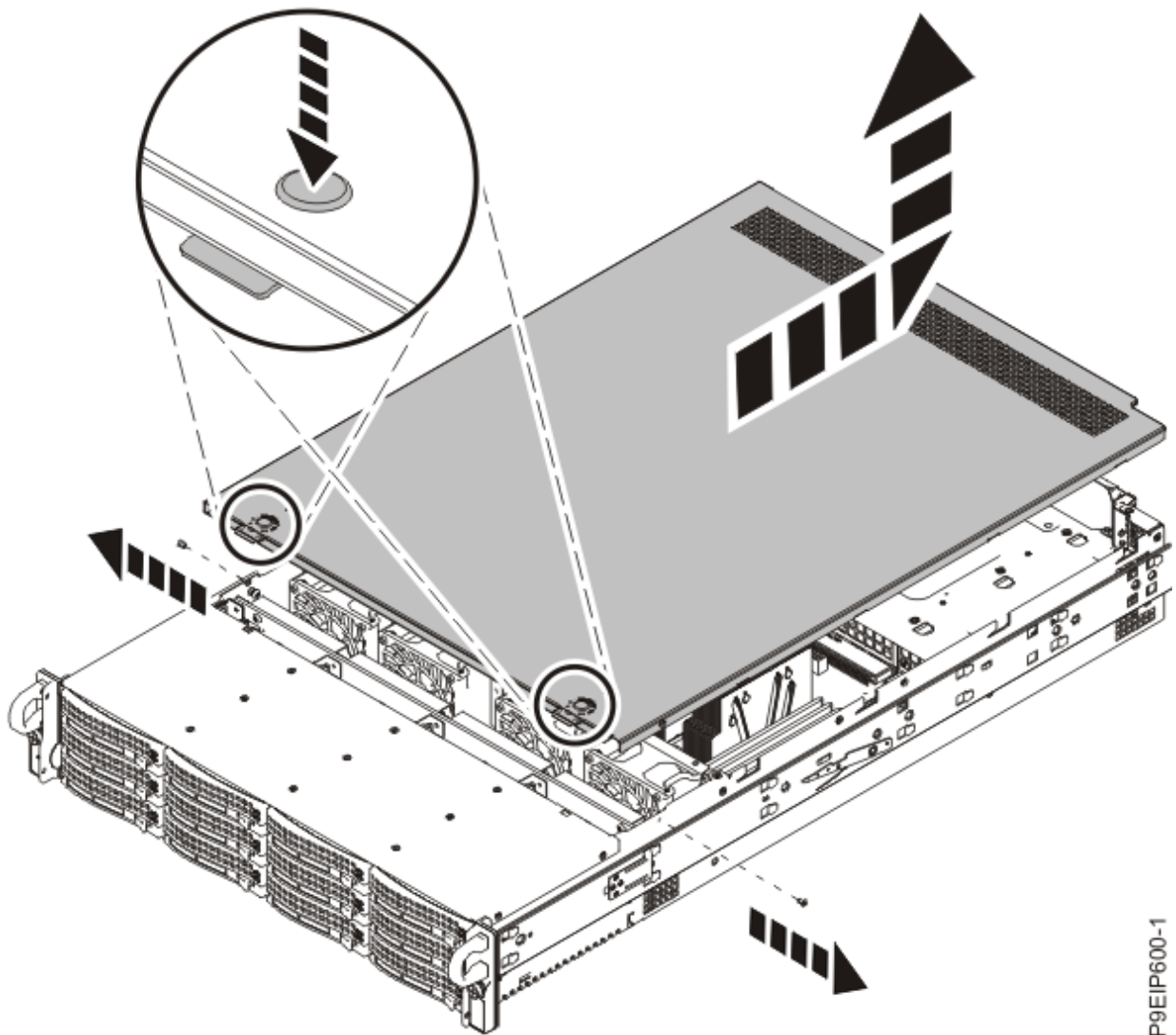
(L005)



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 70](#) on page 88, 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.



P9EIP600-1

Figure 70. 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 5104-22C, 9006-22C, or 9006-22P system

Learn how to install the service access cover on a rack-mounted 5104-22C or 9006-22C system.

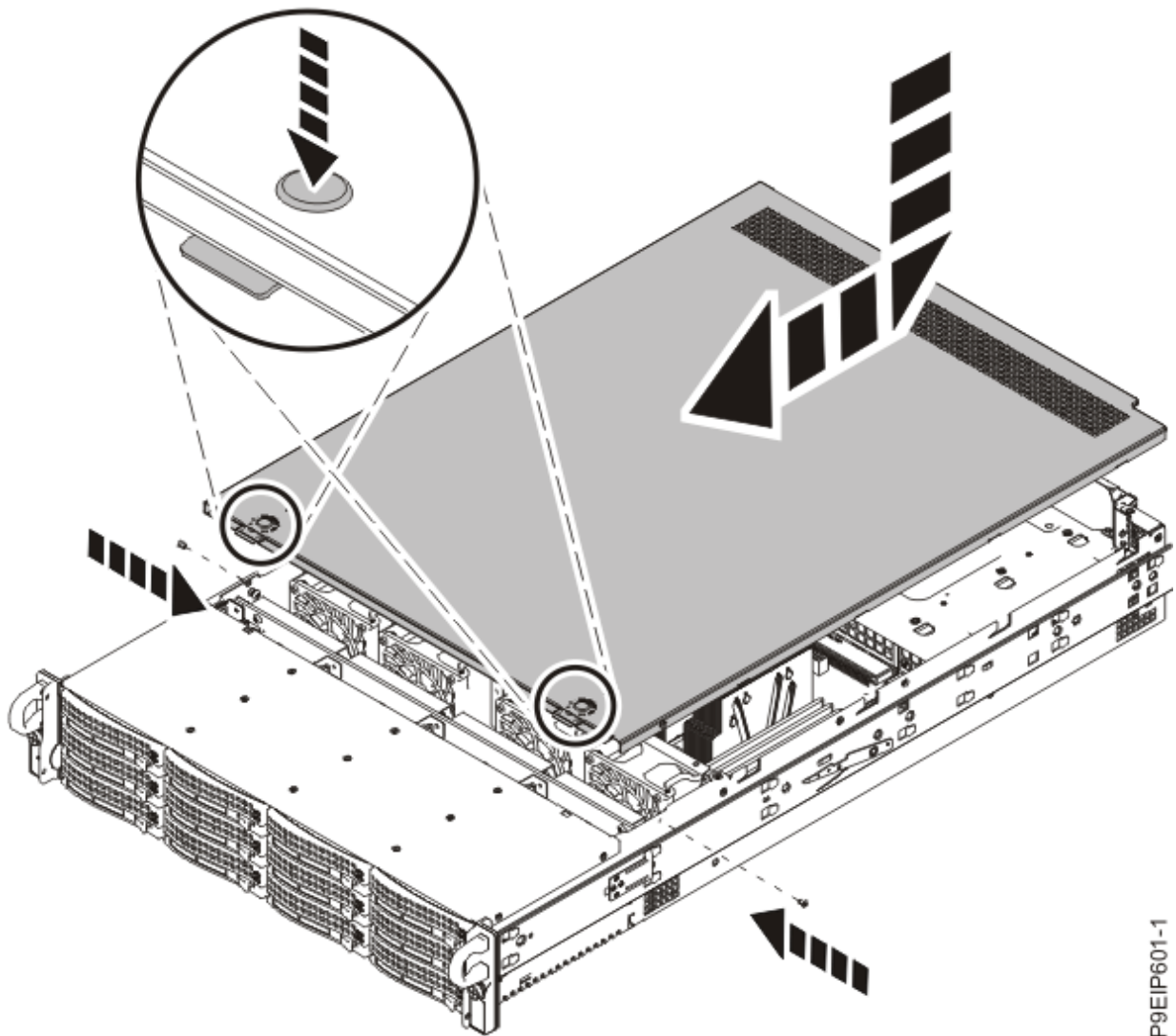
About this task



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 71](#) on page 89.



P9EIP601-1

Figure 71. Replacing and securing the cover

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

Service and operating positions for 5104-22C, 9006-22C, or 9006-22P

Learn how to place an system into the service or operating position.

Placing an 5104-22C, 9006-22C, or 9006-22P system into the service position

To place a system into the service position, complete the steps in this procedure.

Before you begin

Notes:

- When you place the system in the service position, ensure that the cables at the rear of the system do not catch or bind as you pull the system unit out of the rack.
- When you place the system into the service position, ensure that all stability plates are firmly installed to prevent the rack from toppling. Ensure that only one system unit is in the service position 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. Loosen the front screws (A) that secure the system to the rack from both sides of the system as shown in [Figure 72](#) on page 90.

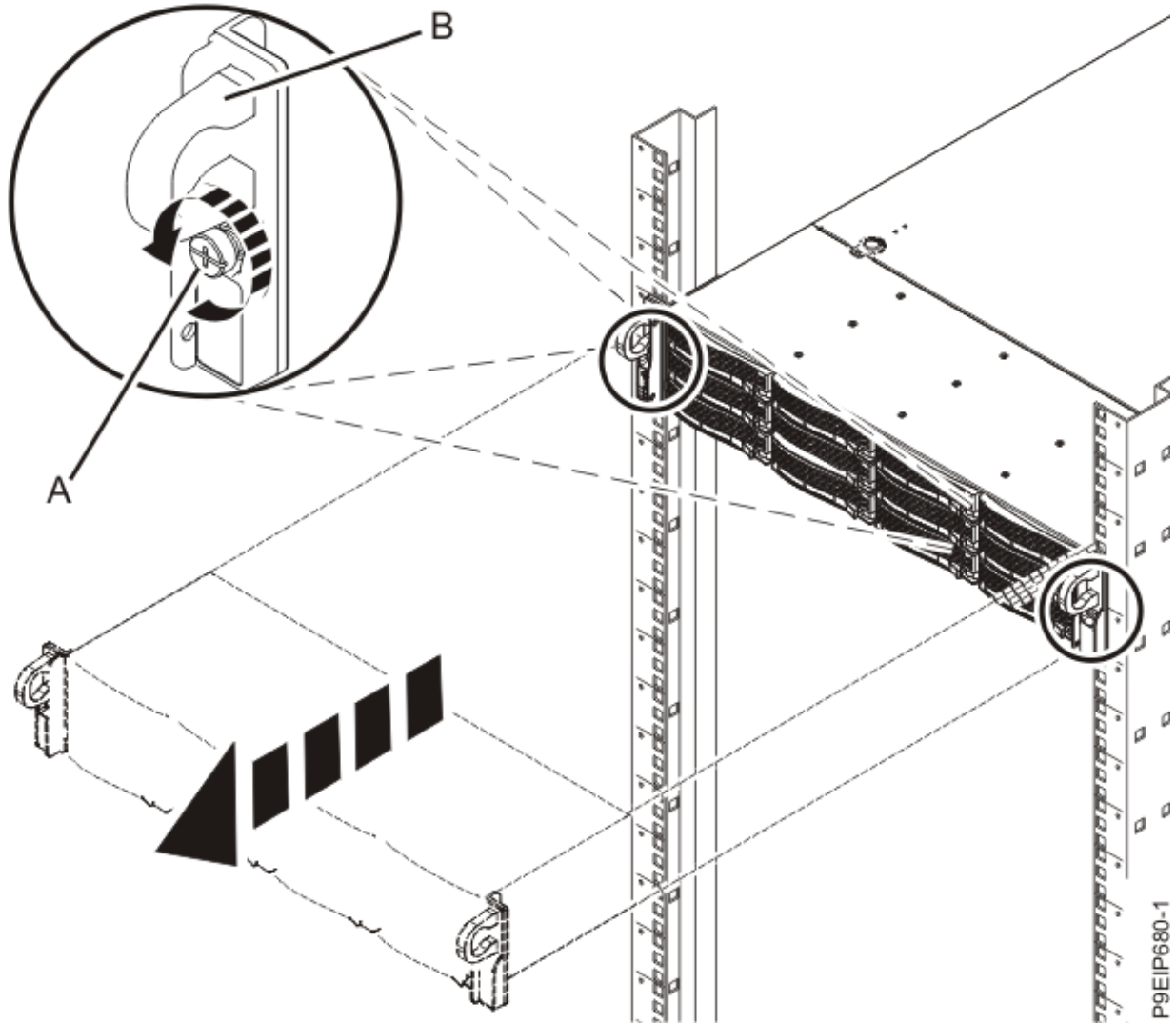


Figure 72. Removing the front screws and removing the system from the rack

2. Slide the system unit out until the rails lock into place.

Ensure that the cables and cable management arm move freely, and that they do not catch on anything.

Placing an 5104-22C, 9006-22C, or 9006-22P system into the operating position

To place a system into the operating position, complete the steps in this procedure.

Before you begin

When you place the system in the operating position, ensure that the cables at the rear of the system do not catch or bind as you push the system unit back into the rack.

Procedure

1. Release the rail safety latches (**A**) as shown in [Figure 73 on page 91](#), then push the system fully into the rack.

Ensure that the cables and cable management arm move freely, and that they do not catch on anything.

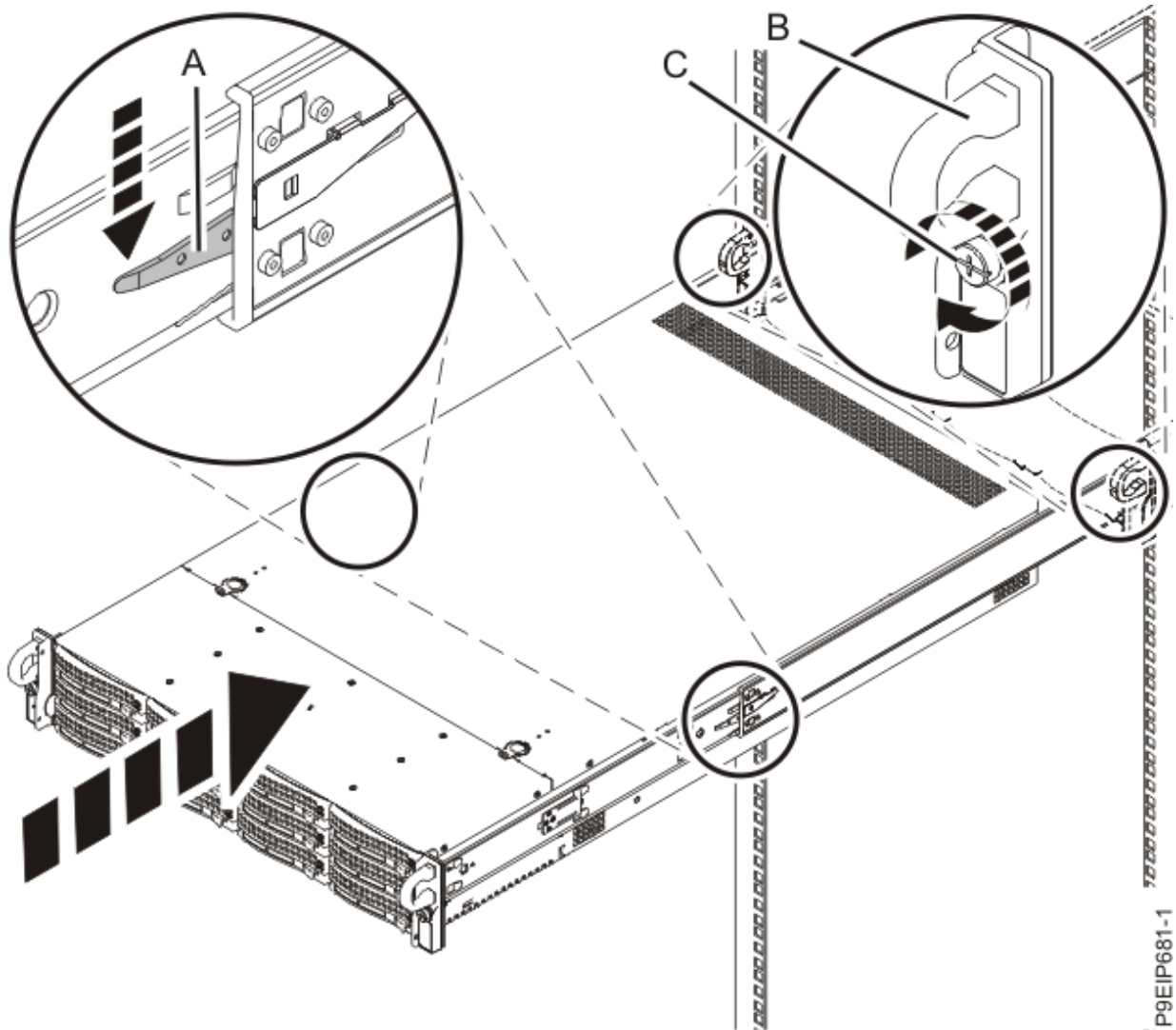


Figure 73. Placing the system into the operating position

2. Fasten the two front screws (**C**) to secure the system to the rack.

Power cords for the 5104-22C, 9006-22C, or 9006-22P system

Learn how to disconnect and connect the power cords on systems.

Disconnecting the power cords from an 5104-22C, 9006-22C, or 9006-22P system

To disconnect the power cords from a system, complete the steps in this procedure.

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 74](#) on page 92.

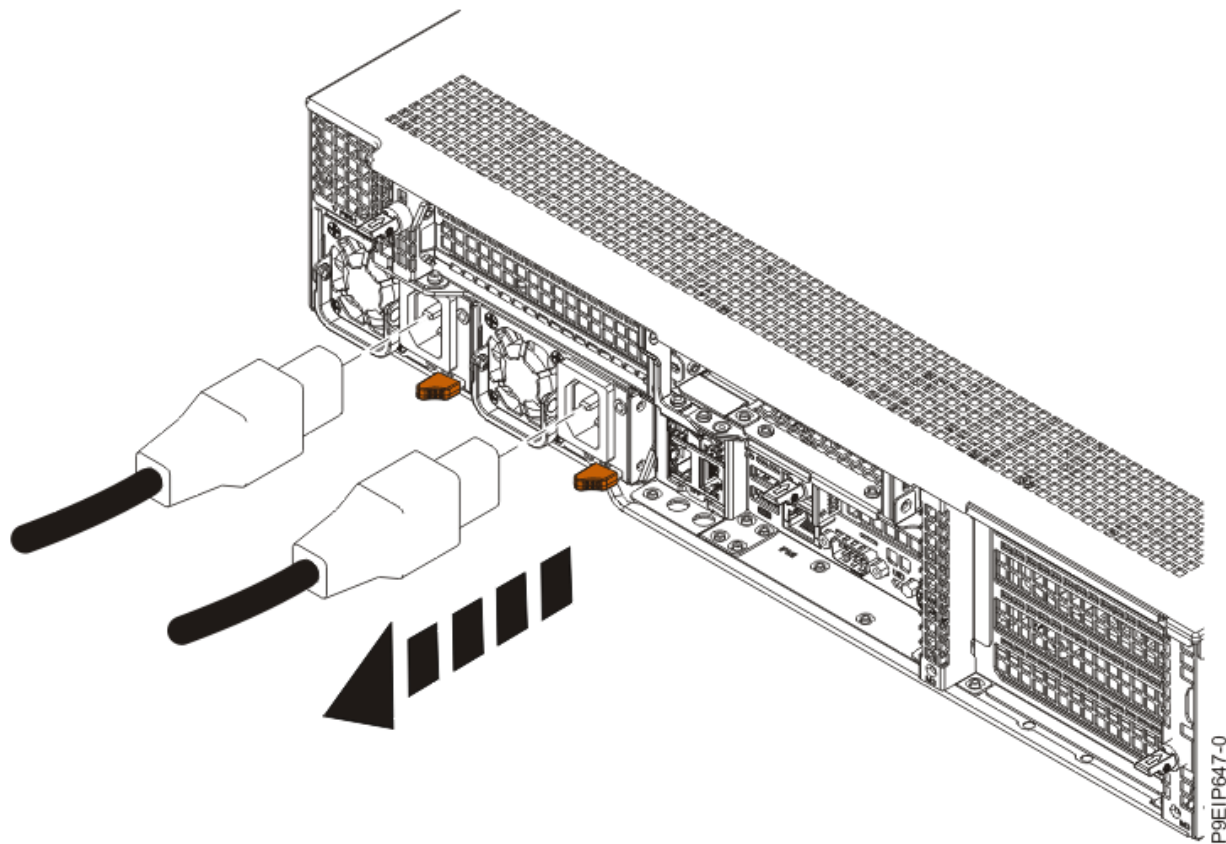


Figure 74. Removing the power cords from the system

Connecting the power cords to an 5104-22C, 9006-22C, or 9006-22P system

To connect the power cords to a system, complete the steps in this procedure.

Procedure

Using your labels, reconnect the power cords to the system unit as shown in [Figure 75](#) on page 93.

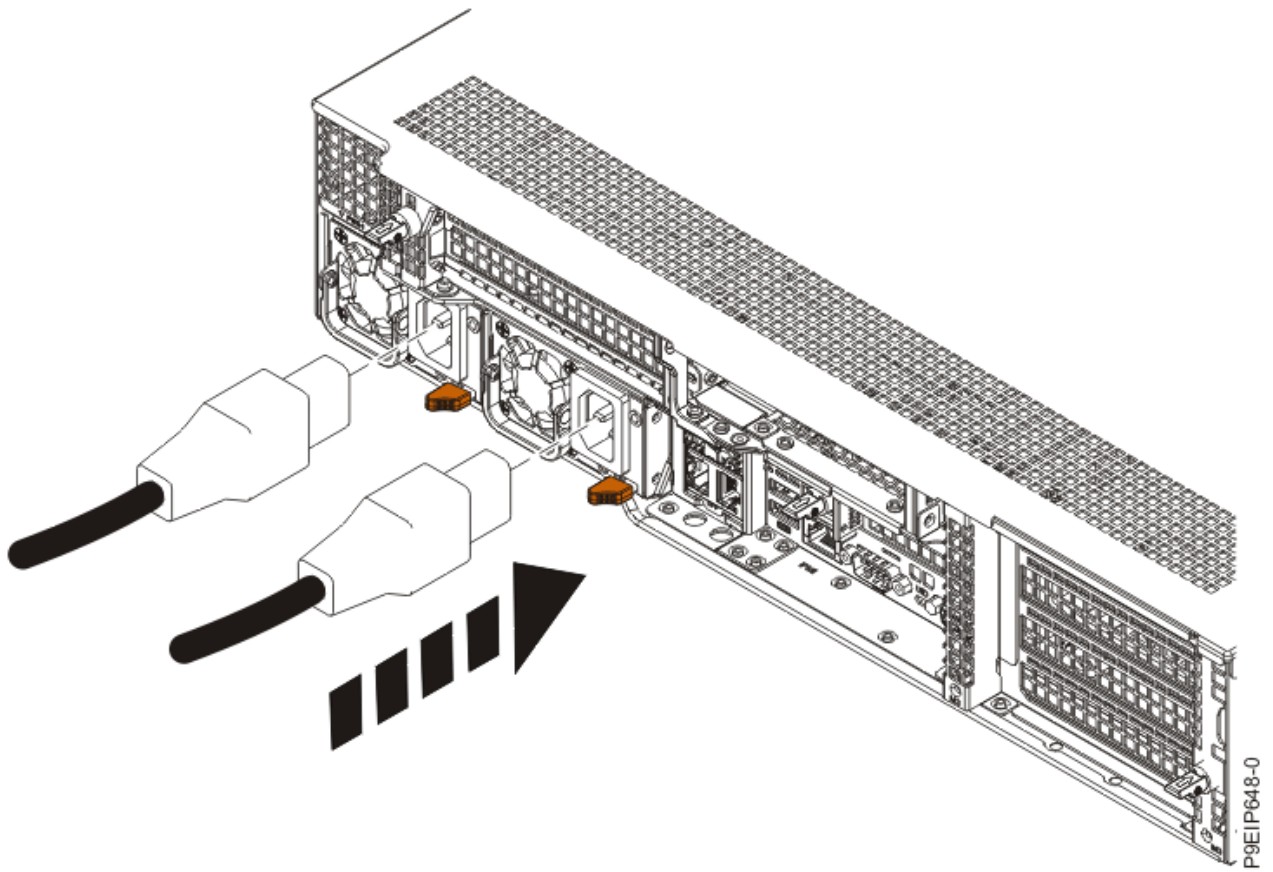


Figure 75. Connecting the power cords to the system

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Overview

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

The IBM Power Systems servers use the latest W3C Standard, [WAI-ARIA 1.0](http://www.w3.org/TR/wai-aria/) (www.w3.org/TR/wai-aria/), to ensure compliance with [US Section 508](http://www.access-board.gov/guidelines-and-standards/communications-and-it/about-the-section-508-standards/section-508-standards) (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](http://www.w3.org/TR/WCAG20/) (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.

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

Properly shielded and grounded cables and connectors must be used in order to meet FCC emission limits. Proper cables and connectors are available from IBM-authorized dealers. IBM is not responsible for any radio or television interference caused by using other than recommended cables and connectors

or by unauthorized changes or modifications to this equipment. Unauthorized changes or modifications could void the user's authority to operate the equipment.

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

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

Class B Notices

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

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

Canada Notice

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

European Community and Morocco Notice

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

German Notice

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

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

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

Deutschland: Einhaltung des Gesetzes über die elektromagnetische Verträglichkeit von Geräten

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

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

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

Verantwortlich für die Einhaltung der EMV Vorschriften ist der Hersteller:
International Business Machines Corp.
New Orchard Road

Armonk, New York 10504
Tel: 914-499-1900

Der verantwortliche Ansprechpartner des Herstellers in der EU ist:
IBM Deutschland GmbH
Technical Relations Europe, Abteilung M456
IBM-Allee 1, 71139 Ehningen, Germany
Tel: +49 (0) 800 225 5426
email: HalloIBM@de.ibm.com

Generelle Informationen:

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

Japan Electronics and Information Technology Industries Association (JEITA) Notice

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

This statement applies to products less than or equal to 20 A per phase.

高調波電流規格 JIS C 61000-3-2 適合品

This statement applies to products greater than 20 A, single phase.

高調波電流規格 JIS C 61000-3-2 準用品

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

- 回路分類 : 6 (単相、PFC回路付)
- 換算係数 : 0

This statement applies to products greater than 20 A per phase, three-phase.

高調波電流規格 JIS C 61000-3-2 準用品

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

- 回路分類 : 5 (3相、PFC回路付)
- 換算係数 : 0

Japan Voluntary Control Council for Interference (VCCI) Notice

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VCCI-B

Taiwan Notice

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

United States Federal Communications Commission (FCC) Notice

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

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

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

This device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions:

(1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Responsible Party:

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

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