ESCALA Power7

Disk drives

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Disk drives

This publication concerns the following models:

 - Bull Escala E5-700 (Power 750 / 8233-E8B)

 - Bull Escala M6-700 (Power 770 / 9117-MMB)

 - Bull Escala M7-700 (Power 780 / 9179-MHB)

 - Bull Escala E1-700 (Power 710 / 8231-E2B)

 - Bull Escala E2-700 / E2-700T (Power 720 / 8202-E4B)

 - Bull Escala E3-700 (Power 730 / 8231-E2B)

 - Bull Escala E4-700 / E4-700T (Power 740 / 8205-E6B)

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

Hardware

September 2010

Trademarks and Acknowledgements

We acknowledge the right of proprietors of trademarks mentioned in this book.

Contents

Safety notices

Safety notices may be printed throughout this guide:

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

World Trade safety information

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

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:
- 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.
- Connect all power cords to a properly wired and grounded electrical outlet. Ensure that the outlet supplies proper voltage and phase rotation according to the system rating plate.
- Connect any equipment that will be attached to this product to properly wired outlets.
- When possible, use one hand only to connect or disconnect signal cables.
- Never turn on any equipment when there is evidence of fire, water, or structural damage.
- Disconnect the attached power cords, telecommunications systems, networks, and modems before you open the device covers, unless instructed otherwise in the installation and configuration procedures.
- Connect and disconnect cables as described in the following procedures when installing, moving, or opening covers on this product or attached devices.

To Disconnect:
1. Turn off everything (unless instructed otherwise).
2. Remove the power cords from the outlets.
3. Remove the signal cables from the connectors.
4. Remove all cables from the devices

To Connect:
1. Turn off everything (unless instructed otherwise).
2. Attach all cables to the devices.
3. Attach the signal cables to the connectors.
4. Attach the power cords to the outlets.
5. Turn on the devices.

(D005)

DANGER

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

- Heavy equipment–personal injury or equipment damage might result if mishandled.
- Always lower the leveling pads on the rack cabinet.
- Always install stabilizer brackets on the rack cabinet.
- To avoid hazardous conditions due to uneven mechanical loading, always install the heaviest devices in the bottom of the rack cabinet. Always install servers and optional devices starting from the bottom of the rack cabinet.
- Rack-mounted devices are not to be used as shelves or work spaces. Do not place objects on top of rack-mounted devices.

- Each rack cabinet might have more than one power cord. Be sure to disconnect all power cords in the rack cabinet when directed to disconnect power during servicing.
- Connect all devices installed in a rack cabinet to power devices installed in the same rack cabinet. Do not plug a power cord from a device installed in one rack cabinet into a power device installed in a different rack cabinet.
- An electrical outlet that is not correctly wired could place hazardous voltage on the metal parts of the system or the devices that attach to the system. It is the responsibility of the customer to ensure that the outlet is correctly wired and grounded to prevent an electrical shock.

CAUTION

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

(R001)

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

- Reduce the weight of the rack cabinet by removing equipment starting at the top of the rack cabinet. When possible, restore the rack cabinet to the configuration of the rack cabinet as you received it. If this configuration is not known, you must observe the following precautions:
  - Remove all devices in the 32U position and above.
  - Ensure that the heaviest devices are installed in the bottom of the rack cabinet.
  - Ensure that there are no empty U-levels between devices installed in the rack cabinet below the 32U level.
- If the rack cabinet you are relocating is part of a suite of rack cabinets, detach the rack cabinet from the suite.
- Inspect the route that you plan to take to eliminate potential hazards.
- Verify that the route that you choose can support the weight of the loaded rack cabinet. Refer to the documentation that comes with your rack cabinet for the weight of a loaded rack cabinet.
- Verify that all door openings are at least 760 x 230 mm (30 x 80 in.).
- Ensure that all devices, shelves, drawers, doors, and cables are secure.
- Ensure that the four leveling pads are raised to their highest position.
- Ensure that there is no stabilizer bracket installed on the rack cabinet during movement.
- Do not use a ramp inclined at more than 10 degrees.
- When the rack cabinet is in the new location, complete the following steps:
  - Lower the four leveling pads.
  - Install stabilizer brackets on the rack cabinet.
  - If you removed any devices from the rack cabinet, repopulate the rack cabinet from the lowest position to the highest position.
- If a long-distance relocation is required, restore the rack cabinet to the configuration of the rack cabinet as you received it. Pack the rack cabinet in the original packaging material, or equivalent. Also lower the leveling pads to raise the casters off of the pallet and bolt the rack cabinet to the pallet.

(R002)

(L001)

(L002)
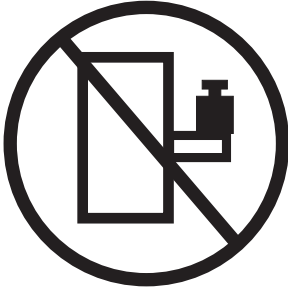
(L003)
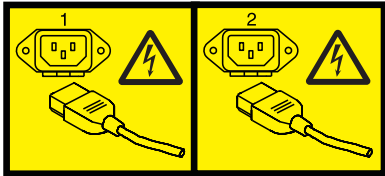
or

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

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

(C026)

CAUTION:
Data processing environments can contain equipment transmitting on system links with laser modules that operate at greater than Class 1 power levels. For this reason, never look into the end of an optical fiber cable or open receptacle. (C027)

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

CAUTION:
Some laser products contain an embedded Class 3A or Class 3B laser diode. Note the following information: laser radiation when open. Do not stare into the beam, do not view directly with optical instruments, and avoid direct exposure to the beam. (C030)

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.

Disk drives

Learn about installing, removing, and replacing a disk drive.

What's new in Disk drives

Read about new or changed information in Disk drives since the previous update of this topic collection.

September 2010

The following updates are made to the content:
- Added information for Internal disk drive sharing on model 8231-E2B .
- Added information for Internal disk drive sharing on model 8202-E4B or 8205-E6B .
- Added information for "Disk drive locations and concurrent maintenance lights for 8231-E2B" on page 127.
- Added information for "Disk drive locations and concurrent maintenance lights for an 8202-E4B or 8205-E6B system" on page 125.
- Added information for "PCIe RAID and SSD SAS adapter locations" on page 125.
- Added a procedure for "Installing the external SAS port on model 8231-E2B" on page 155.
- Added a procedure for "Installing the external SAS port on model 8202-E4B or 8205-E6B" on page 153.

March 2010

The following updates are made to the content:
- Added information for "Disk drive locations and concurrent maintenance lights for models 9117-MMB or 9179-MHB" on page 130.
- Added a procedure for "Internal disk drive sharing in model 9117-MMB or 9179-MHB" on page 151.

February 2010
- Added information for servers that contain the POWER7™ processor.

Installing a disk drive or solid-state drive

You can install a Small Computer System Interface (SCSI), serial-attached SCSI (SAS) disk drive, or solid-state drive (SSD) in the server or expansion unit. Use the procedures in this topic to perform this task.

The system or logical partition can either be turned off or turned on when you install the disk drive. Identify the system for performing the installation or an upgrade. Turn on the System Identify (BLUE) LED.

Solid-state drives

To install and configure solid-state drives (SSD), you must review the supported machine type model, adapter, and configuration details.

Solid®-state drives, also known as flash drives, follow many of the same rules as a regular hard disk drive (HDD). For example, SSDs physically resemble, install in the same manner, and in most of the same slots as HDDs. However, some restrictions and configuration rules that apply to SSD are different from HDD. The following tables can help you determine which operating system, adapter, machine type model, and disk drive configuration rules apply to your system.

After you have reviewed the configuration rules, you can install the drive as you would any other disk drive. For more information, see "Installing a disk drive or solid-state drive."

Restriction: Solid-state drives must be part of a RAID array or System Mirroring (IBM i).

Select the operating system for the server or partition where you want to install drives from the following list:
- Solid-state drive rules for the AIX® operating system
- Solid-state drive rules for the Linux® operating system
- Solid-state drive rules for the IBM i operating system

Attention: Before installing SSD into your system, you must ensure that you have all the prerequisite updates for both the SSD and the adapters. To check the prerequisites, go to the IBM Prerequisite website: http://www-912.ibm.com/e_dir/eServerPrereq.nsf.

Table 1. Solid-state drive rules for the AIX operating system

Machine type model	Adapter	Mixing rules
5886	(5904) - PCI-X DDR 1.5GB Cache SAS RAID Adapter (5906 and 5908) - PCI-X DDR 1.5GB Cache SAS RAID Adapter (BSC) (5903) - PCIe 380 MB Cache Dual - x4 3 Gb SAS RAID Adapter	- Solid-state drives and hard disk drives cannot be mixed in this drive enclosure. - A maximum of eight drives are supported in this configuration. - Only one 5886 can be attached to the adapter, or pair of adapters, when solid-state drives are installed. - Same rules apply when using dual SAS Raid adapters connected to 5886.

Table 1. Solid-state drive rules for the AIX operating system (continued)

Machine type model	Adapter	Mixing rules
8233-E8B and 8236-E8C	• (5679) - SAS RAID Enablement: internal adapter • (5904) - PCI-X DDR 1.5GB Cache SAS RAID Adapter • (5903) - PCIe 380 MB Cache Dual - x4 3 Gb SAS RAID Adapter	• SSD and HDD can never be mixed in the same RAID array or mirroring group. • SSD and HDD can be mixed in the system disk drive backplane if the backplane is not split. • SSD and HDD can both be present in a split backplane if each side of the split backplane has only SSD or HDD. **Restriction:** Split backplane for these models is not supported with dual SAS Raid adapters. **Remember:** SSD must be on one side of the split backplane and HDD must be on the other side of the split backplane. SSD and HDD drive types cannot be mixed within a parity set. If you are mixing SSD and HDD in a system, ensure that you have enough of each drive type to manage your protection scheme.
9117-MMB and 9179-MHB	• (5652) - Disk/Media Backplane • (5662) - 175 MB Cache RAID - Dual IOA Enablement Card • (5903) - PCIe 380 MB Cache Dual - x4 3 Gb SAS RAID Adapter	• SSD and HDD cannot be mixed in the same RAID array or mirroring group. • SSD and HDD can be mixed in the system disk-drive backplane. **Remember:** You cannot mix SSD and HDD drive types within a parity set. If you are mixing SSD and HDD in a system, ensure that you have enough of each drive type to manage your protection scheme.
5802	(5903) - PCIe 380 MB Cache Dual - x4 3 Gb SAS RAID Adapter	• SSD and HDD cannot be mixed in the same system disk drive backplane. • SSD and HDD can both be present in a split backplane if each side of the split backplane has only SSD or HDD. SSD must be on one side of the split backplane and HDD must be on the other side of the split backplane. • SSD and HDD cannot be mixed on a pair of 5903 adapters. • A maximum of nine SSDs are supported on a pair of 5903 adapters.

Table 2. Solid-state drive rules for the Linux operating system

Machine type model	Adapter	Mixing rules
5886	• (5904) - PCI-X DDR 1.5GB Cache SAS RAID Adapter • (5906 and 5908) - PCI-X DDR 1.5GB Cache SAS RAID Adapter (BSC) • (5903) - PCIe 380 MB Cache Dual - x4 3 Gb SAS RAID Adapter	• Solid-state drives and hard disk drives cannot be mixed in this drive enclosure. • A maximum of eight drives are supported in this configuration. • Only one 5886 can be attached to the adapter, or pair of adapters, when solid-state drives are installed. • Same rules apply when using dual SAS Raid adapters connected to 5886.
8233-E8B and 8236-E8C	• (5679) - SAS RAID Enablement: internal adapter • (5904) - PCI-X DDR 1.5GB Cache SAS RAID Adapter • (5903) - PCIe 380 MB Cache Dual - x4 3 Gb SAS RAID Adapter	• SSD and HDD can never be mixed in the same RAID array or mirroring group. • SSD and HDD can be mixed in the system disk drive backplane if the backplane is not split. • SSD and HDD can both be present in a split backplane if each side of the split backplane has only SSD or HDD. **Restriction:** Split backplane for these models is not supported with dual SAS Raid adapters. **Remember:** SSD must be on one side of the split backplane and HDD must be on the other side of the split backplane. SSD and HDD drive types cannot be mixed within a parity set. If you are mixing SSD and HDD in a system, ensure that you have enough of each drive type to manage your protection scheme.
9117-MMB and 9179-MHB	• (5652) - Disk/Media Backplane • (5662) - 175 MB Cache RAID - Dual IOA Enablement Card • (5903) - PCIe 380 MB Cache Dual - x4 3 Gb SAS RAID Adapter	• SSD and HDD cannot be mixed in the same RAID array or mirroring group. • SSD and HDD can be mixed in the system disk-drive backplane. **Remember:** You cannot mix SSD and HDD drive types within a parity set. If you are mixing SSD and HDD in a system, ensure that you have enough of each drive type to manage your protection scheme.

Table 2. Solid-state drive rules for the Linux operating system (continued)

Machine type model	Adapter	Mixing rules
5802	(5903) - PCIe 380 MB Cache Dual - x4 3 Gb SAS RAID Adapter	• SSD and HDD cannot be mixed in the same system disk drive backplane. • SSD and HDD can both be present in a split backplane if each side of the split backplane has only SSD or HDD. SSD must be on one side of the split backplane and HDD must be on the other side of the split backplane. • SSD and HDD cannot be mixed on a pair of 5903 adapters. • A maximum of nine SSDs are supported on a pair of 5903 adapters.

Table 3. Solid-state drive rules for the IBM i operating system

Machine type model	Adapter	Mixing rules
5886	• (5904) - PCI-X DDR 1.5GB Cache SAS RAID Adapter • (5906 and 5908) - PCI-X DDR 1.5GB Cache SAS RAID Adapter (BSC) • (5903) - PCIe 380 MB Cache Dual - x4 3 Gb SAS RAID Adapter	• Solid-state drives and hard disk drives cannot be mixed in this drive enclosure. • A maximum of eight drives are supported in this configuration. • Only one 5886 can be attached to the adapter, or pair of adapters, when solid-state drives are installed. • Same rules apply when using dual SAS Raid adapters connected to 5886.
8233-E8B and 8236-E8C	• (5679) - SAS RAID Enablement: internal adapter • (5904) - PCI-X DDR 1.5GB Cache SAS RAID Adapter • (5903) - PCIe 380 MB Cache Dual - x4 3 Gb SAS RAID Adapter	• SSD and HDD cannot be mixed in the same RAID array or mirroring group. • SSD and HDD can be mixed in the system disk-drive backplane. **Remember:** You cannot mix SSD and HDD drive types within a parity set. If you are mixing SSD and HDD in a system, ensure that you have enough of each drive type to manage your protection scheme.

Table 3. Solid-state drive rules for the IBM i operating system (continued)

Machine type model	Adapter	Mixing rules
9117-MMB and 9179-MHB	• (5652) - Disk/Media Backplane • (5662) - 175 MB Cache RAID - Dual IOA Enablement Card • (5903) - PCIe 380 MB Cache Dual - x4 3 Gb SAS RAID Adapter	• SSD and HDD cannot be mixed in the same RAID array or mirroring group. • SSD and HDD can be mixed in the system disk-drive backplane. **Remember:** You cannot mix SSD and HDD drive types within a parity set. If you are mixing SSD and HDD in a system, ensure that you have enough of each drive type to manage your protection scheme.
5802	(5903) - PCIe 380 MB Cache Dual - x4 3 Gb SAS RAID Adapter	• SSD and HDD cannot be mixed in the same system disk drive backplane. • SSD and HDD can both be present in a split backplane if each side of the split backplane has only SSD or HDD. SSD must be on one side of the split backplane and HDD must be on the other side of the split backplane. • SSD and HDD cannot be mixed on a pair of 5903 adapters. • A maximum of nine SSDs are supported on a pair of 5903 adapters.

Related tasks

"Installing a disk drive or solid-state drive with the AIX system or logical partition powered on"
You can install a disk drive or solid-state drive in a system or expansion unit while the AIX operating system or logical partition that controls the disk drive location is powered on. Use the procedure in this section to perform this task.

"Installing a disk drive or solid-state drive with the Linux system or logical partition powered on" on page 17
You might need to install a disk drive or solid-state drive in a system or expansion unit while the Linux operating system or logical partition that controls the disk drive location is powered on. Use the procedure in this section to perform this task.

"Installing a disk drive or solid-state drive with the IBM i system or logical partition powered on" on page 37
Learn how to install a disk drive or solid-state drive in a system or expansion unit while the IBM i operating system or logical partition that controls the disk drive location is powered on. Use the procedure in this information to perform this task.

"Installing a disk drive or solid-state drive with the system or logical partition power turned off" on page 49
Learn how to install a disk drive in a system or logical partition that controls the disk drive location with the power turned off. Use the procedure in this information to perform this task.

Related information

Cabling the 5802 disk subsystem

Installing a disk drive or solid-state drive with the AIX system or logical partition powered on

You can install a disk drive or solid-state drive in a system or expansion unit while the AIX operating system or logical partition that controls the disk drive location is powered on. Use the procedure in this section to perform this task.

Attention: If you are servicing a failing part, see the service procedures for "Replacing a disk drive with the AIX system or logical partition powered on" on page 63. This procedure is intended for installing a new or upgraded disk drive.

Before installing or replacing a feature, ensure that the software required to support the feature is installed on your system. For information about software prerequisites, see IBM Prerequisite. If the required software is not installed, see the following Web sites to download it, and then install it before continuing:

- To download firmware and software updates and fixes, see Microcode downloads.
- To download Hardware Management Console (HMC) updates and fixes, see Hardware Management Console Support and downloads.

If your system is managed by the HMC, use the HMC to complete the steps for installing a feature in the server. For information about using the HMC to install a feature, see "Installing a feature by using the Hardware Management Console" on page 247. If you do not have an HMC, complete the following steps to install a disk drive from the system or partition that controls the disk drive.

If you are installing Solid State Drives, review the configuration rules and then return here. For more information, see "Solid-state drives" on page 5.

DANGER

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

Electrical voltage and current from power, telephone, and communication cables are hazardous. To avoid a shock hazard:
- Connect power to this unit only with the 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.
- Connect all power cords to a properly wired and grounded electrical outlet. Ensure that the outlet supplies proper voltage and phase rotation according to the system rating plate.
- Connect any equipment that will be attached to this product to properly wired outlets.
- When possible, use one hand only to connect or disconnect signal cables.
- Never turn on any equipment when there is evidence of fire, water, or structural damage.
- Disconnect the attached power cords, telecommunications systems, networks, and modems before you open the device covers, unless instructed otherwise in the installation and configuration procedures.
- Connect and disconnect cables as described in the following procedures when installing, moving, or opening covers on this product or attached devices.

   To Disconnect:
   1. Turn off everything (unless instructed otherwise).
   2. Remove the power cords from the outlets.
   3. Remove the signal cables from the connectors.
   4. Remove all cables from the devices

   To Connect:
   1. Turn off everything (unless instructed otherwise).
   2. Attach all cables to the devices.
   3. Attach the signal cables to the connectors.
   4. Attach the power cords to the outlets.
   5. Turn on the devices.

   (D005)

Attention: The powered-on procedure is a complex set of steps that must be performed precisely as instructed to avoid potential data loss or system damage. You might also consider the powered-off procedure, which is a simpler task that involves less risk of data loss or system damage. For instructions, see "Installing a disk drive or solid-state drive with the system or logical partition power turned off" on page 49.

Note: Some of the figures in these procedures might not look exactly like the system or expansion unit that you have. However, the steps to perform the task are the same.

Prepare the system

1. Perform prerequisite tasks as described in "Before you begin" on page 189.
2. If applicable, remove the system unit door, remove the expansion unit door, or open the rack.
3. If applicable, remove the front cover.
4. Determine the next available disk drive position in your system or expansion unit. For information, see "Disk drive locations and concurrent maintenance lights" on page 125.

Note: When you have a system with an expansion unit, fill the slot positions in the system unit first. However, you can choose a different disk drive placement depending on your data protection strategy.

5. Record the position where the new disk drive will be installed. For example, the next available disk drive slot might be P3-D4.
6. Perform the following steps to install a disk drive.

Install the disk drive

1. Log in as root user.
2. At the command line, type `diag` and press Enter.
3. Press Enter to continue.
4. On the Function Selection display, select **Task Selection**.
5. On the Tasks Selection display, select **Hot Plug Task**.
6. Select **SCSI and SCSI RAID Hot Plug Manager**.
7. Select **Attach a Device to a SCSI Hot Swap Enclosure Device**. A list of empty slots in the SCSI hot swap enclosure device is shown.
8. Select the slot where you want to install the disk drive and press Enter.

   The disk drive slot enters the Identify state. The concurrent maintenance light for the slot begins flashing. To view the locations of the concurrent maintenance lights, select the model into which you are installing a disk drive. For a list of models, see "Disk drive locations and concurrent maintenance lights" on page 125.

9. If the slot you want to use contains a disk-drive filler, store the filler for future use, or discard it, then move on to step Insert the disk drive.

   Note: The disk drive filler is a single piece that does not attach to the new disk drive.

   Important: .

   Pull the disk-drive filler from the slot that you want to use, as shown in Figure 1 on page 13

   Attention:

   • Attach a wrist strap to an unpainted surface of your hardware to prevent electrostatic discharge (ESD) from damaging your hardware.

   • When using a wrist strap, follow all electrical safety procedures. A wrist strap is 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 a wrist strap, just prior to removing the product from ESD packaging and installing or replacing hardware, touch an unpainted surface of the system for a minimum of 5 seconds.
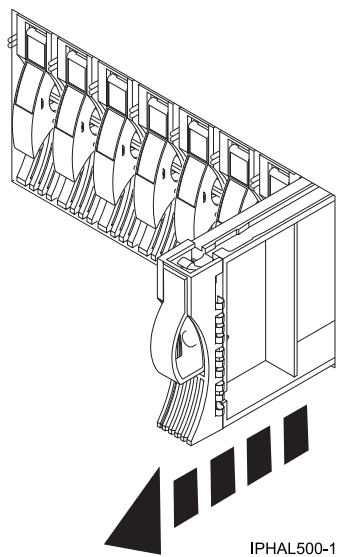
Figure 1. Removing a disk-drive filler from a model .

10. If the slot you want to use contains a disk-drive filler, complete the following step.

    Remove the disk-drive bezel latch **(A)** from the front of the filler, as shown in the following figure.
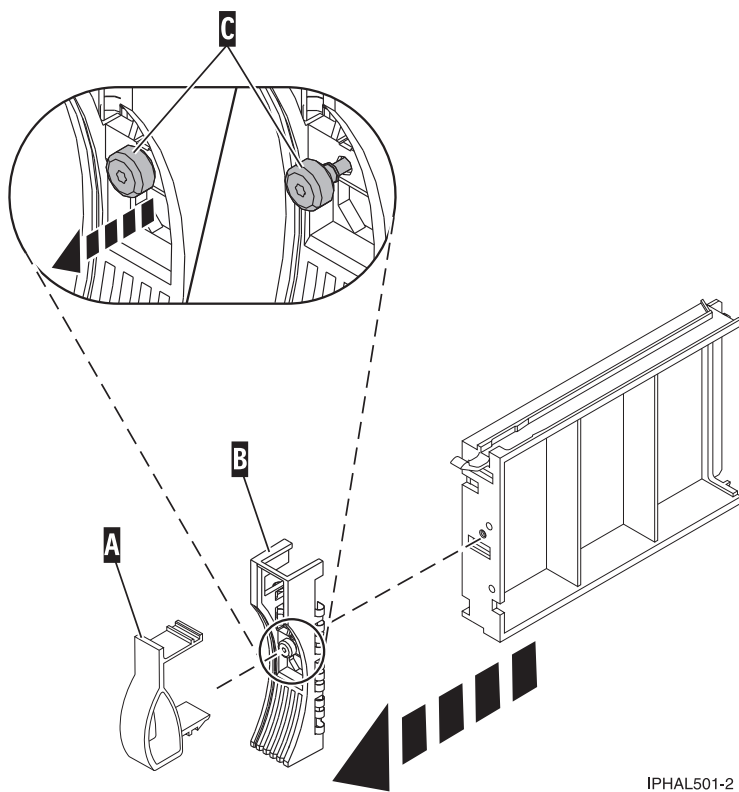
Figure 2. Removing a disk-drive bezel from a disk-drive filler

11. If the slot you want to use contains a disk-drive filler, complete the following step.

    Loosen, and then pull out on the thumbscrew **(C)** to release the bezel **(B)** from the front edge of the filler.

12. Find the package that contains the new disk drive.

    Attention: Disk drives are fragile. Handle with care.

13. Remove the disk drive from the static-protective package.

14. Unlock the disk drive handle by squeezing it and pulling it out toward you. If the handle is not all the way out, the disk drive will not slide into the system or expansion unit.

15. If the disk drive you are installing does not have a bezel preinstalled, then complete the following step.

    Attach the disk-drive bezel **(A)** to the disk drive, as shown in the following figure.

IPHAL502-2

Figure 3. Installing a disk-drive bezel on a disk drive

16. If the disk drive you are installing does not have a bezel preinstalled, then complete the following step.

    Press in and then tighten the thumbscrew **(B)** to secure the bezel **(A)** to the disk drive.

17. Support the bottom of the disk drive as you align it with the guide rails in the system unit. Do not hold the disk drive by the handle.

18. Slide the disk drive into the system unit until it stops, as shown in Figure 4 on page 15.

19. Push the disk drive handle in until it locks. The light on the disk drive will turn on.
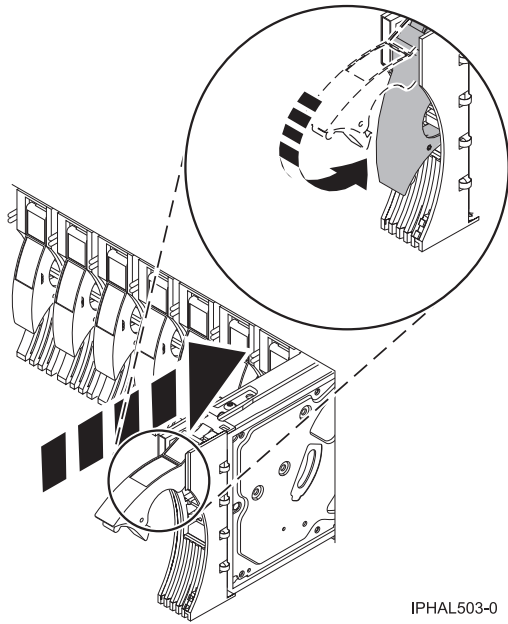
Figure 4. Installing a disk drive in a model
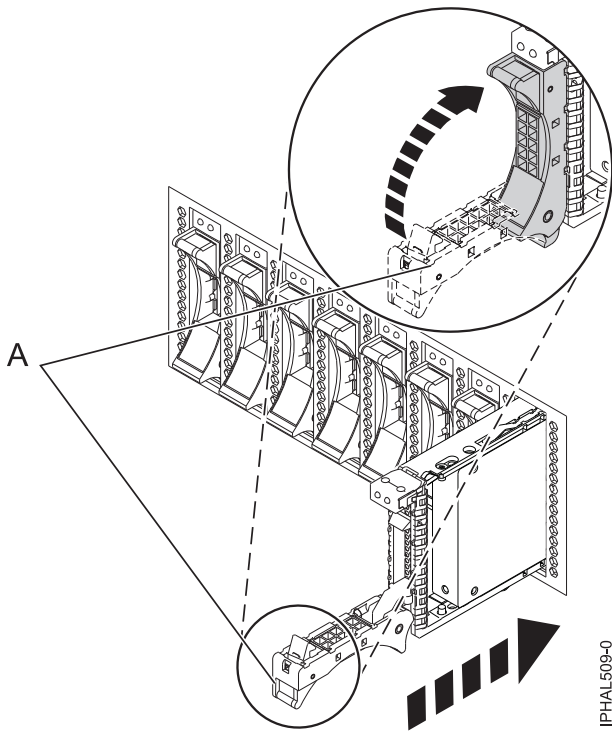
Figure 5. Installing a small-form factor disk drive
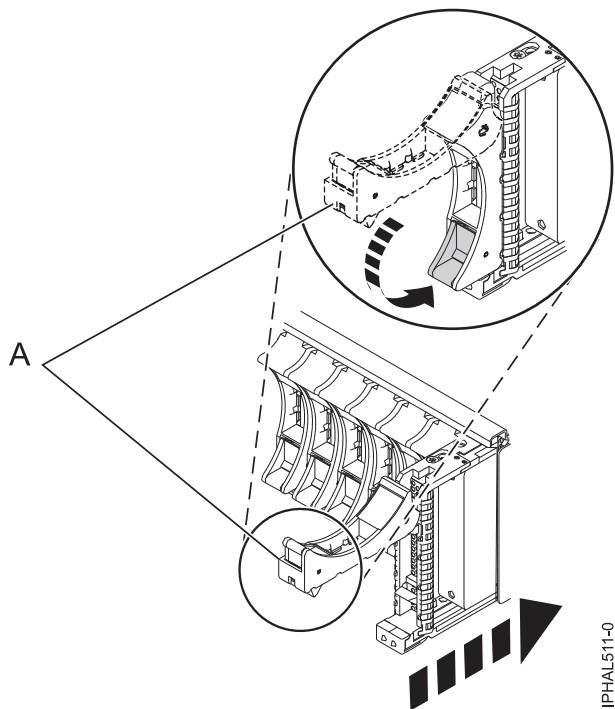
Figure 6. Installing a small-form factor disk drive in the 5803 expansion unit

20. Press Enter.
21. If you are installing more than one disk drive, repeat step 1 on page 12 through step 20 until all disk drives are installed.
22. Cancel to get to the SCSI and SCSI RAID Hot Plug Manager menu.
23. Select **Configure Added/Replaced Devices**.
24. Exit to the command line.

Complete the procedure

1. Replace the front cover.
2. Install or close the system, expansion unit, or rack door.
3. Verify the installed part. For instructions, see "Verifying an installed feature or replaced part in an AIX system or logical partition" on page 249.
4. To prepare the newly installed disk drive for use, go to "Preparing a disk drive for use in an AIX system or logical partition" on page 137.

Related concepts

Removing and replacing covers and doors
Use these procedures to remove and replace the covers on IBM Power Systems™ servers that contain the POWER7 processor.

Related reference

"Removing and replacing the expansion unit cover or door" on page 205
You might need to remove, replace, or install covers or doors on an expansion unit as a part of accessing components or performing a service action.

Installing a disk drive or solid-state drive with the Linux system or logical partition powered on

You might need to install a disk drive or solid-state drive in a system or expansion unit while the Linux operating system or logical partition that controls the disk drive location is powered on. Use the procedure in this section to perform this task.

Attention: If you are servicing a failing part, see the service procedures for "Replacing a disk drive with the Linux system or logical partition powered on" on page 72. This procedure is intended for installing a new or upgraded disk drive.

Before installing or replacing a feature, ensure that the software required to support the feature is installed on your system. For information about software prerequisites, see IBM Prerequisite. If the required software is not installed, see the following Web sites to download it, and then install it before continuing:

- To download firmware and software updates and fixes, see Microcode downloads.
- To download Hardware Management Console (HMC) updates and fixes, see Hardware Management Console Support and downloads.

If your system is managed by the HMC, use the HMC to complete the steps for installing a feature in the server. For information about using the HMC to install a feature, see "Installing a feature by using the Hardware Management Console" on page 247. If you do not have an HMC, complete the following steps to install a disk drive from the system or partition that controls the disk drive.

If you are installing Solid State Drives, review the configuration rules and then return here. For more information, see "Solid-state drives" on page 5.

DANGER

Attention: Be sure you read these instructions carefully and understand the complexity of the powered-on procedure before you begin.

If any of the following steps apply to you, go to "Installing a disk drive or solid-state drive with the system or logical partition power turned off" on page 49.
- You are installing a disk drive that will be connected with the 6203 or 6204 SCSI adapter.
- You do not feel comfortable using the powered-on procedure.

Note: Some of the figures in these procedures might not look exactly like the system or expansion unit that you have. However, the steps to perform the task are the same.

Prepare the system
1. Perform the prerequisite tasks as described in "Before you begin" on page 189.
2. If applicable, remove the system unit door, expansion unit door, or the rack door.
3. If applicable, remove the front cover.
   - If you have a front cover from any other models, remove the front cover.

4. Look at the front of the system or expansion unit and determine the next available disk drive position. For information, see "Disk drive locations and concurrent maintenance lights" on page 125.

   Note: When you have a system with an expansion unit, fill the slot positions in the system unit first. However, you can choose a different disk drive placement depending on your data protection strategy.

5. Record the position where the new disk drive will be installed. For example, the next available disk drive position might be P3-D4.

Install a SCSI disk drive in a system or expansion unit using Linux kernel 2.4 or Linux kernel 2.6.

Related concepts

Removing and replacing covers and doors
Use these procedures to remove and replace the covers on IBM Power Systems servers that contain the POWER7 processor.

Related reference

"Removing and replacing the expansion unit cover or door" on page 205
You might need to remove, replace, or install covers or doors on an expansion unit as a part of accessing components or performing a service action.

Installing a disk drive using Linux kernel 2.4

If you are installing a disk drive in a location that is controlled by Linux kernel 2.4, follow the procedure in this section to perform this task.

Installing a disk drive

1. If the slot you want to use contains a disk-drive filler, store the filler for future use, or discard it, then move on to step 7 on page 21.

   Note: The disk drive filler is a single piece that does not attach to the new disk drive.
   Attention:

   - Attach a wrist strap to an unpainted surface of your hardware to prevent electrostatic discharge (ESD) from damaging your hardware.
   - When using a wrist strap, follow all electrical safety procedures. A wrist strap is 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 a wrist strap, just prior to removing the product from ESD packaging and installing or replacing hardware, touch an unpainted surface of the system for a minimum of 5 seconds.

   a. Pull the disk-drive filler from the slot, as shown in Figure 7 on page 20.

IPHAL500-1
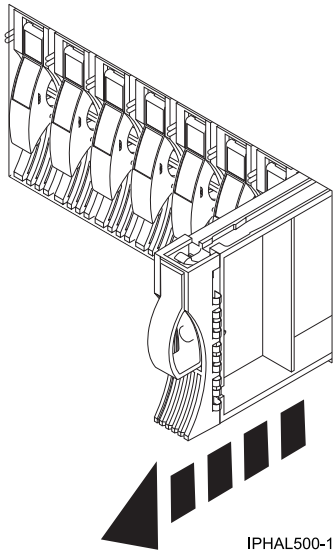
Figure 7. Removing a disk-drive filler from model

   b. Pull off the disk-drive bezel latch **(A)** from the front of the filler, as shown in the following figure.

IPHAL501-2
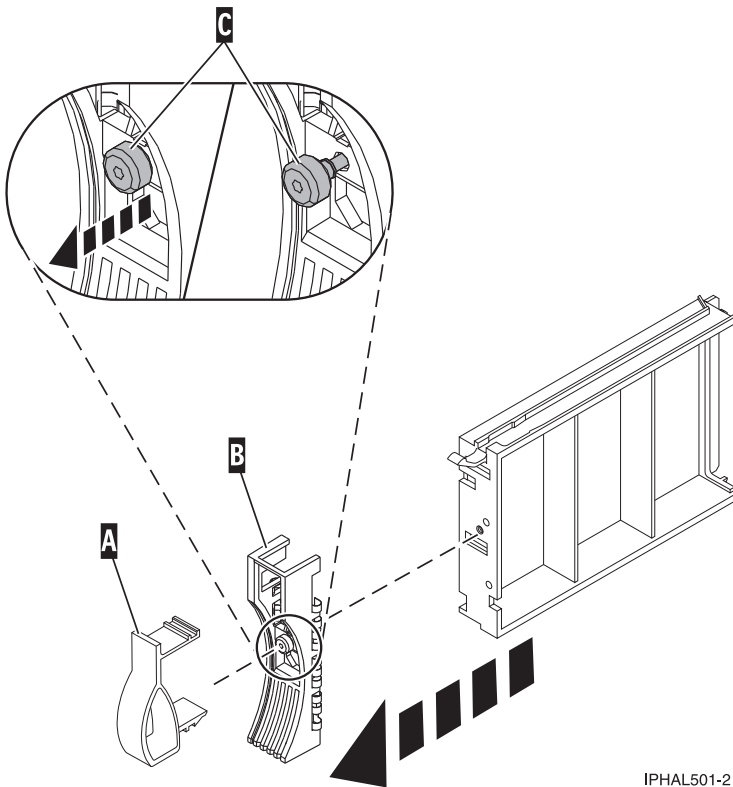
Figure 8. Removing the disk-drive bezel

   c. Loosen, and then pull out on the thumbscrew **(C)** to release the disk-drive bezel **(B)** from the front edge of the filler.

2. Find the package that contains the new disk drive.

Attention: Disk drives are fragile. Handle with care.

3. Remove the disk drive from the static-protective package. Record the serial number (use the last 4 digits) of the disk drive.

4. Unlock the disk drive handle by squeezing and pulling it out toward you. If the handle is not all the way out, the disk drive will not slide into the system or expansion unit.

5. If your disk drive does not have a bezel preinstalled, follow these steps to install the disk-drive bezel on the new disk drive:

    a. Attach the bezel **(A)** to the disk drive, as shown in the following figure.
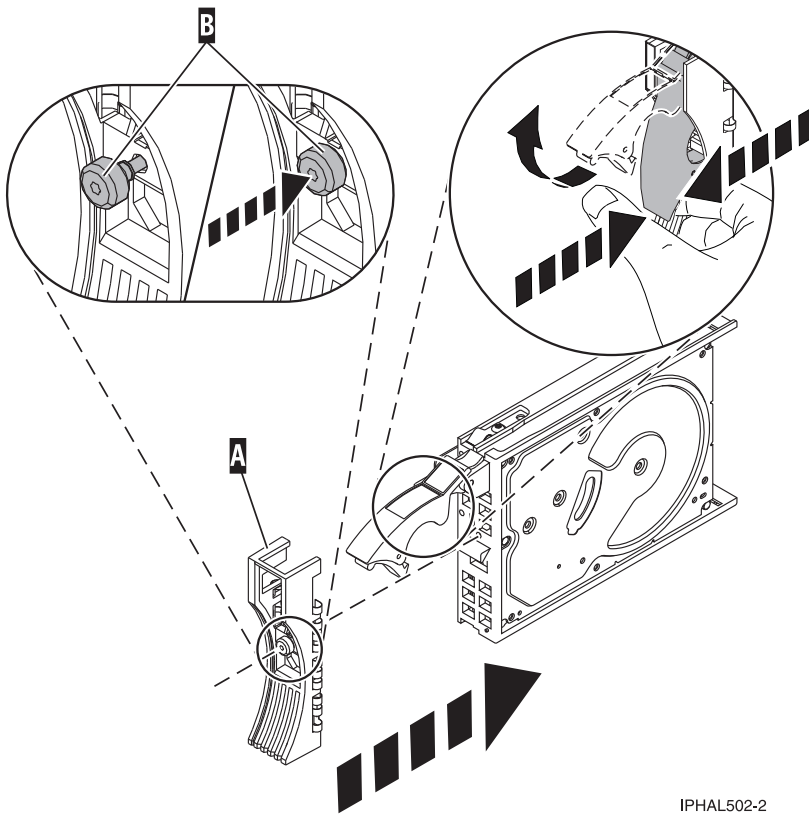
Figure 9. Installing a disk-drive bezel

    b. Press in and then tighten the thumbscrew **(B)** to secure the bezel to the disk drive.

6. Support the bottom of the disk drive as you align it with the guide rails in the system or expansion unit. Do not hold the disk drive by the handle.

7. Slide the disk drive into the system.

    Slide the disk drive all the way in to the system or expansion unit and then lock it in place by pushing in the disk drive handle, as shown in Figure 10 on page 22.

IPHAL503-0
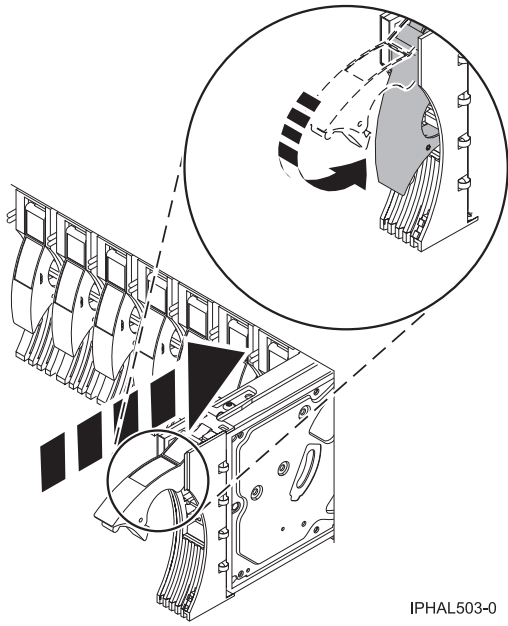
Figure 10. Installing a disk drive in a model

A

IPHAL509-0
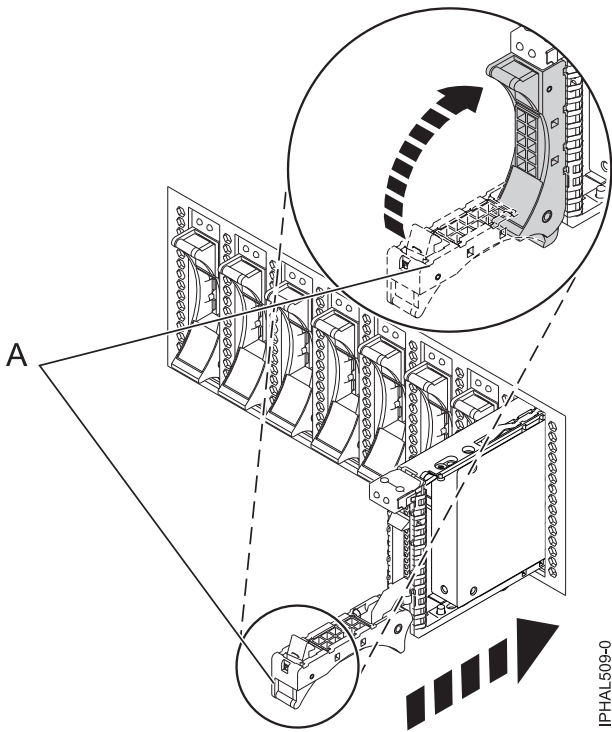
Figure 11. Installing a small-form factor disk drive
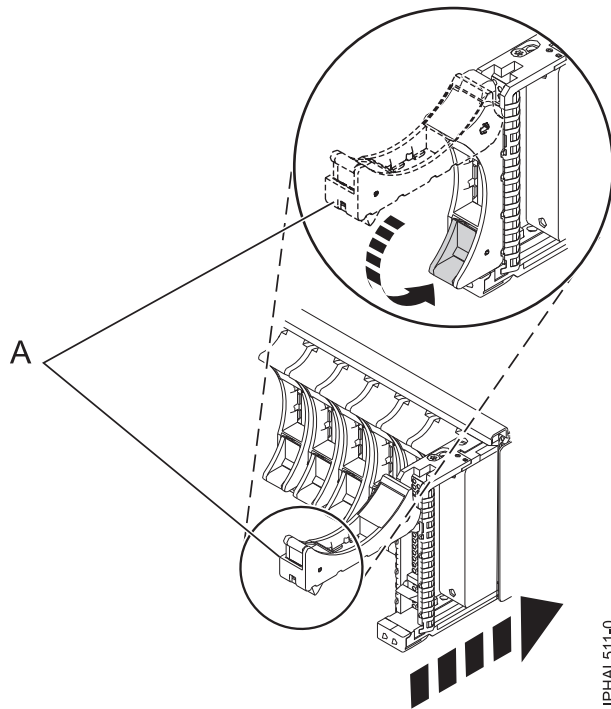
Figure 12. Installing a small-form factor disk drive in the 5803 expansion unit

Note: The concurrent maintenance light stops blinking and remains on when you have installed the disk drive correctly.

To view the locations of the concurrent maintenance lights, select the appropriate model from the following list:

- "Disk drive locations and concurrent maintenance lights for the 5786, 5787, 7031-D24, and 7031-T24 SCSI disk-drive enclosures" on page 133
- "Disk drive locations and concurrent maintenance lights for the 5886 disk enclosure" on page 131
- "Disk drive locations and concurrent maintenance lights for the 5802 expansion unit" on page 135

8. If you are installing more than one disk drive, repeat step 1 on page 19 through step 7 on page 21, until all disk drives are installed.

9. Log in as root user.

10. Wait 30 seconds after installing the disk drive, and then type iprconfig on the command line of the Linux session. Press Enter. The Work with Disk Units display is shown.

11. Select **Display disk hardware status** from the Work with Disk Units display. Press Enter.

A Display Disk Hardware Status display is shown, similar to the following figure.

```
                 Display Disk Hardware Status

 Serial   Vendor   Product               Resource      Hardware
 Number    ID        ID        Model     Name          Status
 03132041  IBM    2780001        001     /dev/ipr3     Operational
 000015A5  IBM    ST373453LC     079                   DPY/Active
 E3V1WEAB  IBM    IC35L036UCDY10-0 070                 DPY/Active
 E3V0J55B  IBM    IC35L036UCDY10-0 079                 DPY/Active
 E3V1W1UB  IBM    IC35L036UCDY10-0 070                 DPY/Active
 04B81193  IBM    3C98D203       210     /dev/sdi      Operational
 000227CE  IBM    ST336605LC     020     /dev/sdh      Operational
 00000001  IBM    570B001        001     /dev/ipr2     Operational
 00006719  IBM    ST336607LC     020     /dev/sdd      Operational
 E3V0E77B  IBM    IC35L036UCDY10-0 020   /dev/sde      Operational
 0007E0C4  IBM    ST373453LC     020     /dev/sdf      Operational
 00000001  IBM    5702001        001     /dev/ipr1     Operational
 03060038  IBM    5703001        001     /dev/ipr0     Operational
                                                    More...

 Press Enter to continue.


 e=Exit          q=Cancel       r=Refresh   f=PageDn   b=PageUp
 d=Display disk unit details    p=Display device parity status
```

Figure 13. Display Disk Hardware Status display

12. Locate the disk drive that you installed. The serial number might be 0.

    If the disk drive is displayed as a model 50 disk, you are done. If not, follow these steps:

    a. Find the /dev/sd*x* name associated with the disk drive that you installed.

    b. Exit to the command line.

    c. Type sg_map on the command line and press Enter.

    d. Using the output from running the sg_map command, correlate the /dev/sd*x* device to a /dev/sg*x* device.

    e. Type sg_inq /dev/sg*x* on the command line using the /dev/sg*x* value from the previous step. Press Enter.

    f. Type iprconfig on the command line and press Enter.

    g. Select **Display disk hardware status** from the Work with Disk Units display. Press Enter.

    h. The serial number for the newly installed disk drive will be displayed on the Display Hardware Status display.

13. Record the resource name, when you configure the disk drive.

Perform the procedure

1. Replace the front cover.

2. Install or close the system, expansion unit or rack front door.

3. Configure the newly installed disk drive for your environment. For information, see the *PCI-X SCSI RAID Controller Reference Guide for Linux*.

    This guide is available from the SCSI PCI Adapters web page.

Related concepts

Removing and replacing covers and doors
Use these procedures to remove and replace the covers on IBM Power Systems servers that contain the
POWER7 processor.

Related reference

"Removing and replacing the expansion unit cover or door" on page 205
You might need to remove, replace, or install covers or doors on an expansion unit as a part of accessing
components or performing a service action.

Installing the disk drive using Linux kernel 2.6

If you are installing a disk drive in a location that is controlled by Linux kernel 2.6, follow the procedure
in this section to perform this task.

Install the disk drive

1. Log in as root user.
2. Type lsslot on the command line of the Linux session and press Enter.

   A display like the following figure, is shown.

```
 x0537p1:~ # lsslot
# Slot                 Description         Linux Name    Device(s)
U787A.001.DNZ00XV-P1-C1   Logical I/O Slot   0000:00:02.0   ethernet
U787A.001.DNZ00XV-P1-C2   Logical I/O Slot   0000:00:02.2   pci
U787A.001.DNZ00XV-P1-C3   Logical I/O Slot   0001:00:02.2   pci1069,b166
U787A.001.DNZ00XV-P1-C4   Logical I/O Slot   0000:00:02.6   pci1069,b166
U787A.001.DNZ00XV-P1-C5   Logical I/O Slot   0001:00:02.6   pci1014,0180
U787A.001.DNZ00XV-P1-T5   Logical I/O Slot   0000:00:02.4   ethernet
U787A.001.DNZ00XV-P1-T7   Logical I/O Slot   0000:00:02.3   usb
U787A.001.DNZ00XV-P1-T10  Logical I/O Slot   0001:00:02.4   scsi
U787A.001.DNZ00XV-P1-T12  Logical I/O Slot   0001:00:02.3   ide
U9111.520.10D3C6C-V1-C0   Virtual I/O Slot   30000000      vty
```

Figure 14. Find the Linux Name for the location for which you want to install the disk drive.

3. Note the Linux Name for the slot that contains the adapter under which you want to install the disk
   drive.
4. Type iprconfig on the command line of the Linux session and press Enter. The IBM Power RAID
   Configuration Utility display is shown.
5. Select **Work with disk unit recovery** from the IBM Power RAID Configuration Utility display. Press
   Enter.
6. Select **Concurrent add device** from the Work with Disk Unit Recovery display. Press Enter.

   A Concurrent Device Add display, like the following figure, is shown.

```
                          Concurrent Device Add

Choose a single location for add operations
  1=Select

OPT Name    PCI/SCSI Location          Description              Status
--- ------  -------------------------  ------------------------ ----------------
        0000:41:01.0.1/0:5:                                    Empty
        0000:41:01.0.1/1:8:                                    Empty
        0001:61:01.0.2/0:8:                                    Empty
```

Figure 15. Example Concurrent Device Remove display

7. Type option 1 next to the location into which you want to install the disk drive and press Enter.

   The Verify Device Concurrent Add display is shown.

A concurrent maintenance light indicates the slot where the disk drive can be installed.

8. Press Enter on the Verify Device Concurrent Add display to verify the location.

9. If the slot you want to use contains a disk-drive filler, store the filler for future use, or discard it, then move on to step 16 on page 28.

Note: The disk drive filler is a single piece that does not attach to the new disk drive.
Attention:

- Attach a wrist strap to an unpainted surface of your hardware to prevent electrostatic discharge (ESD) from damaging your hardware.

- When using a wrist strap, follow all electrical safety procedures. A wrist strap is 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 a wrist strap, just prior to removing the product from ESD packaging and installing or replacing hardware, touch an unpainted surface of the system for a minimum of 5 seconds.

a. Pull the disk-drive filler from the slot as shown in Figure 16.

IPHAL500-1

Figure 16. Removing a disk-drive filler from model

b. Pull off the disk-drive bezel latch **(A)** from the front of the filler, as shown in the following figure.
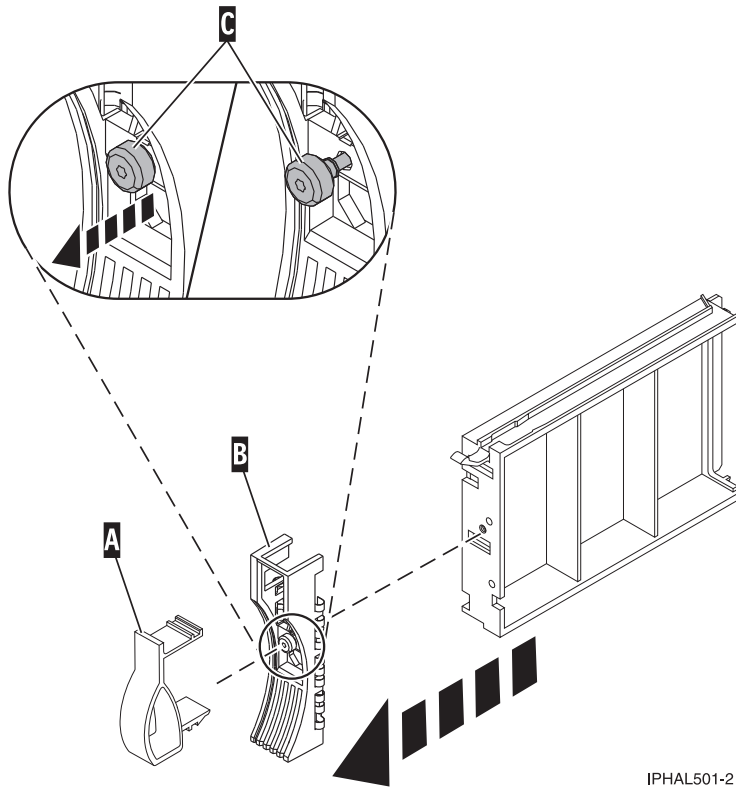
Figure 17. Removing a disk-drive bezel from the disk drive.

  c. Loosen, and then pull out on the thumbscrew **(C)** to release the disk-drive bezel **(B)** from the front edge of the filler.

10. Find the package that contains the new disk drive.

    Attention: Disk drives are fragile. Handle with care.

11. Remove the disk drive from the static-protective package. Record the serial number (use the last four digits) of the disk drive.

12. Unlock the disk drive handle by squeezing and pulling it out toward you. If the handle is not all the way out, the disk drive cannot slide into the system or expansion unit.

13. If your disk drive does not have a bezel preinstalled, follow these steps to install the disk-drive bezel on the new disk drive:

    a. Attach the bezel **(A)** to the disk drive, as shown in the following figure.
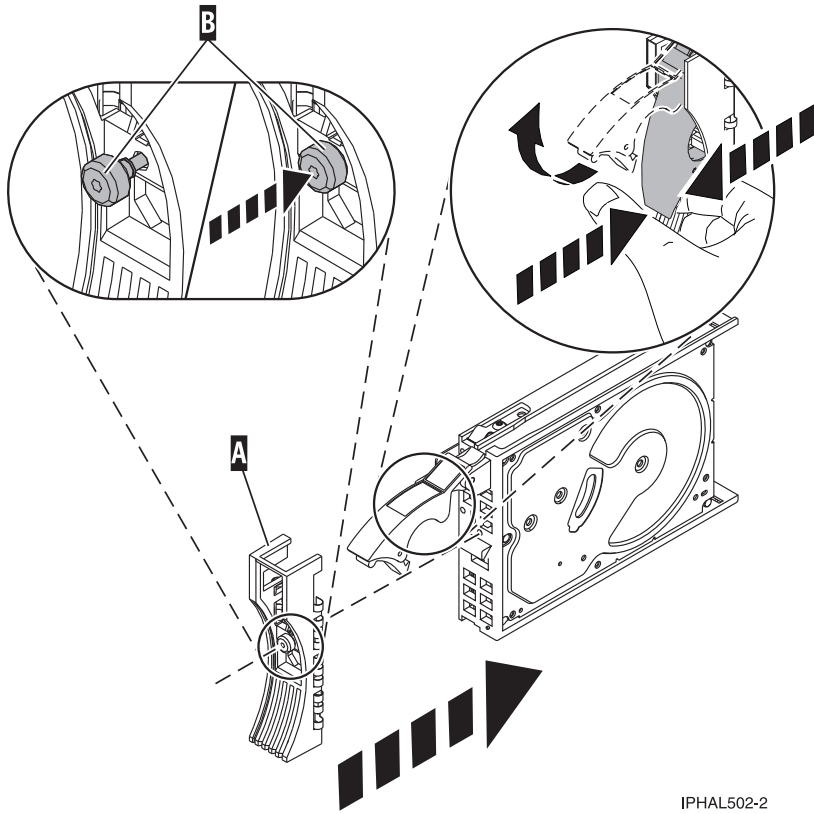
IPHAL502-2

Figure 18. Attaching the disk-drive bezel to the disk drive.

     b. Press in and then tighten the thumbscrew **(B)** to secure the bezel to the disk drive.

14. Support the bottom of the disk drive as you align it with the guide rails in the system or expansion unit. Do not hold the disk drive by the handle.

15. The Complete Device Concurrent Add display is shown.

16. Slide the disk drive into the system.

    Slide the disk drive all the way in into the system or expansion unit and then lock it in place by pushing in the disk drive handle, as shown in Figure 19 on page 29.
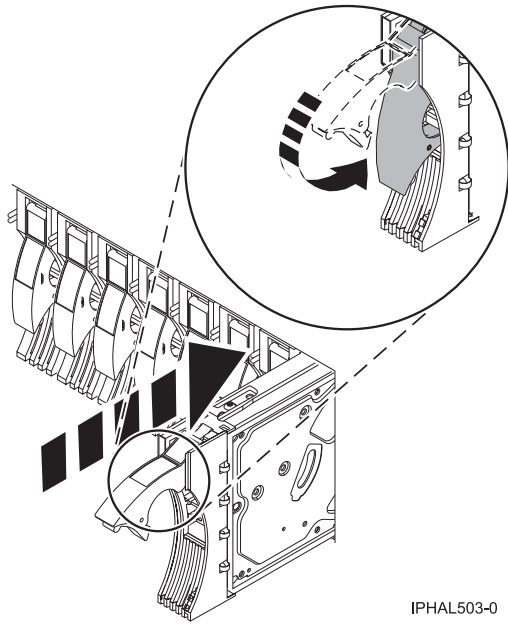
Figure 19. Installing a disk drive in a model
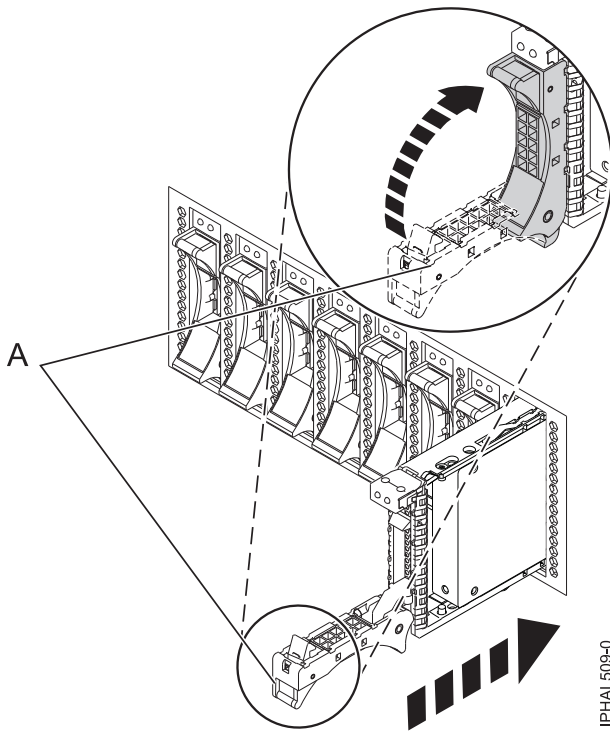
Figure 20. Installing a small-form factor disk drive
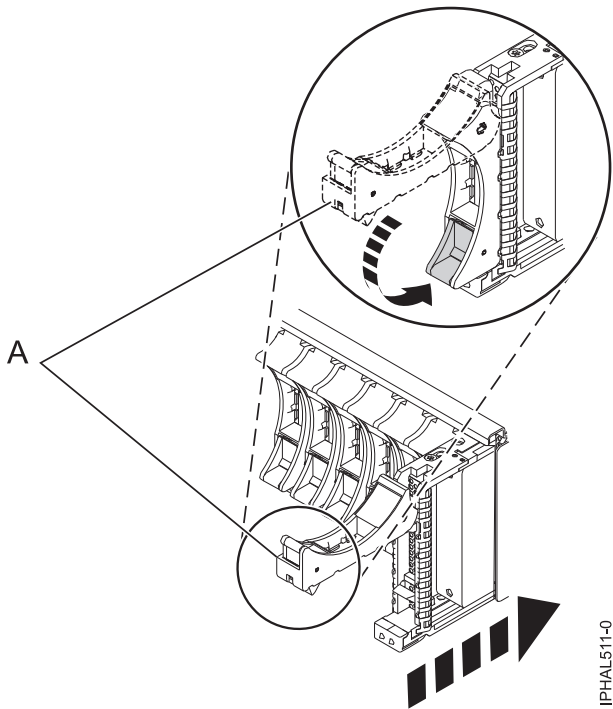
Figure 21. Installing a small-form factor disk drive in the 5803 expansion unit

17. Press Enter. The concurrent maintenance light stops flashing and remains on when you have installed the disk drive properly.

    To view the locations of the concurrent maintenance lights, select the appropriate model from the following list:

    - "Disk drive locations and concurrent maintenance lights for the 5786, 5787, 7031-D24, and 7031-T24 SCSI disk-drive enclosures" on page 133
    - "Disk drive locations and concurrent maintenance lights for the 5886 disk enclosure" on page 131
    - "Disk drive locations and concurrent maintenance lights for the 5802 expansion unit" on page 135

18. If you are installing more than one disk drive, repeat step 2 on page 25 through step 17 until all disk drives are installed.

Verify that the new disk drive is operational

To verify that the new disk drive is operational, follow these steps:

1. Log in as root user.
2. Type iprconfig on the command line of the Linux session and press Enter. The IBM Power RAID Configuration Utility display is shown.
3. Select **Display hardware status**.

   The Display Hardware Status display is shown, like the following figure.

```
                       Display Hardware Status

Type option, press Enter.
  1=Display hardware resource information details

OPT Name   PCI/SCSI Location          Description             Status
--- ------ -------------------------- ----------------------- ----------------
           0000:01:01.0.0/            PCI-X SCSI Adapter      Operational
           0000:41:01.0.1/            PCI-X SCSI Adapter      Operational
    sda    0000:41:01.0.1/0:3:0       Physical Disk           Active
    sdb    0000:41:01.0.1/0:4:0       Physical Disk           Active
    sdc    0000:41:01.0.1/0:8:0       Physical Disk           Active
    sdd    0000:41:01.0.1/1:3:0       Physical Disk           Active
    sde    0000:41:01.0.1/1:4:0       Physical Disk           Active
    sdf    0000:41:01.0.1/1:5:0       Physical Disk           Active
           0001:61:01.0.2/            PCI-X SCSI RAID Adapter  Operational
    sdg    0001:61:01.0.2/0:3:0       Physical Disk           Active
           0001:61:01.0.2/0:6:0       Advanced Function Disk  Active
    sdi    0001:61:01.0.2/0:9:0       Physical Disk           Active
    sdh    0001:61:01.0.2/255:0:0     RAID 10 Disk Array      Failed
           0001:61:01.0.2/0:4:0       RAID 10 Array Member    Failed
           0001:61:01.0.2/0:5:0       RAID 10 Array Member    Failed


e=Exit   q=Cancel   r=Refresh   t=Toggle
```

Figure 22. Example Display Hardware Status

4. Verify that the disk drive that you installed is shown on this display.

Perform the procedure

1. Replace the front cover.
2. Install or close the system, expansion unit, or rack front door.
3. Configure the newly installed disk drive for your environment. For information, go to the *PCI-X SCSI RAID Controller Reference Guide for Linux*.

    This guide is available from the SCSI PCI Adapters web page.

Related concepts

Removing and replacing covers and doors
Use these procedures to remove and replace the covers on IBM Power Systems servers that contain the POWER7 processor.

Related reference

"Removing and replacing the expansion unit cover or door" on page 205
You might need to remove, replace, or install covers or doors on an expansion unit as a part of accessing components or performing a service action.

Installing a disk drive or solid-state drive with the Virtual I/O Server system or logical partition powered on

You can install a disk drive or solid-state drive in a system or expansion unit while the Virtual I/O Server operating system or logical partition that controls the disk drive location is powered on. Use the procedure in this information to perform this task.

Before installing or replacing a feature, ensure that the software required to support the feature is installed on your system. For information about software prerequisites, see IBM Prerequisite. If the required software is not installed, see the following websites to download it, and then install it before continuing:

- To download firmware and software updates and fixes, see Microcode downloads.
- To download Hardware Management Console (HMC) updates and fixes, see Hardware Management Console Support and downloads.

If your system is managed by the HMC, use the HMC to perform the steps for installing a feature in the server. For information about using the HMC to install a feature, see "Installing a feature by using the Hardware Management Console" on page 247. If you do not have an HMC, perform the following steps to install a disk drive from the system or partition that controls the disk drive.

DANGER

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

Electrical voltage and current from power, telephone, and communication cables are hazardous. To avoid a shock hazard:
* **Connect power to this unit only with the 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.**
* **Connect all power cords to a properly wired and grounded electrical outlet. Ensure that the outlet supplies proper voltage and phase rotation according to the system rating plate.**
* **Connect any equipment that will be attached to this product to properly wired outlets.**
* **When possible, use one hand only to connect or disconnect signal cables.**
* **Never turn on any equipment when there is evidence of fire, water, or structural damage.**
* **Disconnect the attached power cords, telecommunications systems, networks, and modems before you open the device covers, unless instructed otherwise in the installation and configuration procedures.**
* **Connect and disconnect cables as described in the following procedures when installing, moving, or opening covers on this product or attached devices.**

  To Disconnect:
  1. **Turn off everything (unless instructed otherwise).**
  2. **Remove the power cords from the outlets.**
  3. **Remove the signal cables from the connectors.**
  4. **Remove all cables from the devices**

  To Connect:
  1. **Turn off everything (unless instructed otherwise).**
  2. **Attach all cables to the devices.**
  3. **Attach the signal cables to the connectors.**
  4. **Attach the power cords to the outlets.**
  5. **Turn on the devices.**

  (D005)

Attention: The powered-on procedure is a complex set of steps that must be performed precisely as instructed to avoid potential data loss or system damage. You might also consider the powered-off procedure, which is a simpler task that involves less risk of data loss or system damage. For instructions, see "Installing a disk drive or solid-state drive with the system or logical partition power turned off" on page 49.

Note: Some of the figures in these procedures might not look exactly like the system or expansion unit that you have. However, the steps to perform the task are the same.

Prepare the system

1. Perform prerequisite tasks as described in "Before you begin" on page 189.
2. Remove the front covers. For instructions, see "System covers" on page 207

3. Determine the next available disk drive position in your system or expansion unit. For information, see "Disk drive locations and concurrent maintenance lights" on page 125.

   Note: When you have a system with an expansion unit, fill the slot positions in the system unit first. However, you can select a different disk drive placement depending on your data protection strategy.

4. Record the position where the new disk drive can be installed. For example, the next available disk drive slot might be P3-D4.

5. Perform the following steps to install a disk drive.

Install the disk drive

1. Log in as root user.
2. At the command line, type `diagmenu` and press Enter.
3. Press Enter to continue.
4. On the Function Selection display, select **Task Selection**.
5. On the Tasks Selection display, select **Hot Plug Task**.
6. Select **SCSI and SCSI RAID Hot Plug Manager**.
7. Select **Attach a Device to a SCSI Hot Swap Enclosure Device**. A list of empty slots in the SCSI hot swap enclosure device is shown.
8. Select the slot where you want to install the disk drive and press Enter.

   The disk drive slot enters the Identify state. The concurrent maintenance light for the slot begins flashing. To view the locations of the concurrent maintenance lights, select the model you are installing a disk drive in to. For a list of models see, "Disk drive locations and concurrent maintenance lights" on page 125.

9. If the slot you want to use contains a disk-drive filler, store the filler for future use, or discard it, then move on to step Insert the disk drive.

   Note: The disk drive filler is a single piece that does not attach to the new disk drive.

   Important: .

   Pull the disk-drive filler from the slot that you want to use, as shown in Figure 23 on page 34

   Attention:
   • Attach a wrist strap to an unpainted surface of your hardware to prevent electrostatic discharge (ESD) from damaging your hardware.
   • When using a wrist strap, follow all electrical safety procedures. A wrist strap is 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 a wrist strap, just prior to removing the product from ESD packaging and installing or replacing hardware, touch an unpainted surface of the system for a minimum of 5 seconds.
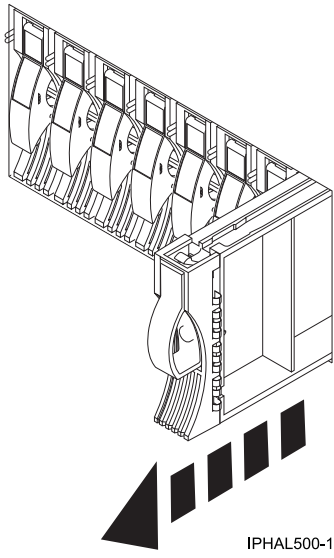
Figure 23. Removing a disk-drive filler from a model

10. If the slot you want to use contains a disk-drive filler, perform the following step.

    Remove the disk-drive bezel latch **(A)** from the front of the filler, as shown in the following figure.
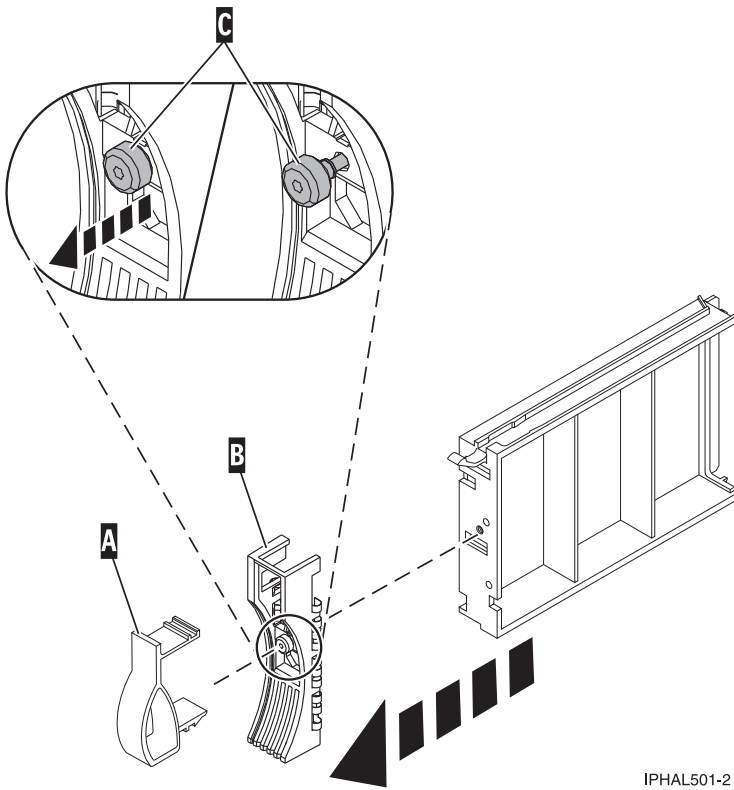
Figure 24. Removing a disk-drive bezel from a disk-drive filler

11. If the slot you want to use contains a disk-drive filler, perform the following step.

    Loosen, and then pull out on the thumbscrew **(C)** to release the bezel **(B)** from the front edge of the filler.

12. Find the package that contains the new disk drive.

    Attention: Disk drives are fragile. Handle with care.

13. Remove the disk drive from the static-protective package.

14. Unlock the disk drive handle by squeezing it and pulling it out toward you. If the handle is not all the way out, the disk drive does not slide into the system or expansion unit.

15. If the disk drive you are installing does not have a bezel preinstalled, then perform the following step.

    Attach the disk-drive bezel **(A)** to the disk drive, as shown in the following figure.

Figure 25. Installing a disk-drive bezel on a disk drive

16. If the disk drive you are installing does not have a bezel preinstalled, then perform the following step.

    Press in and then tighten the thumbscrew **(B)** to secure the bezel **(A)** to the disk drive.

17. Support the bottom of the disk drive as you align it with the guide rails in the system unit. Do not hold the disk drive by the handle.

18. Slide the disk drive into the system unit until it stops, as shown in Figure 26 on page 36.

19. Push the disk drive handle in until it locks. The light on the disk drive turns on.
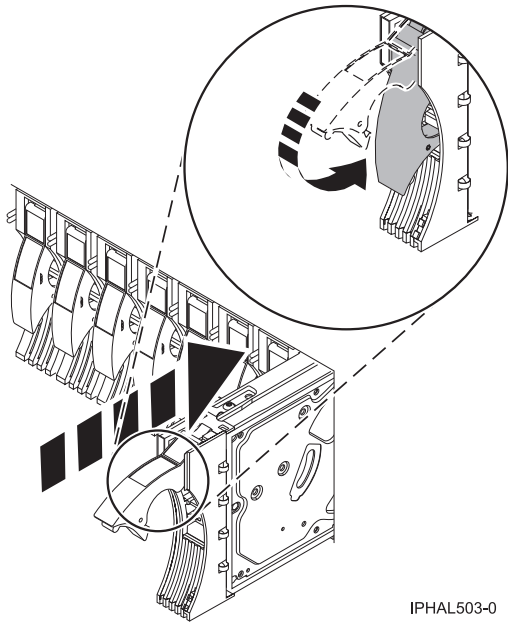
Figure 26. Installing a disk drive in a model
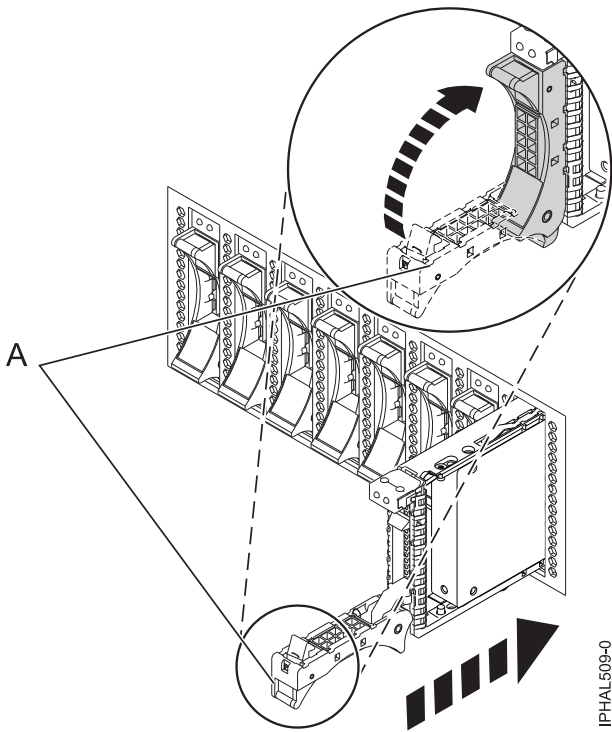
Figure 27. Installing a small-form factor disk drive

Figure 28. Installing a small-form factor disk drive in the 5803 expansion unit

20. Press Enter.
21. If you are installing more than one disk drive, repeat step 1 on page 33 through step 20 until all disk drives are installed.
22. Cancel to get to the SCSI and SCSI RAID Hot Plug Manager menu.
23. Select **Configure Added/Replaced Devices**.
24. Exit to the command line.

Perform the procedure

1. Replace the front cover. For instructions on replacing the cover, see "System covers" on page 207.
2. Verify the installed part. For instructions, see "Verifying the installed part" on page 249.

Installing a disk drive or solid-state drive with the IBM i system or logical partition powered on

Learn how to install a disk drive or solid-state drive in a system or expansion unit while the IBM i operating system or logical partition that controls the disk drive location is powered on. Use the procedure in this information to perform this task.

Attention: If you are servicing a failing part, see the service procedures for "Replacing a disk drive with the IBM i system or logical partition powered on" on page 89. This procedure is intended for installing a new or upgraded disk drive.

Before installing or replacing a feature, ensure that the software required to support the feature is installed on your system. For information about software prerequisites, see IBM Prerequisite. If the required software is not installed, see the following websites to download it, and then install it before continuing:

• To download firmware and software updates and fixes, see Microcode downloads.

- To download Hardware Management Console (HMC) updates and fixes, see Hardware Management Console Support and downloads.

If your system is managed by the HMC, use the HMC to perform the steps for installing a feature in the server. For information about using the HMC to install a feature, see "Installing a feature by using the Hardware Management Console" on page 247. If you do not have an HMC, perform the following steps to install a disk drive from the system or partition that controls the disk drive.

If you are installing Solid State Drives, review the configuration rules and then return here. For more information, see "Solid-state drives" on page 5.

DANGER

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

Electrical voltage and current from power, telephone, and communication cables are hazardous. To avoid a shock hazard:
- Connect power to this unit only with the 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.
- Connect all power cords to a properly wired and grounded electrical outlet. Ensure that the outlet supplies proper voltage and phase rotation according to the system rating plate.
- Connect any equipment that will be attached to this product to properly wired outlets.
- When possible, use one hand only to connect or disconnect signal cables.
- Never turn on any equipment when there is evidence of fire, water, or structural damage.
- Disconnect the attached power cords, telecommunications systems, networks, and modems before you open the device covers, unless instructed otherwise in the installation and configuration procedures.
- Connect and disconnect cables as described in the following procedures when installing, moving, or opening covers on this product or attached devices.

  To Disconnect:
  1. Turn off everything (unless instructed otherwise).
  2. Remove the power cords from the outlets.
  3. Remove the signal cables from the connectors.
  4. Remove all cables from the devices

  To Connect:
  1. Turn off everything (unless instructed otherwise).
  2. Attach all cables to the devices.
  3. Attach the signal cables to the connectors.
  4. Attach the power cords to the outlets.
  5. Turn on the devices.

  (D005)

Attention: The powered-on procedure is a complex set of steps that must be performed exactly to avoid potential data loss or system damage. You might also consider the powered-off procedure, which is a simpler task that involves less risk of data loss or system damage. For instructions, see "Installing a disk drive or solid-state drive with the system or logical partition power turned off" on page 49.

Note: Some of the figures in these procedures might not look exactly like the system or expansion unit that you have. However, the steps to perform the task are the same.

Prepare the system

1. Perform prerequisite tasks as described in "Before you begin" on page 189.
2. Determine the next available disk drive position for your system or expansion unit. For information, see "Disk drive locations and concurrent maintenance lights" on page 125.
3. Record the position where the new disk drive can be installed. For example, the next available disk drive slot might be P3-D4.
4. If your system is managed by a Hardware Management Console (HMC), use the HMC to perform the steps for installing the disk drive. For instructions, see "Installing a feature by using the Hardware Management Console" on page 247. If you do not have an HMC, do the following steps to install a disk drive.

Prepare to install the disk drive

1. Record the physical location where the new disk drive can be installed.

   The physical location has the following form: U787A.001.AAAXXXX-P3-D4 where P3-D4 is the position of the disk drive in the system unit or expansion unit. Find the U787A.001.AAAXXXX location information from the control panel display on the system unit or expansion unit.

   If you cannot find the location information from the control panel, find the feature code (FC) and sequence number (SN or SEQ) on the label that is shown on the front of the system unit or expansion unit, as shown in the following figure.

Figure 29. Example of a system or expansion unit label

   In this example, U787A.001.AAAXXXX-P3-D4, U787A.001 comes from the feature code (FC) on the label, *AAAXXXX* comes from the last seven digits of the sequence number (SN or SEQ) on the label, and P3–D4 is the slot where you are installing the disk drive as shown in "Disk drive locations and concurrent maintenance lights" on page 125.

   In the example, U5074.001.AAAXXXX-DB3-D32, you would install a disk drive in the expansion unit with type 5074, model 001, sequence number *AAAXXXX*, and disk drive position DB3–D32.

2. Sign on to service level authority.
3. Type strsst on the command line of the IBM i session and press Enter.
4. Type your service tools user ID and service tools password on the Start Service Tools (STRSST) Sign On display. Press Enter.

   Remember: The service tools password is case-sensitive.

5. Select **Start a service tool** from the System Service Tools (SST) display. Press Enter.
6. Select **Hardware service manager** from the Start a Service Tool display. Press Enter.
7. If the slot you want to use contains a disk-drive filler, store the filler for future use, or discard it, then move on to step "Install the disk drive" on page 41.

Note: The disk drive filler is a single piece that does not attach to the new disk drive.
Attention:

- Attach a wrist strap to an unpainted surface of your hardware to prevent electrostatic discharge (ESD) from damaging your hardware.
- When using a wrist strap, follow all electrical safety procedures. A wrist strap is 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 a wrist strap, just prior to removing the product from ESD packaging and installing or replacing hardware, touch an unpainted surface of the system for a minimum of 5 seconds.

a. Pull the disk-drive filler from the slot, as shown in the following figure.

IPHAL500-1

Figure 30. Removing a disk-drive filler

b. Pull off the disk drive bezel latch **(A)** from the front of the filler, as shown in the following figure.
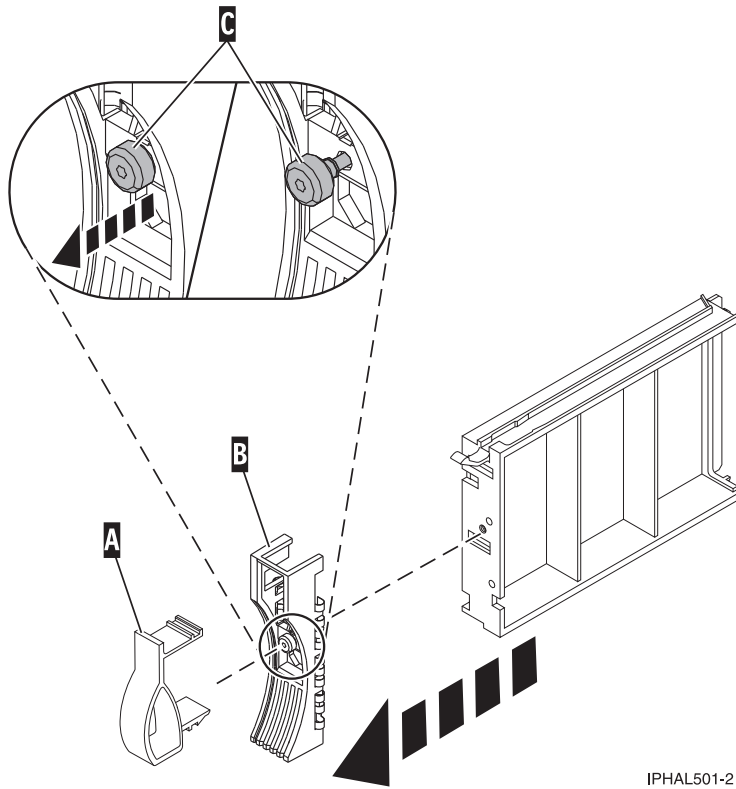
Figure 31. Removing a disk-drive bezel

    c. Loosen, and then pull out the thumbscrew **(C)** to release the disk-drive bezel **(B)** from the front edge of the filler.

Install the disk drive

1. Find the package that contains the new disk drive.

   Attention: Disk drives are fragile. Handle with care.

2. Remove the disk drive from the protective package. Record the serial number (use the last four digits) of the disk drive.

3. Unlock the disk drive handle by squeezing it and pulling it out toward you. If the handle is not all the way out, the disk drive does does not slide into the system or expansion unit.

4. Follow these steps to install the disk-drive bezel on the new disk drive:

   a. Attach the bezel **(A)** to the disk drive, as shown in the following figure.
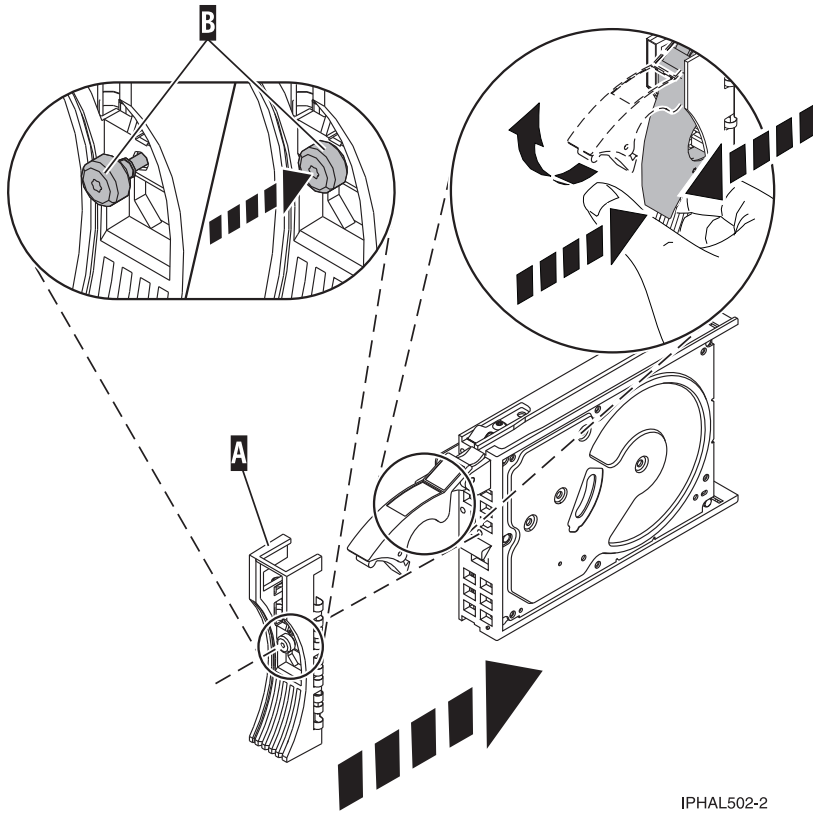
Figure 32. Installing a disk-drive bezel on a disk drive

  b. Press in and then tighten the thumbscrew **(B)** to secure the bezel to the disk drive.
 5. Support the bottom of the disk drive as you align it with the guide rails in the system or expansion unit. Do not hold the disk drive by the handle.
 6. Slide the disk drive halfway into the system or expansion unit.
 7. Select **Device Concurrent Maintenance** from the Hardware Service Manager display. Press Enter.

The Device Concurrent Maintenance is displayed, as shown in the following figure.

```
                  Device Concurrent Maintenance

Type the choices, then press Enter.

Specify either physical location or resource name.
     Physical location:
U787A.001.1234567-P3-D4
          or
     Device resource name:

Specify action as 1=Remove device  2=Install device
     Action to be performed . . . . . . . .: 2

Enter a time value between 00 and 19.
     Time delay needed in minutes . . . . .: 01

F3=Exit    F5=Refresh    F12=Cancel
```

Figure 33. Example Device Concurrent Maintenance display

 8. In the **Specify either physical location or resource name** field, type the physical location that you had previously recorded in this procedure, as shown in Figure 33.
 9. Select option **2** (Install device) for the Action to be performed.

10. Set the time delay for one minute - 01.

   Important: Do not press Enter at this time.

11. Locate the concurrent maintenance light that corresponds to the position of the disk drive that you
   are installing. To view the locations of the concurrent maintenance lights, select the appropriate
   model from the following list:

   • "Disk drive locations and concurrent maintenance lights for the 5786, 5787, 7031-D24, and
     7031-T24 SCSI disk-drive enclosures" on page 133
   • "Disk drive locations and concurrent maintenance lights for the 5886 disk enclosure" on page 131
   • "Disk drive locations and concurrent maintenance lights for the 5802 expansion unit" on page 135

12. Press Enter on the console.

   Important: When you press Enter, after a one minute delay, the light comes on and begins to flash
   rapidly. You then have nine seconds to slide the disk drive all the way in and then lock it in place by
   pushing in the disk drive handle.

13. When the concurrent maintenance light starts blinking, slide the disk drive all the way in and lock it
   in place by closing the latch, as shown in the following figure.

   Note: The light stops blinking and remains on when you have installed the disk drive properly.

IPHAL503-0
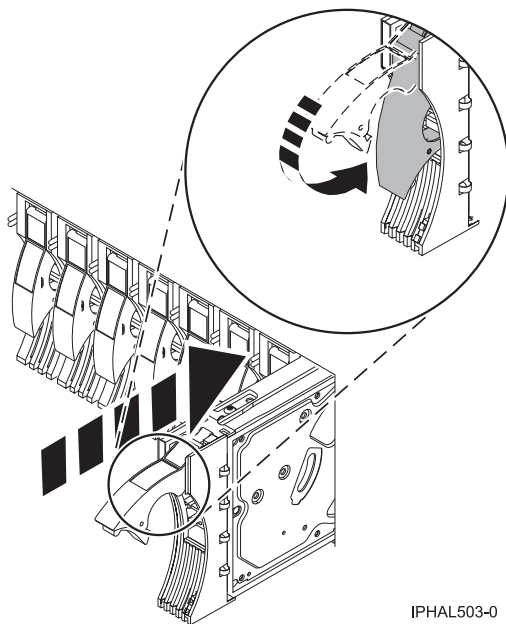
Figure 34. Sliding the disk drive in to the system unit
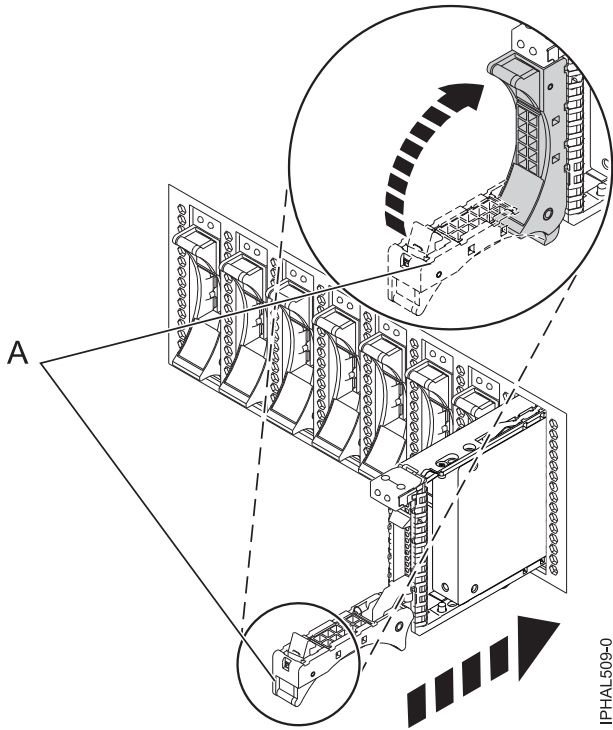
Figure 35. Installing the small-form factor disk drive into the system

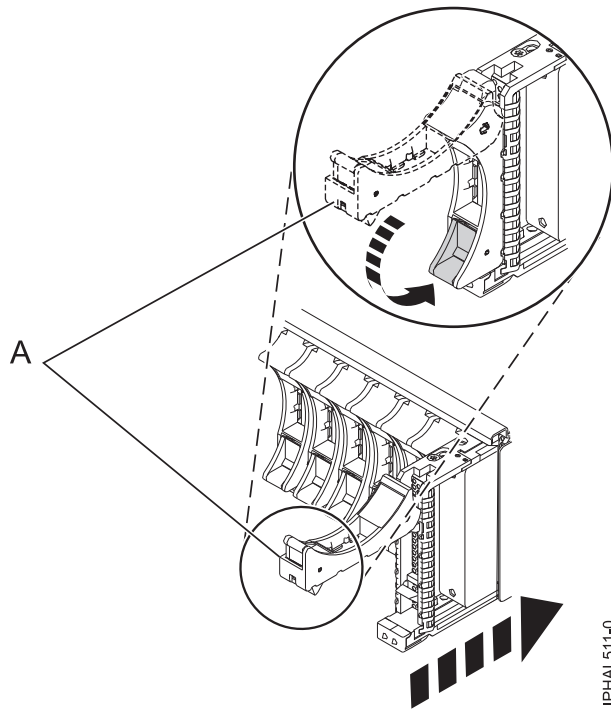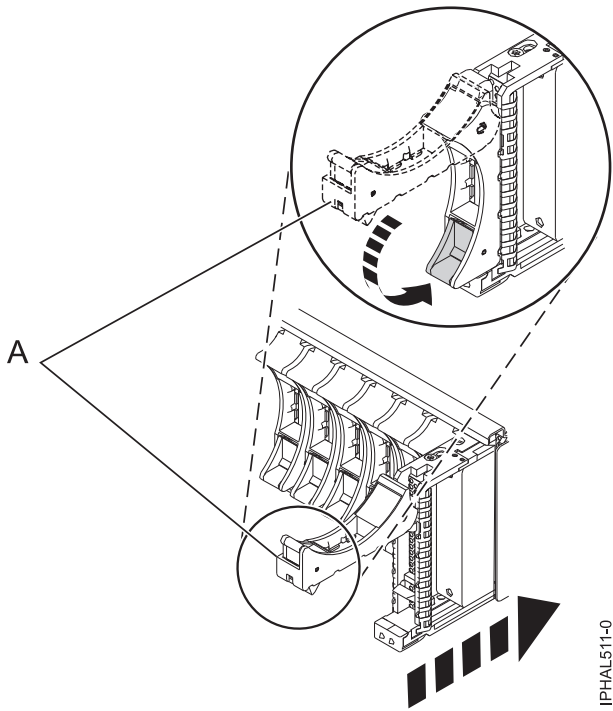*Figure 36. Installing a small-form factor disk drive in the 5803 expansion unit*

14. If you are installing more than one disk drive, perform step 1 on page 39 through 13 on page 43 until all disk drives are installed.

Perform the procedure

1. Return to the console and wait until the Concurrent Maintenance Results display is shown. Press Enter.
2. When the Hardware Service Manager display is shown, press F12 twice and then press Enter.
3. To perform this procedure, go to "Configuring a disk drive in an system or logical partition."

Related concepts

Removing and replacing covers and doors
Use these procedures to remove and replace the covers on IBM Power Systems servers that contain the POWER7 processor.

Related reference

"Removing and replacing the expansion unit cover or door" on page 205
You might need to remove, replace, or install covers or doors on an expansion unit as a part of accessing components or performing a service action.

Configuring a disk drive in an system or logical partition

To configure a newly installed disk drive into an existing device parity set, follow these steps:

If you want to start a new device parity set or change the protection on your disks, see Manage device parity protection or Start device parity protection in the Disk Management section of the IBM i

Information Center website at http://www.ibm.com/systems/i/infocenter .

1. If necessary, start System Service Tools (SST) by typing `strsst` on the command line of the IBM i session and pressing Enter.
2. Type your service tools user ID and service tools password on the Start Service Tools (STRSST) Sign On display. Press Enter.

   Restriction: The service tools password is case sensitive.
3. Select **Work with Disk Units** on the System Service Tools display. Press Enter.
4. Select **Display disk configuration** on the Work with Disk Units display. Press Enter.
5. Select **Display non-configured units** on the Display disk configuration display. Press Enter.
6. The disk drive that you installed is listed. The serial number should match the serial number you recorded (the last 4 digits).

   Note: The new disk drive might take up to five minutes to appear in the list. If the disk drive is not listed, ensure that the disk drive was properly installed.
7. Press F12 twice.
8. Select **Work with disk configuration** on the Work with Disk Units display. Press Enter.
9. Are you adding a disk drive to an existing device parity set?
   - **Yes**: Continue with the next step.
   - **No**: Go to step 23 on page 46 for mirroring or no protection, go to 1 on page 47 for hot spare.

   Tip: Select **No** for mirroring, hot spare or no protection.
10. Select **Work with device parity protection** on the Work with Disk Configuration display. Press Enter.
11. Select **Include unit in device parity protection** on the Work with Device Parity Protection display. Press Enter.
12. Did the Include Device Parity Protection Failed display appear?
    - **Yes**: Continue with the next step.
    - **No**: Go to step 15 on page 46.
13. The following conditions must be met before you can start device parity protection.

- If there are enough disk drives available to create a new parity set, the drives are eligible for *Start Device Parity Protection* operation and not for the *Include Device Parity Protection* operation.
- All disk drives in a parity set must be the same capacity with a minimum number of three or four disk drives and maximum of 10 or 18 disk drives in the resulting parity set, depending on the disk drive type.
- Not all disk drives attached to an advanced function input output processor have reported to the system. Retry the operation.
- The type or model of the disk drives cannot be used for the requested operation.

  When these conditions are met, press F12 to return to the Work with Disk Configuration display.
14. Select **Include unit in device parity protection** on the Work with disk configuration display. Press Enter.
15. On the Include Disk Units in Device Parity Protection display, select the disk drives to be included in Device Parity Protection. Type a **1** in the Option column. Press Enter.
16. Press Enter to confirm your choice. The configuration starts and might take 30 to 60 minutes to complete.
17. When the device parity protection is complete, the message "Selected drives have been included successfully" is shown on the Work with device parity protection display. Press F12.
18. Select **Display disk configuration** on the Work with disk configuration display. Press Enter.
19. Select **Display disk configuration status** on the Display disk configuration display.
20. If you have more than one ASP, determine the auxiliary storage pool (ASP) to which you want to add the disk drive.
21. Press F12 twice to get to the Work with Disk Units display.
22. Select **Work with disk configuration** on the Work with Disk Units display. Press Enter.
23. Select the option to add units to ASPs and balance data on the Work with disk configuration display. Press Enter.
24. Specify the number of the ASP to which you want to add the disk drive. The system ASP is **ASP 1**. Press Enter.

    Notes:
    a. If ASP is mirror protected, disk drives must be added in pairs of the same size.
    b. When one or more pairs of disk drives are added to a mirrored ASP, they automatically become mirror protected.
    c. To start mirrored protection on an ASP, refer to **Recovering your system** in the IBM i Information Center.

       To access the IBM i Information Center Web site, go to http://www.ibm.com/systems/i/infocenter and select from the following options:
       - If you select V6R1, expand **IBM i 6.1 Information Center** > **Systems management** > **Backup and recovery** > **Recovering your system**
       - If you select V5R4, expand **i5/OS Information Center** > **Systems management** > **Backup and recovery** > **Backing up and recovering your system** > **Recovering your system**
25. The Confirm Add Units display is shown showing the configuration your system will have when the add operation completes.

    Note: If you have selected the wrong ASP, press F12 to change your options. Press the Enter key to continue. The add process will take several minutes to complete.
26. When the message `Selected units have been added successfully` is shown, press F3 three times and press Enter to return to the Main Menu display.
27. If you have a printer, print the configuration list. A service provider might refer to the configuration list in the future.
    a. You need to sign on **with at least service level authority**

b. Type `strsst` on the Main Menu command line. Press Enter.

c. Type your service tools user ID and service tools password on the Start Service Tools (STRSST) Sign On display. Press Enter.

   Remember: The service tools password is case sensitive.

d. Select **Start a service tool** on the System Service Tools (SST) display. Press Enter.

e. Select **Hardware service manager** on the Start a Service Tool display. Press Enter.

f. Press F6 (print the configuration) from the Hardware Service Manager display.

g. To return to the Main Menu display, press F3 (Exit) twice and then press Enter.

h. Place the configuration list where you can refer to it in the future.

28. If you are a service provider performing this task, return to the procedure that sent you here.

1. Select **Work with hot spare protection** from the **Work with disk configuration** menu.

2. Select **Start device parity protection - RAID 5 with hot spare** or **Start device parity protection - RAID 6 with hot spare** depending on the level of parity protection that is desired.

3. Return to the procedure that sent you here.

Rebuilding data on a replacement disk drive using IBM i

Learn how to rebuild data on replacement disk.

To rebuild data on the replacement disk drive, complete the following steps:

1. If necessary, start System Service Tools (SST) by typing `strsst` on the command line of the IBM i session and pressing Enter.

2. Type your service tools user ID and service tools password on the Start Service Tools (STRSST) Sign On display. Press Enter.

   Note: The service tools password is case sensitive.

3. Select **Work with disk units** from the Start System Service Tools (SST) display. Press Enter.

4. Select **Work with disk unit recovery** from the Work with Disk Units display. Press Enter.

5. If you determined that the disk drive you replaced had **device parity protection (RAID)**, follow these steps to restore device parity protection (RAID) on the disk drive:

   a. Select **Rebuild disk unit data** on the Work with Disk unit recovery display. Press Enter.

   b. Select **1** to rebuild the disk drive displayed (the disk drive displayed is the disk drive that you **removed**) on the Rebuild Disk Unit Data display. Press Enter.

   c. Press Enter on the Confirm Rebuild Disk Unit Data display. The rebuild process might take several minutes to complete.

   d. Press F5 to refresh the display until the **Percent complete** shows 5%.

   e. When the display shows at least 5% complete, you can either continue to monitor this display to completion, or press F3 (Exit) to return to the Work with disk units display.

   f. Press F3 (Exit) to return to the System service tools display.

   g. Press F3 (Exit) to return to the Exit SST display and press Enter.

   h. Return to the procedure that sent you here.

6. If the disk drive that you replaced had **mirrored protection**, follow these steps:

   a. Select **Replace configured unit** on the Work with Disk unit recovery display. Press Enter.

   b. Select the configured disk drive that you are exchanging (suspended drive) on the Select Configured Unit to Replace display. Press Enter.

   c. Select the disk drive that you just installed on the Select Replacement Unit display. This drive has a non-configured status.

Note: In some cases, it might take several minutes for a new disk drive to display. Repeat these steps until the new drive is shown.
Press Enter.

d. Press Enter on the Confirm Replace of Configured Unit display to confirm your choice for replacement.

   The replacement process might take several minutes to complete. When the process is complete, the Work with Disk unit recovery display is shown.

e. Press F3 (Exit) to return to the Work with disk units display.

f. Select **Display disk configuration** on the Work with disk units display.

g. Select **Display disk configuration status** on the Display Disk Configuration display.

   Mirrored status shows Resuming. When complete, the mirrored status shows Active. This process might take several minutes to complete. You can either monitor this display to completion, or press F3 (Exit) three times, and then press Enter to return to the IBM i main menu.

Determining the IBM i disk drive protection status

To determine the protection status of the disk drives in your IBM i system or logical partition, follow these steps from the System Service Tools (SST) display:

Tip: If you do not know the protection status of the disk drives and you cannot get to the System Service Tools display, contact your next level of support.

1. Sign on **with at least service level authority**.
2. Type `strsst` on the command line of the IBM i session and press Enter.
3. Type your service tools user ID and service tools password on the Start Service Tools (STRSST) Sign On display. Press Enter.

   Note: The service tools password is case-sensitive.

4. Select **Work with disk units** from the System Service Tools (SST) display. Press Enter.
5. Select **Display Disk Configuration** from the Work with Disk Units display. Press Enter.
6. Select **Display Disk Configuration Status** from the Display Disk Configuration display. Press Enter.

   A list of each auxiliary storage pool (ASP) displays, showing the disk drives that are members of the ASP. The Status column shows one of the following protection statuses for the ASP:

   • **Mirrored**. These ASPs are configured for mirrored protection. If the failing disk drive has mirrored protection, record the status of both disk drives in the mirrored pair. You need this information in the recovery procedure.

   • **Unprotected**. An ASP with a status of Unprotected might contain disk drives that are device parity protected. Record the status of the failing disk drive as it is shown in the Status column of the Display Disk Configuration Status display.

   A disk drive with one of the following statuses has device parity protection only if all other disk drives in the array are operational:
   – DPY/Active
   – DPY/Failed
   – DPY/HDW Failure
   – DPY/Degraded
   – DPY/Power Loss
   – DPY/Not Ready
   – DPY/Unknown

   A disk drive with any other status (such as DPY/Rebuild or DPY/Unprotected) does not have device parity protection.

   Examples:

– Suppose one disk drive has a status of DPY/Failed while all other disk drives have a status of DPY/Unprotected. In this case, only the disk drive with the DPY/Failed status is protected. Servicing the failed disk drive does not result in data loss. Removing any of the unprotected disk drives might result in data loss.

– All disk drives have a status of DPY/Active or DPY/Degraded, therefore, all disk drives are protected. In this case, exchanging any disk drive does not result in data loss.

Tip: For more information about the meaning of a status for any disk drive, use the Help key on the display.

Installing a disk drive or solid-state drive with the system or logical partition power turned off

Learn how to install a disk drive in a system or logical partition that controls the disk drive location with the power turned off. Use the procedure in this information to perform this task.

Attention: If you are servicing a failing part, see the service procedures for "Replacing a disk drive with the system or logical partition powered off" on page 106. This procedure is intended for installing a new or upgraded disk drive.

Before installing or replacing a feature, ensure that the software required to support the feature is installed on your system. For information about software prerequisites, see IBM Prerequisite. If the required software is not installed, see the following websites to download it, and then install it before continuing:

• To download firmware and software updates and fixes, see Microcode downloads.
• To download Hardware Management Console (HMC) updates and fixes, see Hardware Management Console Support and downloads.

If your system is managed by the HMC, use the HMC to perform the steps for installing a feature in the server. For information about using the HMC to install a feature, see http://publib.boulder.ibm.com/infocenter/powersys/v3r1m5/topic/p7haj/hmcinstall.htm. If you do not have an HMC, perform the following steps to install a disk drive from the system or partition that controls the disk drive.

If you are installing Solid State Drives, review the configuration rules and then return here. For more information, see "Solid-state drives" on page 5.

DANGER

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

Electrical voltage and current from power, telephone, and communication cables are hazardous. To avoid a shock hazard:
- Connect power to this unit only with the 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.
- Connect all power cords to a properly wired and grounded electrical outlet. Ensure that the outlet supplies proper voltage and phase rotation according to the system rating plate.
- Connect any equipment that will be attached to this product to properly wired outlets.
- When possible, use one hand only to connect or disconnect signal cables.
- Never turn on any equipment when there is evidence of fire, water, or structural damage.
- Disconnect the attached power cords, telecommunications systems, networks, and modems before you open the device covers, unless instructed otherwise in the installation and configuration procedures.
- Connect and disconnect cables as described in the following procedures when installing, moving, or opening covers on this product or attached devices.

  To Disconnect:
  1. Turn off everything (unless instructed otherwise).
  2. Remove the power cords from the outlets.
  3. Remove the signal cables from the connectors.
  4. Remove all cables from the devices

  To Connect:
  1. Turn off everything (unless instructed otherwise).
  2. Attach all cables to the devices.
  3. Attach the signal cables to the connectors.
  4. Attach the power cords to the outlets.
  5. Turn on the devices.

  (D005)

Prepare the system

1. Perform prerequisite tasks as described in "Before you begin" on page 189.

   Note: Do not disconnect the power source when you stop the system or logical partition to install a disk drive or solid-state drive.
2. If applicable, remove the system unit door or expansion unit door, or open the rack.
3. If applicable, remove the front cover.
4. Determine the next available disk drive position in your system or expansion unit. For information, see "Disk drive locations and concurrent maintenance lights" on page 125.

   Note: When you have a system with an expansion unit, you must fill the slot positions in the system unit first. However, you can select a different disk drive placement depending on your data protection strategy.
5. Stop the system or the logical partition that controls the disk drive location. For instructions, see http://publib.boulder.ibm.com/infocenter/powersys/v3r1m5/topic/p7haj/crustopsys.htm.

Install the disk drive

1. If the slot you want to use contains a disk-drive filler, store the filler for future use, or discard it, then move on to step Insert the disk.

   Note: The disk drive filler is a single piece that does not attach to the new disk drive.
   Attention:

   - Attach a wrist strap to an unpainted surface of your hardware to prevent electrostatic discharge (ESD) from damaging your hardware.
   - When using a wrist strap, follow all electrical safety procedures. A wrist strap is 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 a wrist strap, just prior to removing the product from ESD packaging and installing or replacing hardware, touch an unpainted surface of the system for a minimum of 5 seconds.

   a. Pull the disk-drive filler from the slot you want to use, as shown in Figure 37.
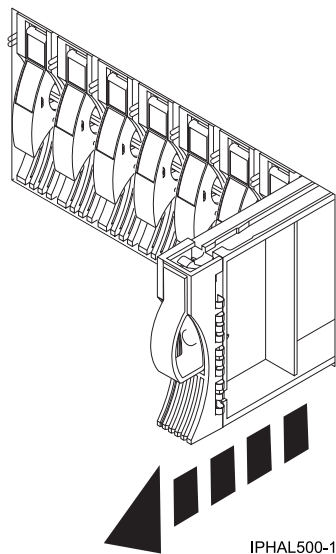
IPHAL500-1

Figure 37. Removing a disk-drive filler from a model

   b. Pull off the disk-drive bezel latch **(A)** from the front of the filler, as shown in the following figure.
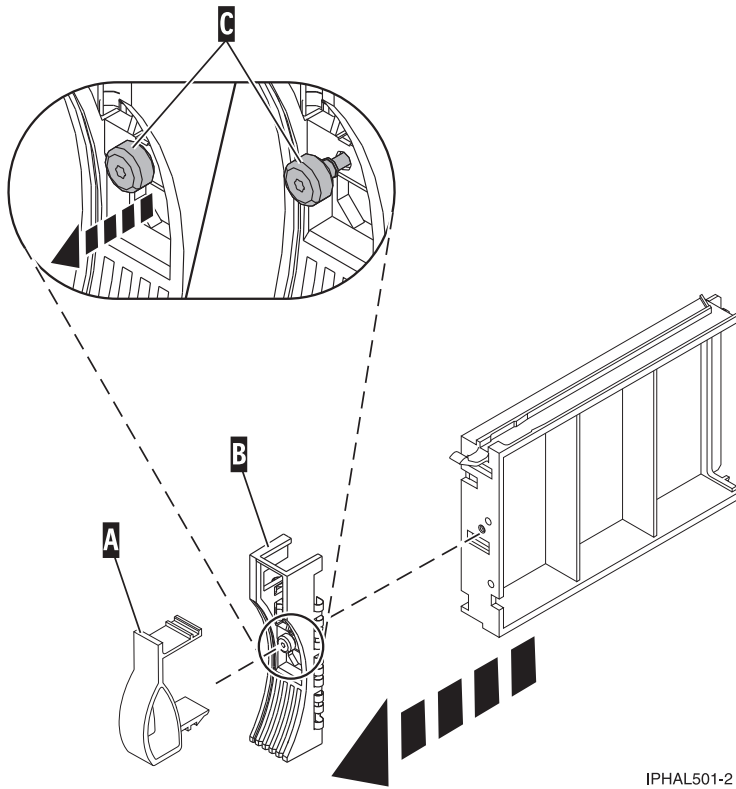
IPHAL501-2

Figure 38. Removing a disk-drive bezel

    c. Loosen, and then pull out on the thumbscrew **(C)** to release the bezel **(B)** from the front edge of the filler.

2. Find the package that contains the new disk drive.

    Attention: Disk drives are fragile. Handle with care.

3. Remove the disk drive from its protective package. Record the serial number (use the last four digits) of the disk drive.

4. Unlock the disk drive handle by squeezing and pulling it out toward you before you install the disk drive. If the handle is not all the way out, the disk drive does not slide into the system or expansion unit.

5. If your disk drive does not have a bezel preinstalled, follow these steps to install the disk-drive bezel on the new disk drive:

    a. Attach the bezel **(A)** to the disk drive, as shown in the following figure.

Figure 39. Installing a disk-drive bezel

    b. Press in and then tighten the thumbscrew **(B)** to secure the bezel to the disk drive.

6. Support the bottom of the disk drive as you align it with the guide rails in the system or expansion unit. Do not hold the disk drive by the handle.

7. Slide the disk drive into the system or expansion unit until it stops.

    Note: When installing a disk drive, the drive must be fully seated and all the way into the system.

8. Push the disk drive handle in until it locks, as shown in Figure 40 on page 54.
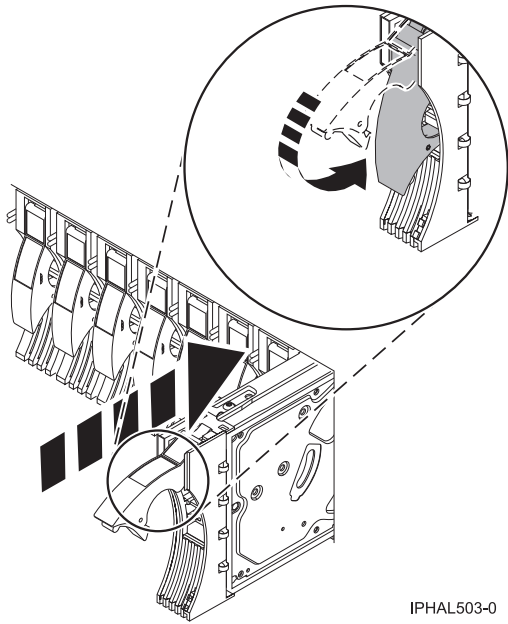
Figure 40. Installing a disk drive in the

Figure 41. Installing a small-form factor disk drive
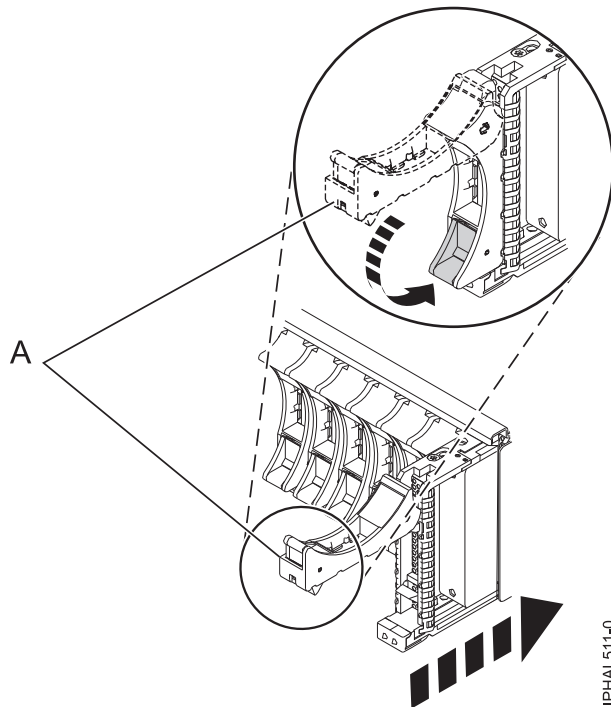
Figure 42. Installing a small-form factor disk drive in the 5803 expansion unit

9. If you are installing more than one disk drive, repeat step 1 on page 51 through step 8 on page 53 until all disk drives are installed.

Perform the procedure

1. Replace the front cover.
2. Install or close the system, expansion unit, or rack front door.
3. If the system power cables were removed, reconnect them.
4. Start the system or logical partition. For instructions, see "Starting the system or logical partition" on page 199.
5. To configure the newly installed disk drive, select the procedure for the operating system that controls the disk drive.
   - "Preparing a disk drive for use in an AIX system or logical partition" on page 137
   - For information about configuring the newly installed disk drive for a Linux environment, see the *PCI-X SCSI RAID Controller Reference Guide for Linux*.

     This guide is available from the SCSI PCI Adapters web page.

Related concepts

Removing and replacing covers and doors
Use these procedures to remove and replace the covers on IBM Power Systems servers that contain the POWER7 processor.

Related reference

"Removing and replacing the expansion unit cover or door" on page 205
You might need to remove, replace, or install covers or doors on an expansion unit as a part of accessing components or performing a service action.

Removing a disk drive or solid-state drive

You might need to remove a disk drive or solid-state drive from the sever or expansion unit. This section includes information about the disk-drive enclosure and procedures so that you can perform these tasks.

To remove and replace a failed disk drive, go to "Replacing a disk drive" on page 63. If your system is managed by the Hardware Management Console (HMC), use the HMC to complete the steps for removing a disk drive. For instructions, see "Removing a part by using the Hardware Management Console" on page 247.

Remove a disk drive from a system or expansion unit that is controlled by different operating systems.

"Replacing a disk drive with the AIX system or logical partition powered on" on page 63

"Replacing a disk drive with the Linux system or logical partition powered on" on page 72

"Replacing a disk drive with the IBM i system or logical partition powered on" on page 89

Removing a disk drive from a system or expansion unit controlled by IBM i

Learn how to remove a Small Computer System Interface (SCSI) or serial-attached SCSI (SAS) disk drive from a system or expansion unit with an IBM i operating system or a logical partition that controls the disk drive location. Use the procedure in this information to perform this task.

Attention: If you are removing a disk drive in order to install a new or upgraded disk drive, see "Installing a disk drive or solid-state drive with the IBM i system or logical partition powered on" on page 37. If you are removing a disk drive as part of a service procedure, continue to use the following procedure.

If your system is managed by the Hardware Management Console (HMC), use the HMC to perform the steps for removing disk drives from the server. For information about using the HMC to remove memory modules, see "Removing a part by using the Hardware Management Console" on page 247. If you do not have an HMC, perform the following steps to remove the disk drive.

DANGER

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

Electrical voltage and current from power, telephone, and communication cables are hazardous. To avoid a shock hazard:
- Connect power to this unit only with the 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.
- Connect all power cords to a properly wired and grounded electrical outlet. Ensure that the outlet supplies proper voltage and phase rotation according to the system rating plate.
- Connect any equipment that will be attached to this product to properly wired outlets.
- When possible, use one hand only to connect or disconnect signal cables.
- Never turn on any equipment when there is evidence of fire, water, or structural damage.
- Disconnect the attached power cords, telecommunications systems, networks, and modems before you open the device covers, unless instructed otherwise in the installation and configuration procedures.
- Connect and disconnect cables as described in the following procedures when installing, moving, or opening covers on this product or attached devices.

  To Disconnect:
  1. Turn off everything (unless instructed otherwise).
  2. Remove the power cords from the outlets.
  3. Remove the signal cables from the connectors.
  4. Remove all cables from the devices

  To Connect:
  1. Turn off everything (unless instructed otherwise).
  2. Attach all cables to the devices.
  3. Attach the signal cables to the connectors.
  4. Attach the power cords to the outlets.
  5. Turn on the devices.

  (D005)

1. Before removing a disk drive, back up all the data from the disk drive or the array that the drive is a part of, and then move the data from the disk drive that you want to remove. For instructions, choose one of the following options:
   - Move and remove disk units
   - **Recovering your system** in the IBM i Information Center

     To access the IBM i Information Center website, go to http://www.ibm.com/systems/i/infocenter and select from the following options:
     – If you select V6R1, expand **IBM i 6.1 Information Center** > **Systems management** > **Backup and recovery** > **Recovering your system**
     – If you select V5R4, expand **i5/OS Information Center** > **Systems management** > **Backup and recovery** > **Backing up and recovering your system** > **Recovering your system**

2. Prepare to remove the disk drive from the system configuration as described in "Preparing to remove a disk drive from a system or logical partition controlled by IBM i" on page 61.

3. Locate the disk drive to be removed. See "Disk drive locations and concurrent maintenance lights" on page 125.

4. Stop the system or logical partition that controls the disk drive location. For instructions, see "Stopping a system or logical partition" on page 201.

Prepare the system

1. If applicable, remove the system unit door, expansion unit door, or open the rack.
2. If applicable, remove the front cover.
   - If you have a front cover from any other models, remove the front cover.

Remove the disk drive

1. Unlock the disk drive handle by squeezing it and pulling it out toward you.

   Attention:

   - Attach a wrist strap to an unpainted surface of your hardware to prevent electrostatic discharge (ESD) from damaging your hardware.
   - When using a wrist strap, follow all electrical safety procedures. A wrist strap is 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 a wrist strap, just prior to removing the product from ESD packaging and installing or replacing hardware, touch an unpainted surface of the system for a minimum of 5 seconds.
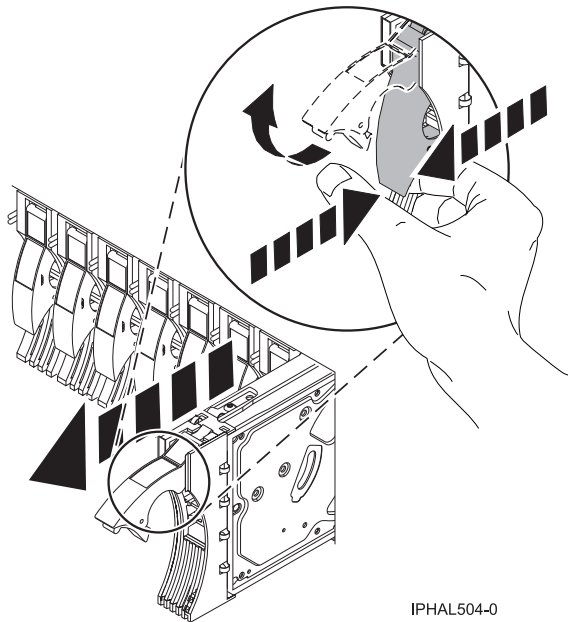
IPHAL504-0

Figure 43. Removing a disk drive

Figure 44. Removing a small-form factor disk drive

Figure 45. Removing a small-form factor disk drive from the 5803 expansion unit

2. Support the bottom of the disk drive as you slide it out of the system or expansion unit. Do not hold the disk drive by the handle.

3. If a disk-drive filler is available, follow these steps:

Note: Refill the disk drive slots with either another disk drive or a disk-drive filler. Filling the disk drive slot can help ensure proper airflow for cooling and help maintain optimal EMI compliance.

  a. Attach the disk-drive bezel to the filler.

  b. Press in and then tighten the thumbscrew **(B)** to secure the bezel to the disk drive.

  c. Install the disk-drive filler in the system or expansion unit.

Perform the procedure

1. Install or close the front door of the system, expansion unit, or rack.
2. Reconnect all system power cables.
3. Reconnect the system to the power supply by plugging it into the system.
4. Start the system or logical partition. For instructions, see "Starting the system or logical partition" on page 199.

Related concepts

Removing and replacing covers and doors
Use these procedures to remove and replace the covers on IBM Power Systems servers that contain the POWER7 processor.

Related reference

"Removing and replacing the expansion unit cover or door" on page 205
You might need to remove, replace, or install covers or doors on an expansion unit as a part of accessing components or performing a service action.

Preparing to remove a disk drive from a system or logical partition controlled by IBM i

Learn the actions you need to take to properly remove a disk drive.

Before removing a disk drive from a system or expansion unit that is controlled by IBM i, follow these steps:

1. Determine the protection status of the disk drive that you are replacing. For instructions, see "Determining the IBM i disk drive protection status" on page 48.
2. The service provider must perform one of the following tasks:
   - Save data and initialize the disk drive.
   - Initialize the disk drive and copy to disk.
3. **For mirrored disk drives** on an IBM i system or logical partition, follow these steps to verify that the disk drive you are replacing has been suspended:
   a. Sign on with service level authority.
   b. Type `strsst` on the command line of the IBM i session and press Enter.
   c. Type your service tools user ID and service tools password on the Start Service Tools (STRSST) Sign On display. Press Enter.

      Remember: The service tools password is case sensitive.

   d. Select **Work with disk units** from the System Service Tools (SST) display. Press Enter.
   e. Select **Display Disk Configuration** from the Work with Disk Units display. Press Enter.
   f. Select **Display Disk Configuration Status** from the Display Disk Configuration display. Press Enter.
   g. Does the disk drive that is mirrored to the disk drive that you are replacing (same drive number) have a status of Active?
      - **No**: The replacement must be performed by a service provider.
      - **Yes**: Does the disk drive that you are replacing have a status of Suspended?
        - **Yes**: Continue with the next step.

- **No**: Follow these steps to suspend mirrored protection on the disk drive that you are replacing:
    1) Press F3 from the Display Disk Configuration display to return to the Work with Disk Units display.
    2) Select **Work with Disk Unit Recovery** from the Work with Disk Units display. Press Enter.
    3) Select **Suspend mirrored protection** from the Work with Disk Unit Recovery display. Press Enter.
    4) Select the option to suspend the disk drive that you are replacing from the Suspend Mirrored Protection display. Press Enter.
  h. Press F3 repeatedly to exit System Service Tools and return to the main menu.

Replacing a disk drive

You might need to replace a Small Computer System Interface (SCSI) or serial-attached SCSI (SAS) disk drive in the server or expansion unit. Use the procedures in this section to perform this task.

Note: These instructions (the first 3 sections) can also be used if you are replacing an SAS disk drive.

To remove and replace a disk drive in a different enclosure, use the information for that enclosure.

Use this procedure to remove a failed disk drive and replace it with the same type of disk drive. If you plan to remove a disk drive and install a different type of disk drive, remove the existing disk drive as described in "Removing a disk drive or solid-state drive" on page 57, then install the new disk drive as described in "Installing a disk drive or solid-state drive" on page 5. If your system is managed by the Hardware Management Console (HMC), use the HMC to complete the steps for replacing a disk drive. For instructions, see "Exchanging a part by using the Hardware Management Console" on page 247.

Your system or logical partition can be powered off or powered on when you replace the disk drive. If the disk drive that is being replaced is in the AIX or Linux root volume group (rootvg) and does not have disk protection replace your disk with the powered-off procedure.

Replacing a disk drive with the AIX system or logical partition powered on

You might need to replace a Small Computer System Interface (SCSI) or serial-attached SCSI (SAS) disk drive in a system or expansion unit while the AIX operating system or logical partition that controls the disk drive location is powered on. Use the procedure in this section to perform this task.

Attention: If you are installing a new or upgraded disk drive, see "Installing a disk drive or solid-state drive with the AIX system or logical partition powered on" on page 10. If you are removing a disk drive as part of a service procedure, continue to use the following procedure.

DANGER

> **When working on or around the system, observe the following precautions:**
>
> **Electrical voltage and current from power, telephone, and communication cables are hazardous. To avoid a shock hazard:**
> - **Connect power to this unit only with the 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.**
> - **Connect all power cords to a properly wired and grounded electrical outlet. Ensure that the outlet supplies proper voltage and phase rotation according to the system rating plate.**
> - **Connect any equipment that will be attached to this product to properly wired outlets.**
> - **When possible, use one hand only to connect or disconnect signal cables.**
> - **Never turn on any equipment when there is evidence of fire, water, or structural damage.**
> - **Disconnect the attached power cords, telecommunications systems, networks, and modems before you open the device covers, unless instructed otherwise in the installation and configuration procedures.**
> - **Connect and disconnect cables as described in the following procedures when installing, moving, or opening covers on this product or attached devices.**
>
>   **To Disconnect:**
>   1. **Turn off everything (unless instructed otherwise).**
>   2. **Remove the power cords from the outlets.**
>   3. **Remove the signal cables from the connectors.**
>   4. **Remove all cables from the devices**
>
>   **To Connect:**
>   1. **Turn off everything (unless instructed otherwise).**
>   2. **Attach all cables to the devices.**
>   3. **Attach the signal cables to the connectors.**
>   4. **Attach the power cords to the outlets.**
>   5. **Turn on the devices.**
>
>   **(D005)**

Attention: The powered-on procedure is a complex set of steps that must be performed exactly to avoid potential data loss or system damage. You might also consider the powered-off procedure, which is a simpler task that involves less risk of data loss or system damage. If the system or logical partition that controls the disk drive you are replacing is at the AIX command line, you can use this powered-on procedure. If the disk drive that you are replacing is in the root volume group (rootvg) and it is not protected by either Redundant Array of Independent Disks (RAID) or mirroring, or to use the powered-off procedure, go to "Replacing a disk drive with the system or logical partition powered off" on page 106.

Note: Some of the figures in these procedures might not look exactly like the system or expansion unit that you have. However, the steps to perform the task are the same.

Prepare the system

1. Perform prerequisite tasks as described in "Before you begin" on page 189.
2. Prepare to remove the disk drive from the system or expansion unit as described in "Preparing to remove a disk drive from a system or expansion unit controlled by AIX" on page 137.
3. If applicable, remove the system unit door, expansion unit door, or the rack door.

4. If applicable, remove the front cover.
   - If you have a front cover from any other models, remove the front cover.

To replace a Just a Bunch of Disks (JBOD) disk drive attached to any SCSI or SCSI RAID adapter, see the procedure in "Replacing a SCSI disk drive" on page 114.

Remove a disk drive

1. If you are removing a solid state device located on a PCIe RAID and SSD SAS adapter, go to Removing and replacing the PCIe RAID and SSD SAS adapterRemoving and replacing the PCIe RAID and SSD SAS adapter and complete that procedure, then return here and perform the following steps.
2. Log in as root user.
3. At the command line, type `diag` and press Enter.
4. Press Enter to continue.
5. On the Function Selection display, select **Task Selection**.
6. Select **Hot Plug Task**.
7. Select **SCSI and SCSI RAID Hot Plug Manager** or **RAID Hot Plug Devices**, depending on the adapter that your drive is attached to.

   Tip: One or both of these options might be available, depending on the configuration of your system. If the drive you want to replace is not listed when you follow the steps for the SCSI and SCSI RAID Hot Plug Manager, go to step 8.
   - If you have a RAID disk drive attached to a 2498 PCI SCSI RAID adapter, continue with step 8.
   - If you have a JBOD disk drive attached to any SCSI or SCSI RAID adapter, go to "Replacing a SCSI disk drive" on page 114.
   - If you have RAID drives attached to any other adapter, go to the *PCI-X SCSI RAID Controller Reference Guide for AIX*. This guide is available from the SCSI PCI Adapters Web page at http://publib.boulder.ibm.com/infocenter/pseries/v5r3/index.jsp?topic=/com.ibm.pseries.doc/hardware_docs/scsipciadapters.htm.
8. Select **RAID Hot Plug Devices**.
9. On the Resource Selection List, select the adapter that is connected to the array that contains the disk drive you want to replace. Press Enter.
10. Select **Commit**.
11. On the Identify and Remove Resources menu, select **Remove**. Press Enter.

    A list of the disk drives that you can remove is shown. If the disk drive you want to remove does not appear in the list, ask your system administrator to put the disk drive in the Failed state before continuing with this procedure. For information, see *AIX System Management Guide: Operating System and Devices*. This guide is available at the System p® and AIX Information Center (http://publib.boulder.ibm.com/infocenter/pseries/v5r3/index.jsp).
12. Select the drive that you want to remove and press Enter. The concurrent maintenance light for the slot will flash rapidly.

    Attention: If the light does not flash rapidly, do not remove the disk drive.

    To view the locations of the concurrent maintenance lights, go to "Disk drive locations and concurrent maintenance lights" on page 125.
13. Unlock the disk drive handle by squeezing it and pulling it out toward you as shown in Figure 46 on page 66.
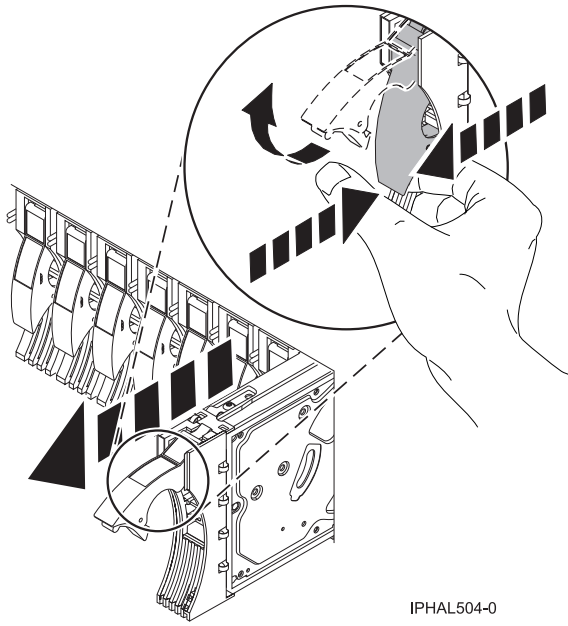
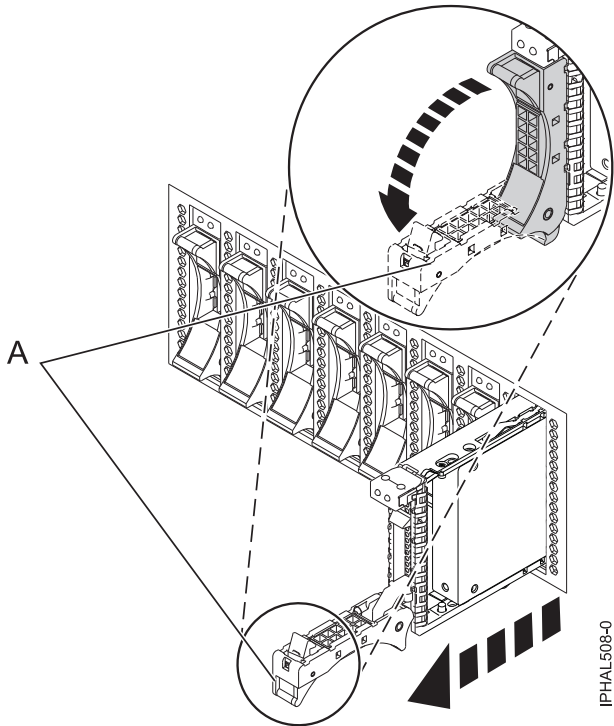*Figure 46. Removing a disk drive from a model*

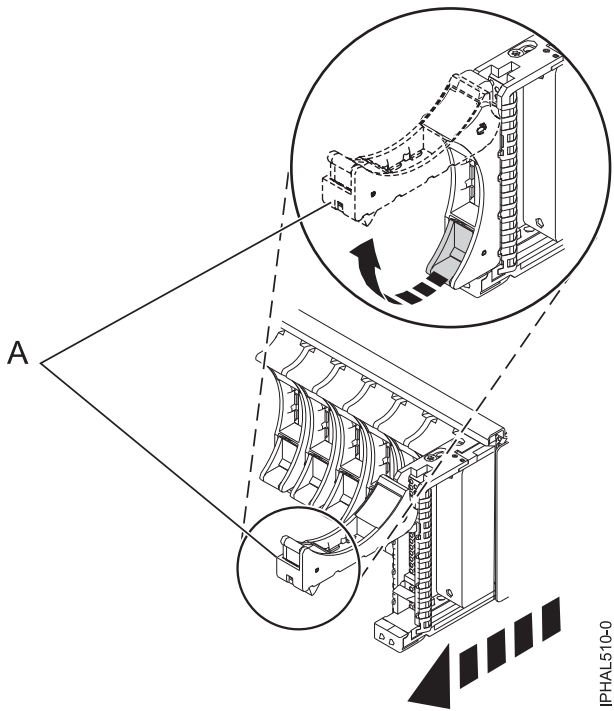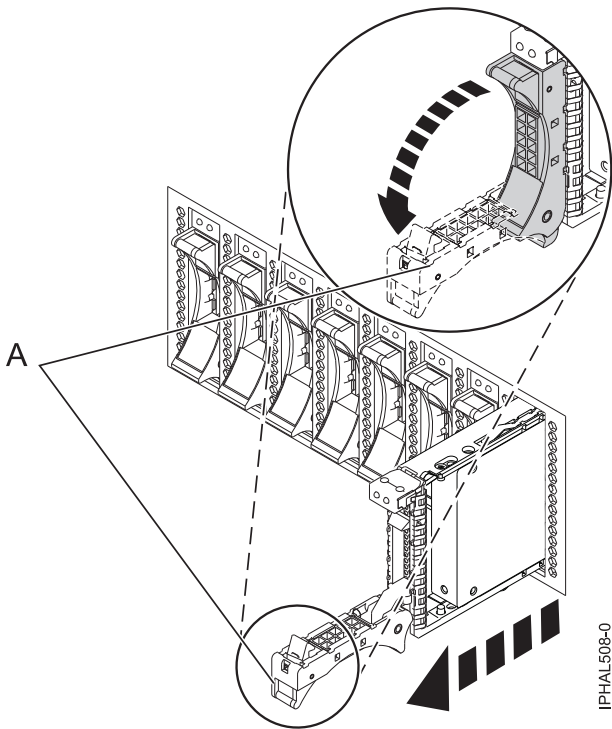*Figure 47. Removing a small-form factor disk drive*
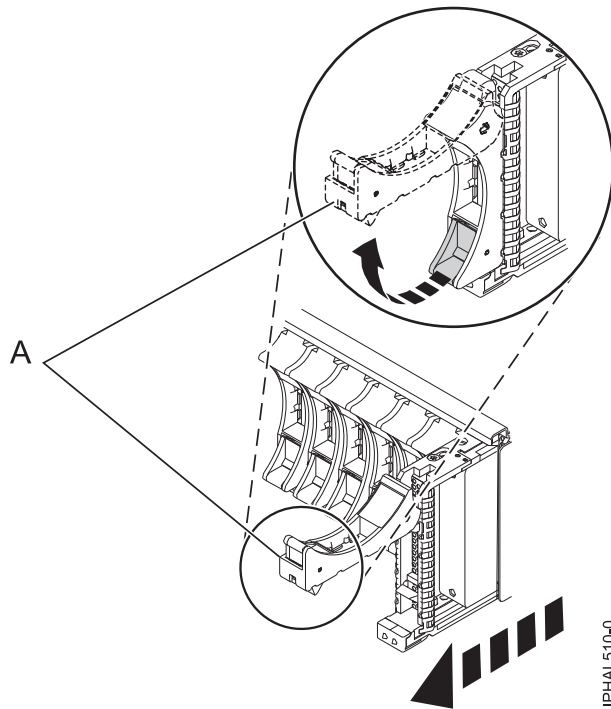
Figure 48. Removing a small-form factor disk drive from the 5803 expansion unit

14. Support the bottom of the disk drive as you slide it out of the system or expansion unit. Do not hold the disk drive by the handle.

    The concurrent maintenance light for the slot turns off when you remove the disk drive.

15. Does your new disk drive have a bezel preinstalled?
    - No: Continue with the procedure from here.
    - Yes: Go to step 6 on page 69 of the replacement procedure.

    Important: If the disk drive bezel does not have a thumbscrew, it is not removable and is a serial-attached SCSI (SAS) disk drive. The replacement drive should come with an attached bezel.

    Loosen and pull out on the thumbscrew **(B)** to release the bezel **(C)** from the disk drive, as shown in the following figure.
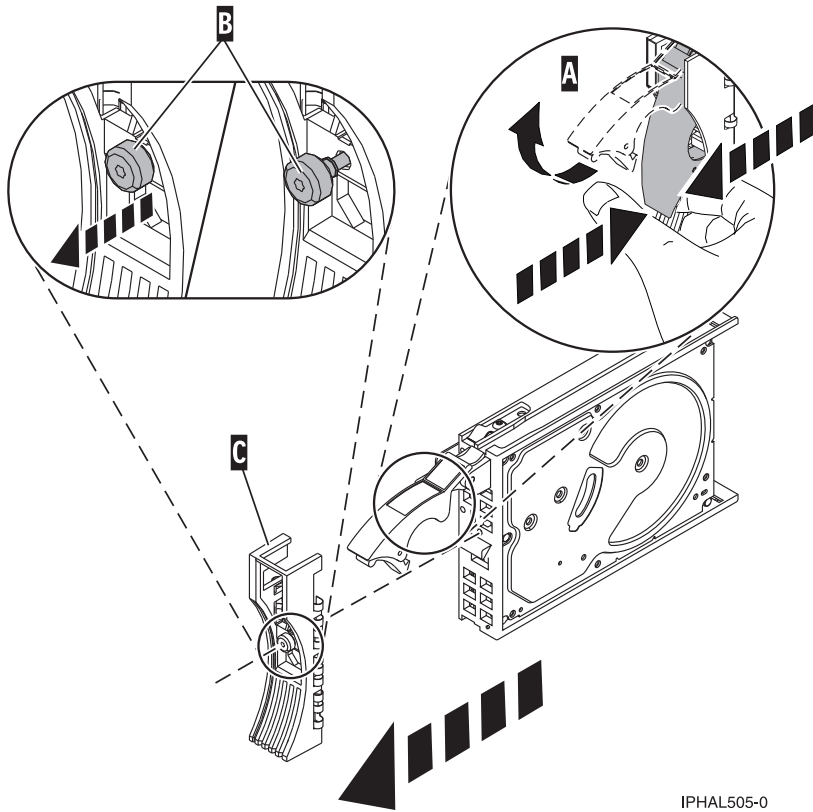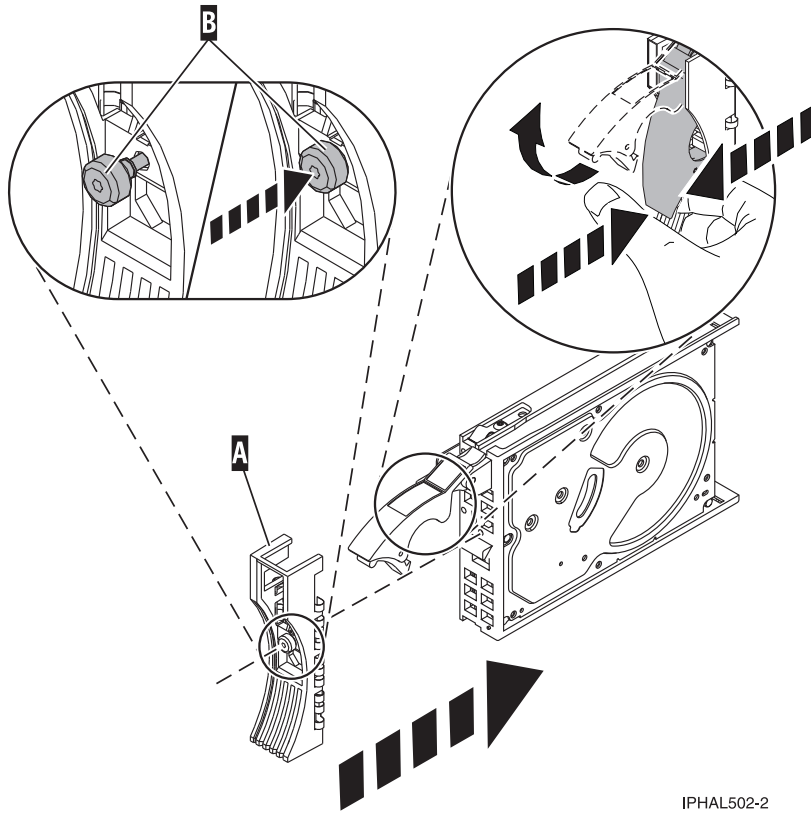
Figure 49. Removing a disk-drive bezel

Replace a disk drive

1. Find the package that contains the new disk drive.

   Attention: Disk drives are fragile. Handle with care.

2. Remove the disk drive from its protective package.

3. Unlock the handle of the replacement disk drive by squeezing and pulling it out toward you. If the handle is not all the way out, the disk drive cannot slide into the system.

4. If your new disk drive does not have a bezel preinstalled, then perform the following step.

   Attach the disk-drive bezel **(A)** to the replacement disk drive, as shown in the following figure.

5. If your new disk drive does not have a bezel preinstalled, then perform the following step.

   Press in and then tighten the thumbscrew **(B)** to secure the bezel to the disk drive.

IPHAL502-2

Figure 50. Installing a disk-drive bezel

6. Install the disk drive as shown in Figure 51 on page 70.

   a. Support the bottom of the disk drive as you align it with the guide rails in the system unit. Do not hold the disk drive by the handle.

   b. Slide the disk drive into the system until it stops.

   Important: Ensure that when installing a disk drive, that the drive is fully seated and all the way into the system.

   c. Push the disk drive handle in until it locks.

IPHAL503-0

Figure 51. Installing a disk drive in a model

A

IPHAL509-0

Figure 52. Installing a small-form factor disk drive

Figure 53. Installing a small-form factor disk drive in the 5803 expansion unit

7. Press Enter. The disk drive slot exits the Remove state and enters the Normal state.
8. Exit to the RAID Hot-Plug Devices menu. Press F3 to return.
9. Exit to the Task selection display.
10. Select **Log Repair Action**.
11. Select the disk drive that you replaced and then press Enter.
12. Select **Commit** after you have made your selection and then press Enter.
13. Exit to the command line.

Complete the procedure

1. Replace the front cover.
2. Install or close the front door of the system, expansion unit or rack.
3. To prepare the disk drive for use, go to "Rebuilding data on a replacement disk drive using AIX" on page 137.

Related concepts

Removing and replacing covers and doors
Use these procedures to remove and replace the covers on IBM Power Systems servers that contain the
POWER7 processor.

Related reference

"Removing and replacing the expansion unit cover or door" on page 205
You might need to remove, replace, or install covers or doors on an expansion unit as a part of accessing
components or performing a service action.

Replacing a disk drive with the Linux system or logical partition powered on

You might need to replace a Small Computer System Interface (SCSI) or serial-attached SCSI (SAS) disk
drive in a system or expansion unit while the Linux operating system or logical partition that controls the
disk drive location is powered on. Use the procedure in this section to perform this task.

Attention: If you are installing a new or upgraded disk drive, see "Installing a disk drive or solid-state
drive with the Linux system or logical partition powered on" on page 17. If you are removing a disk
drive as part of a service procedure, continue to use the following procedure.

DANGER

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

Electrical voltage and current from power, telephone, and communication cables are hazardous. To avoid a shock hazard:
- Connect power to this unit only with the 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.
- Connect all power cords to a properly wired and grounded electrical outlet. Ensure that the outlet supplies proper voltage and phase rotation according to the system rating plate.
- Connect any equipment that will be attached to this product to properly wired outlets.
- When possible, use one hand only to connect or disconnect signal cables.
- Never turn on any equipment when there is evidence of fire, water, or structural damage.
- Disconnect the attached power cords, telecommunications systems, networks, and modems before you open the device covers, unless instructed otherwise in the installation and configuration procedures.
- Connect and disconnect cables as described in the following procedures when installing, moving, or opening covers on this product or attached devices.

  To Disconnect:
  1. Turn off everything (unless instructed otherwise).
  2. Remove the power cords from the outlets.
  3. Remove the signal cables from the connectors.
  4. Remove all cables from the devices

  To Connect:
  1. Turn off everything (unless instructed otherwise).
  2. Attach all cables to the devices.
  3. Attach the signal cables to the connectors.
  4. Attach the power cords to the outlets.
  5. Turn on the devices.

  (D005)

Attention: Read these instructions carefully and understand the complexity of the powered-on procedure before you begin. If the system or logical partition that controls the disk drive you are replacing is at the Linux command line, you can use this powered-on procedure.

Go to "Replacing a disk drive with the system or logical partition powered off" on page 106, if:
- You are installing a disk drive that will be connected with the 6203 or 6204 SCSI adapter
- You do not feel comfortable using the powered-on procedure

Note: Some of the figures in these procedures might not look exactly like the system or expansion unit that you have. However, the steps to perform the task are the same.

Prepare the system

1. Perform prerequisite tasks as described in "Before you begin" on page 189.
2. Is the disk drive you are replacing in a redundant array of independent disk (RAID) 0 array or is the disk drive you are replacing in a failed RAID level 5 or 10 array?
   - If yes, you must delete the disk array before replacing the disk. For instructions, see *PCI-X SCSI RAID Controller Reference Guide for Linux*.

This guide is available from the SCSI PCI Adapters Web page at http://publib.boulder.ibm.com/infocenter/pseries/v5r3/index.jsp?topic=/com.ibm.pseries.doc/hardware_docs/scsipciadapters.htm.

- If no, your drive is configured as Just a Bunch of Disks (JBOD) or is configured within a degraded array. Proceed to the next step.

3. If the disk drive you are replacing is in a redundant array of independent disk (RAID) Level 0 disk array or in a failed RAID Level 5 or RAID Level 10 disk array, you must delete the disk array before replacing the disk. For instructions, see the *PCI-X SCSI RAID Controller Reference Guide for Linux*.

This guide is available from the SCSI PCI Adapters Web page at http://publib.boulder.ibm.com/infocenter/pseries/v5r3/index.jsp?topic=/com.ibm.pseries.doc/hardware_docs/scsipciadapters.htm.

4. If applicable, remove the system unit door or expansion unit door or open the rack front door.

5. If applicable, remove the front cover.

- If you have a front cover from any other models, remove the front cover.

To replace a disk drive in a location with the Linux system or logical partition that controls the disk drive location powered on, select the appropriate procedure from the following list:

Related concepts

Removing and replacing covers and doors
Use these procedures to remove and replace the covers on IBM Power Systems servers that contain the POWER7 processor.

Related reference

"Removing and replacing the expansion unit cover or door" on page 205
You might need to remove, replace, or install covers or doors on an expansion unit as a part of accessing components or performing a service action.

Replacing the disk drive using Linux kernel 2.4

Learn how to replace a disk drive in a location that is controlled by a system or logical partition that is running Linux kernel 2.4.

Prepare to remove the disk drive

1. Log in as root user.

2. Type `iprconfig` on the command line of the Linux session and press Enter. The Work with Disk Units display is shown.

3. From the Work with Disk Units display, select **Analyze log**. Press Enter. The Kernel Messages Log display is shown, like the following display.

```
                           Kernel Messages Log

Select one of the following:

     1. Use vi to view most recent IBM Storage error messages
     2. Use vi to view IBM Storage error messages
     3. Use vi to view all kernel error messages
     4. Use vi to view sisconfig error messages
     5. Set root kernel message log directory
     6. Set default editor
     7. Restore defaults
     8. Use vi to view IBM Storage boot time messages
Selection:

e=Exit
```
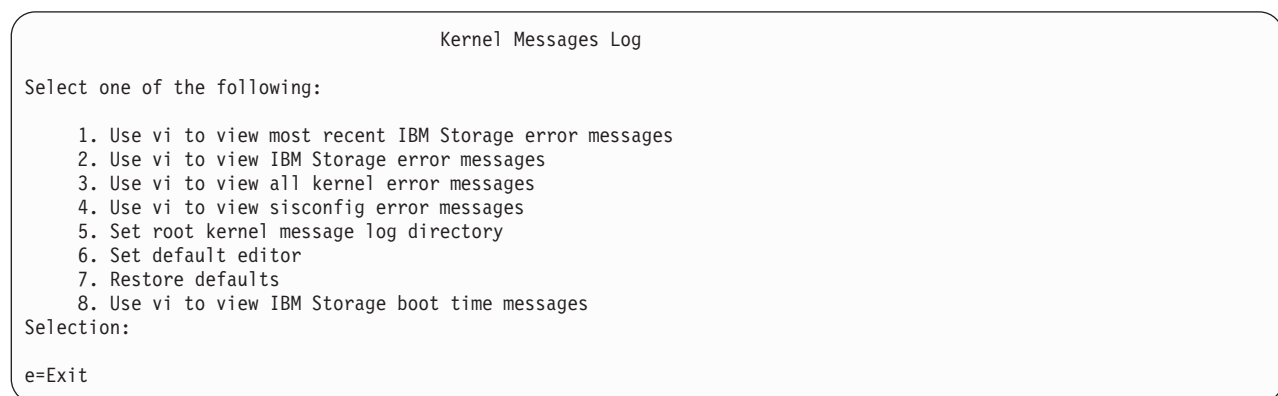
Figure 54. Kernel Messages Log

4. From the Kernel Messages Log display, select **Use vi to view most recent IBM Storage error messages**. Press Enter.

5. Find the device error log entry for the disk drive you want to replace.

6. Record the location information for the disk drive. The location information has the form of P1–I2/Z1–A5.
7. Exit to the Work with Disk Units display.
8. Select **Display disk hardware status** from the Work with Disk Units display. Press Enter.
9. Record the hardware status of the disk drive you want to replace.
10. Type d (Display disk unit details) next to the disk drive you want to replace.
11. On the Display Disk Unit Details display, type 5 (Display hardware resource information details) next to the disk drive you want to replace.

    The Disk Unit Hardware Resource Information Details display is shown, like the following display.

```
                 Disk Unit Hardware Resource Information Details


   Manufacturer. . . . . . . . : IBM
   Machine Type and Model. . . : IC35L073UCDY10-0
   Firmware Version. . . . . . : 53323846
   Model . . . . . . . . . . . : 020
   Serial Number . . . . . . . : E6VKUNPD
   Capacity. . . . . . . . . . : 73.41 GB
   Resource Name . . . . . . . : /dev/sda

   Physical location:
    Location . . . . . . . : U1.9-P1/Z1-A8
    PCI Bus. . . . . . . . . : 257
    PCI Device . . . . . . . . : 1
    SCSI Host Number . . . . . : 0
    SCSI Channel. . . . . . . : 0
    SCSI Id. . . . . . . . . : 8
    SCSI Lun. . . . . . . . : 0


   Press Enter to continue.

   e=Exit        q=Cancel        v=Display Extended VPD
```

Figure 55. Disk Unit Hardware Resource Information Details display

12. Record the physical location information.
13. Exit to the Work with Disk Units display.
14. If the disk drive you want to replace is unprotected or in use, move the data from the disk drive before continuing with this procedure.

    For information, see the *PCI-X SCSI RAID Controller Reference Guide for Linux*.

    This guide is available from the SCSI PCI Adapters web page.

Remove the disk drive

1. If you are removing a solid state device located on a PCIe RAID and SSD SAS adapter, go to Removing and replacing the PCIe RAID and SSD SAS adapterRemoving and replacing the PCIe RAID and SSD SAS adapter and complete that procedure, then return here and perform the following steps.
2. From the Work with Disk Units display, select **Work with disk unit recovery**. Press Enter.
3. From the Work with Disk Unit Recovery display, select **Device Concurrent maintenance**. Press Enter.

   A Device Concurrent Maintenance display is shown, like the following display.

```
                    Device Concurrent Maintenance

 Type the choices, then press Enter.

   Specify either Physical Location or PCI/SCSI location.
       Physical Location: U0.1-P1-I4/Z1-A8
            OR
       PCI/SCSI . . . PCI Bus:          PCI Device:
                 SCSI Channel:    SCSI Id:    SCSI Lun:


   Specify action as    1=Remove device   2=Install device
       Action to be performed  . . . . . . . . . : 1


   Enter a time value between 01 and 19.
       Time needed in minutes  . . . . . . . . . : 1

   Or leave blank and press Enter to cancel
```

Figure 56. Example Device Concurrent Maintenance display

4. Enter either the physical location information or the PCI or SCSI location for the disk drive you want to replace. Press Enter.

5. Specify 1 (Remove device) for the action to be performed.

6. Enter a time value in minutes, that is the time required by you to remove the disk drive.

    The concurrent maintenance light indicates that you can remove the disk drive. To view the locations of the concurrent maintenance lights, select the appropriate model from the following list:

    -   "Disk drive locations and concurrent maintenance lights for the 5786, 5787, 7031-D24, and 7031-T24 SCSI disk-drive enclosures" on page 133

7. Press Enter.

    A Device Concurrent Maintenance Action display is shown, like the following display.

```
                    Device Concurrent Maintenance Action

 Removal of device:
    Location: U0.1-P1-I4/Z1-A8


  You have 1 minute to perform the operation

  During this time, your system can seem unresponsive



 c=Confirm     q=Cancel
```

Figure 57. Example Device Concurrent Maintenance Action display

8. Enter c to confirm that you want to remove the disk drive at the specified location.

    A Device Concurrent Maintenance Action In Progress display is shown, like the following display.

```
                    Device Concurrent Maintenance Action In Progress

 Please remove the device located in:
    Location: U0.1-P1-I4/Z1-A8
```

Figure 58. Example Device Concurrent Maintenance Action In Progress display

Attention:

- Attach a wrist strap to an unpainted surface of your hardware to prevent electrostatic discharge (ESD) from damaging your hardware.
- When using a wrist strap, follow all electrical safety procedures. A wrist strap is 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 a wrist strap, just prior to removing the product from ESD packaging and installing or replacing hardware, touch an unpainted surface of the system for a minimum of 5 seconds.

9. Squeeze or lift the handle of the disk drive out toward you before you remove the disk drive, as shown in Figure 59. If the handle is not all the way out, the disk drive cannot slide out of the system or expansion unit.

IPHAL504-0
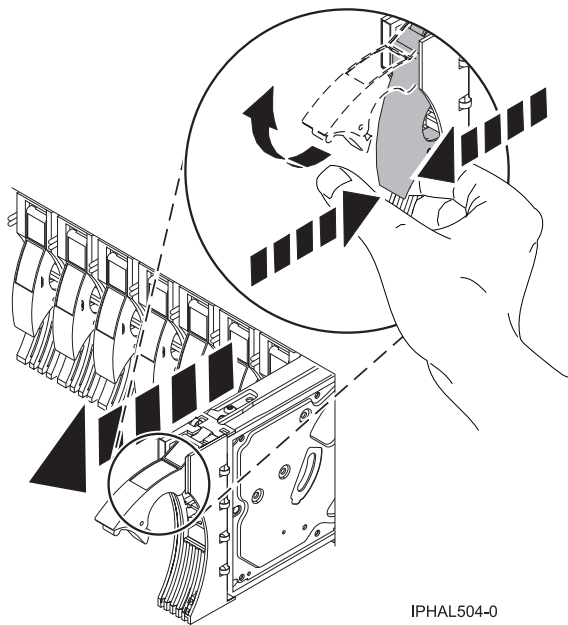
Figure 59. Removing a disk drive from a model or 7311-D20
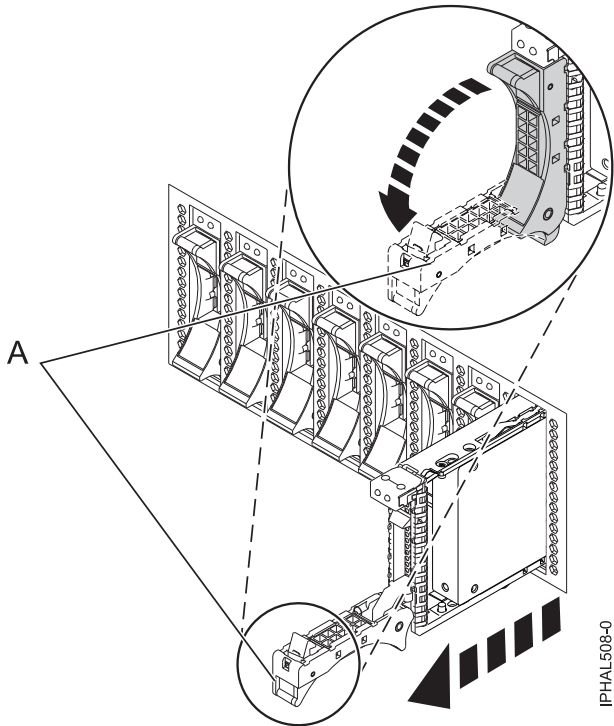
Figure 60. Removing a small-form factor disk drive
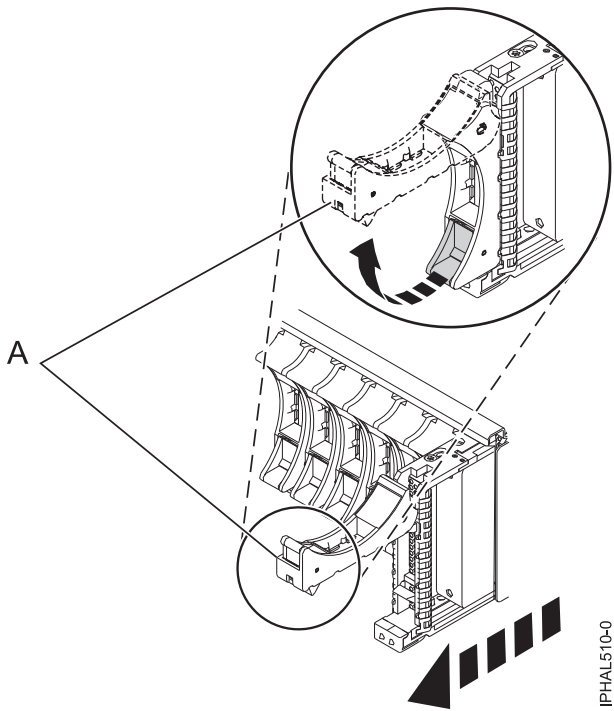
Figure 61. Removing a small-form factor disk drive from the 5803 expansion unit

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

Note: The concurrent maintenance light for the slot stops flashing and remains off when you remove the disk drive.

11. Press Enter.

12. Does your disk drive have a bezel preinstalled?

    - No: Continue with the procedure from here.
    - Yes: Move on to step 5 on page 80 of the replace procedure.

    Loosen and pull out on the thumbscrew **(B)** to release the disk-drive bezel **(C)** from the disk drive, as shown in the following figure.
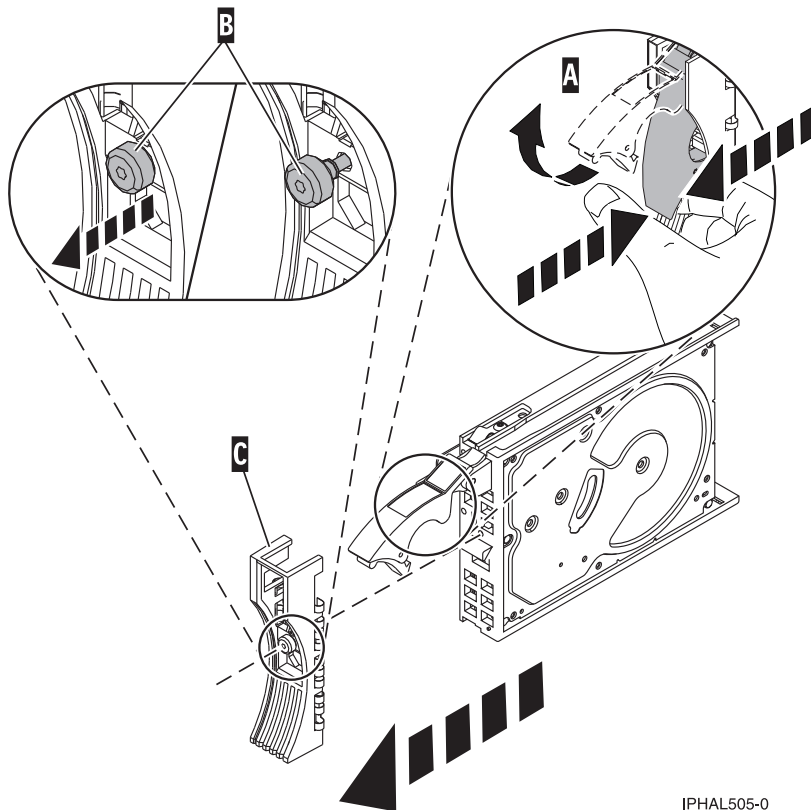
Figure 62. Removing a disk-drive bezel

Replace the disk drive

1. Find the package that contains the new disk drive.

   Attention: Disk drives are fragile. Handle with care.

2. Remove the disk drive from its protective package.

3. Unlock the disk drive handle by squeezing and pulling it out toward you before you install the disk drive. If the handle is not all the way out, the disk drive does not slide into the system or expansion unit.

4. If your replacement disk drive does not have a bezel preinstalled, then follow these steps to install the disk-drive bezel on the replacement disk drive:

   a. Attach the bezel **(A)** to the disk drive, as shown in the following figure.
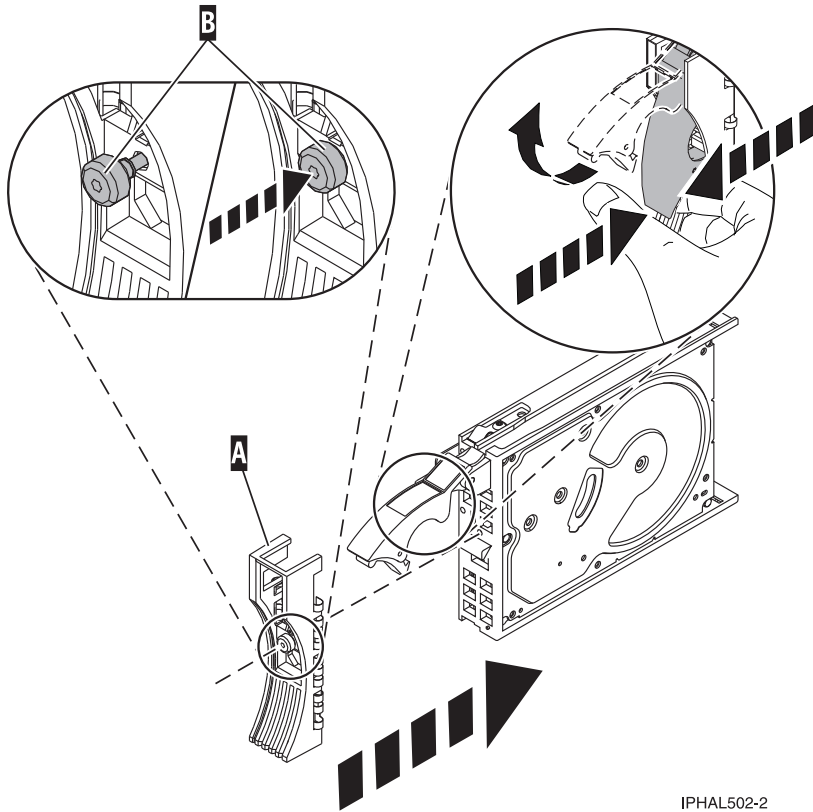
Figure 63. Attaching a bezel to the disk drive

    b. Press in and then tighten the thumbscrew **(B)** to secure the bezel to the disk drive.

5. Select **Device Concurrent maintenance** from the Work with Disk Unit Recovery display. Press Enter.

6. Enter either the physical location code or the PCI/SCSI location from which you removed the disk drive. Press Enter.

7. Specify action as **2** (Install device).

8. Enter a time value in minutes, that is time required by you to install the new disk drive.

   The concurrent maintenance light for the slot indicates that you can install the disk drive.

9. Press Enter. A Device Concurrent Maintenance Action display is shown, like the following display.

```
                    Device Concurrent Maintenance Action

 Installation of device:
    Location: U0.1-P1-I4/Z1-A8


  You have 1 minute to perform the operation

  During this time, your system can seem unresponsive




 c=Confirm     q=Cancel
```

Figure 64. Example Device Concurrent Action Maintenance display

10. Enter c to confirm that you want to install the disk drive in the specified location.

    A Device Concurrent Maintenance Action In Progress display like the following sample is shown.

```
         Device Concurrent Maintenance Action In Progress



Please insert the device located in:
    Location: U0.1-P1-I4/Z1-A8
```

Figure 65. Example Device Concurrent Maintenance Action In Progress display

11. Support the bottom of the disk drive as you align it with the guide rails in the system or expansion unit. Do not hold the disk drive by the handle.

12. Slide the disk drive all the way in into the system or expansion unit and then lock it in place by pushing in the disk drive handle as shown in Figure 66.
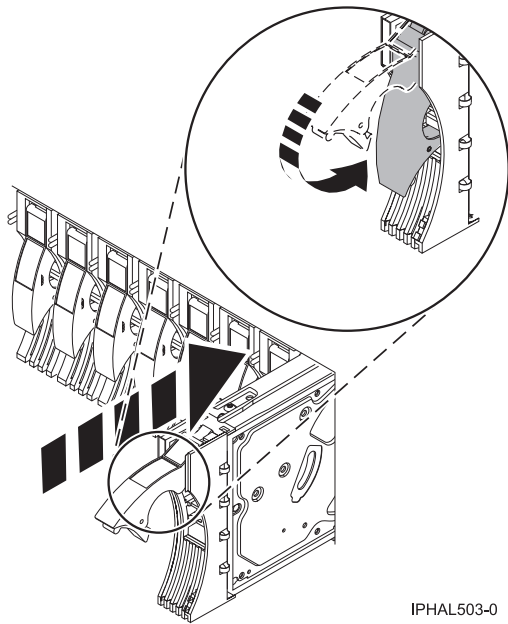
IPHAL503-0

Figure 66. Installing a disk drive in a model or 7311-D20
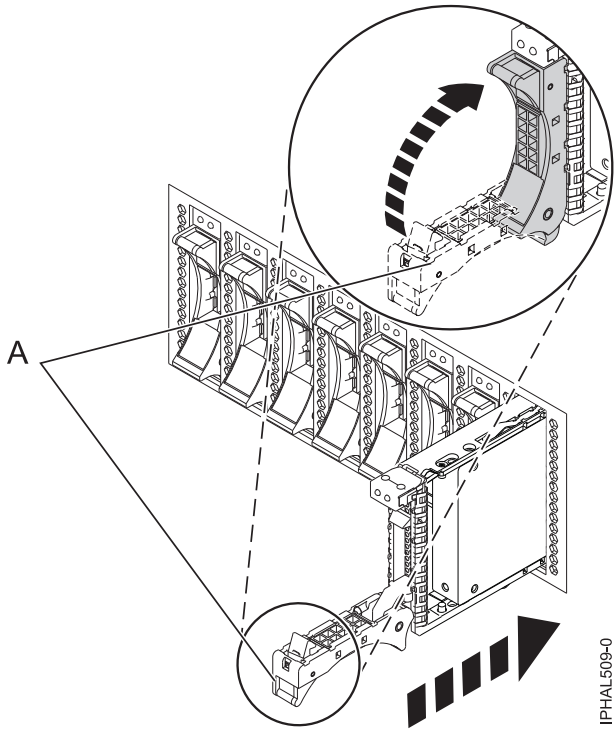
Figure 67. Installing a small-form factor disk drive
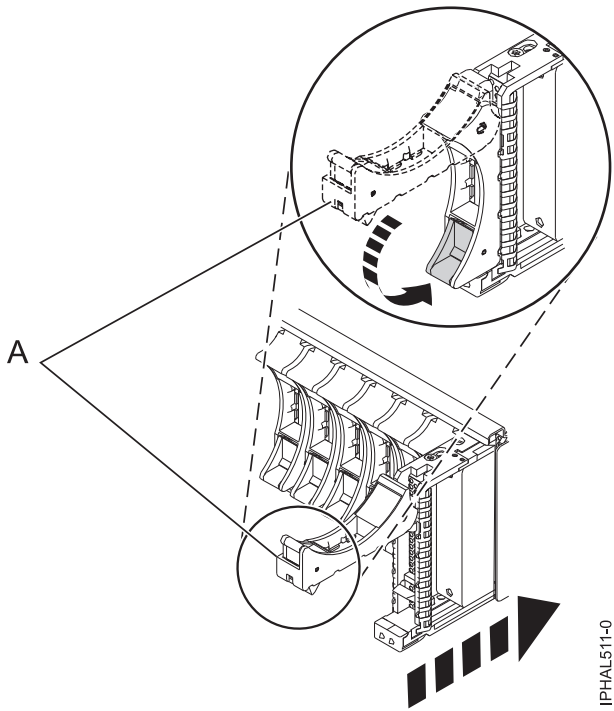
Figure 68. Installing a small-form factor disk drive in the 5803 expansion unit

The concurrent maintenance light for the slot stops flashing and remains on when you have installed the disk drive properly.

Perform the procedure

1. Rebuild the data on the replacement disk drive. For instructions, go to "Rebuilding data on a replacement disk drive using Linux" on page 137.
2. Replace the front cover.
3. Install or close the system, expansion unit, or rack front door.

Related concepts

Removing and replacing covers and doors
Use these procedures to remove and replace the covers on IBM Power Systems servers that contain the POWER7 processor.

Related reference

"Removing and replacing the expansion unit cover or door" on page 205
You might need to remove, replace, or install covers or doors on an expansion unit as a part of accessing components or performing a service action.

Replacing the disk drive using Linux kernel 2.6

Learn how to replace a disk drive in a location that is controlled by a system or logical partition that is running Linux kernel 2.6.

Prepare to remove the disk drive

1. Log in as root user.
2. Type iprconfig on the command line of the Linux session and press Enter.
   The IBM Power RAID Configuration Utility display is shown.
3. Select **Analyze log**. Press Enter. The Kernel Messages Log display is shown.

```
                         Kernel Messages Log


Select one of the following:

     1. View most recent ipr error messages
     2. View ipr error messages
     3. View all kernel error messages
     4. View iprconfig error messages
     5. Set root kernel message log directory
     6. Set default editor
     7. Restore defaults
     8. View ipr boot time messages


Selection:

e=Exit
```
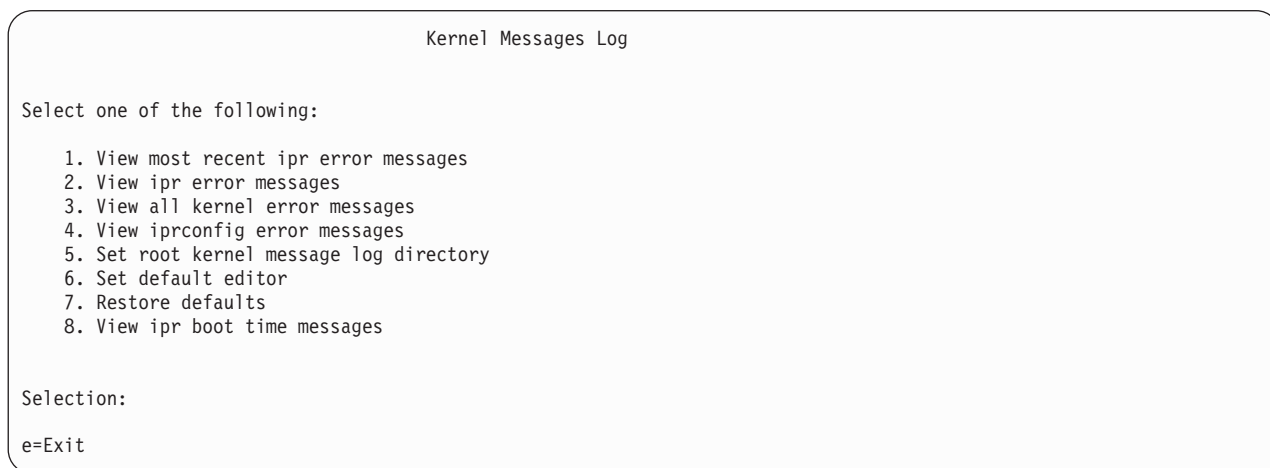
Figure 69. Kernel Messages Log

4. Select **View most recent ipr error messages** from the Kernel Messages Log display. Press Enter.
5. Find the entry in the log for the disk drive you want to replace.
6. Record the location information for the disk drive.

   Note: The location information has the form of 2:0:8:0. In this example, 2 is the SCSI host number, 0 is the SCSI bus, 8 is the SCSI target ID, and 0 is the LUN (logical unit).

7. Return to the command line.
8. Type the following command:
   ls -ld /sys/class/scsi_host/host#/device
   Where # is the SCSI host number. Press Enter.

9. Record the PCI location information.

   Note: The PCI location information has the form of 61:01:0:2.
10. Type `iprconfig` on the command line and press Enter.
    The IBM Power RAID Configuration Utility display is shown.
11. Select **Display hardware status** from the IBM Power RAID Configuration Utility display. Press Enter.
    The Display Hardware Status display is shown.

```
                        Display Hardware Status

Type option, press Enter.
  1=Display hardware resource information details

OPT Name   PCI/SCSI Location         Description               Status
--- ------ ------------------------- ------------------------- ----------------
         0000:01:01.0.0/          PCI-X SCSI Adapter        Operational
         0000:41:01.0.1/          PCI-X SCSI Adapter        Operational
    sda   0000:41:01.0.1/0:3:0     Physical Disk             Active
    sdb   0000:41:01.0.1/0:4:0     Physical Disk             Active
    sdc   0000:41:01.0.1/0:8:0     Physical Disk             Active
    sdd   0000:41:01.0.1/1:3:0     Physical Disk             Active
    sde   0000:41:01.0.1/1:4:0     Physical Disk             Active
    sdf   0000:41:01.0.1/1:5:0     Physical Disk             Active
         0001:61:01.0.2/          PCI-X SCSI RAID Adapter   Operational
    sdg   0001:61:01.0.2/0:3:0     Physical Disk             Active
         0001:61:01.0.2/0:6:0     Advanced Function Disk    Active
    sdi   0001:61:01.0.2/0:9:0     Physical Disk             Active
    sdh   0001:61:01.0.2/255:0:0   RAID 10 Disk Array        Failed
         0001:61:01.0.2/0:4:0     RAID 10 Array Member      Failed
         0001:61:01.0.2/0:5:0     RAID 10 Array Member      Failed

e=Exit   q=Cancel   r=Refresh   t=Toggle
```

Figure 70. Example Display Hardware Status

12. Look for the disk drive at the PCI location you recorded. The disk drive might have a Failed status.
13. If the disk drive you want to replace is unprotected or in use, move the data from the disk drive before continuing with this procedure.
    For information, see the *PCI-X SCSI RAID Controller Reference Guide for Linux*.
    This guide is available from the SCSI PCI Adapters web page.
14. Type option **1** (Display hardware resource information details) next to the disk drive you want to replace. Press Enter.
    The Disk Hardware Resource Information Details is displayed like the shown in the following sample.

```
                Disk Unit Hardware Resource Information Details


Manufacturer . . . . . . . . . . . . . . . : IBM
Product ID . . . . . . . . . . . . . . . . : ST336607LC
Firmware Version . . . . . . . . . . . . . : 43353048 (C50H)
Serial Number. . . . . . . . . . . . . . . : 00006719
Capacity . . . . . . . . . . . . . . . . . : 36.40 GB
Resource Name. . . . . . . . . . . . . . . : /dev/sdd


Physical location
PCI Address. . . . . . . . . . . . . . . . : 0001:50:01.0
SCSI Host Number . . . . . . . . . . . . . : 2
SCSI Channel . . . . . . . . . . . . . . . : 0
SCSI Id. . . . . . . . . . . . . . . . . . : 4
SCSI Lun . . . . . . . . . . . . . . . . . : 0


Extended Details
FRU Number . . . . . . . . . . . . . . . . : 00P2676
                                                            More...

Press Enter to Continue

e=Exit   q=Cancel   f=PageDn   b=PageUp
```

Figure 71. Example Disk Hardware Resource Information Details display

15. Record the physical location information.
16. Return to the IBM Power RAID Configuration Utility display.

Remove the disk drive

1. If you are removing a solid state device located on a PCIe RAID and SSD SAS adapter, go to Removing and replacing the PCIe RAID and SSD SAS adapterRemoving and replacing the PCIe RAID and SSD SAS adapter and complete that procedure, then return here and perform the following steps.

2. From the IBM Power RAID Configuration Utility display, select **Work with disk unit recovery**. Press Enter.

3. From the Work with Disk Unit Recovery display, select **Concurrent remove device**. Press Enter. A Concurrent Device Remove display is shown, like the following sample.

```
                        Concurrent Device Remove

Choose a single location for remove operations
  1=Select

OPT Name   PCI/SCSI Location          Description              Status
--- ------ -------------------------- ------------------------ ----------------
    sdc    0000:41:01.0.1/0:8:0       Physical Disk            Active
           0000:41:01.0.1/0:5:                                 Empty
    sdb    0000:41:01.0.1/0:4:0       Physical Disk            Active
    sda    0000:41:01.0.1/0:3:0       Physical Disk            Active
           0000:41:01.0.1/1:8:                                 Empty
    sdf    0000:41:01.0.1/1:5:0       Physical Disk            Active
    sde    0000:41:01.0.1/1:4:0       Physical Disk            Active
    sdd    0000:41:01.0.1/1:3:0       Physical Disk            Active
           0001:61:01.0.2/0:8:                                 Empty
    sdh    0001:61:01.0.2/0:9:0       Physical Disk            Active
    sdg    0001:61:01.0.2/0:3:0       Physical Disk            Active
```

Figure 72. Example Concurrent Device Remove display

4. Type option 1 (Select) next to the location for the disk drive you want to replace. Press Enter.

5. The Verify Device Concurrent Remove display is shown. The concurrent maintenance light turns on for that disk drive slot. To view the locations of the concurrent maintenance lights, select the appropriate model from the following list:

- "Disk drive locations and concurrent maintenance lights for the 5786, 5787, 7031-D24, and 7031-T24 SCSI disk-drive enclosures" on page 133

6. On the Verify Device Concurrent Remove display, verify that the selected disk drive is the disk drive you want to replace, then press Enter. The identify light turns on for the disk drive.

    Note: Ensure that the disk drive is not in use to prevent loss of data.

7. The Device Concurrent Remove display is shown.

    Attention:

    - Attach a wrist strap to an unpainted surface of your hardware to prevent electrostatic discharge (ESD) from damaging your hardware.
    - When using a wrist strap, follow all electrical safety procedures. A wrist strap is 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 a wrist strap, just prior to removing the product from ESD packaging and installing or replacing hardware, touch an unpainted surface of the system for a minimum of 5 seconds.

8. Squeeze and pull the handle of the disk drive out toward you before you remove the disk drive as shown in Figure 73. If the handle is not all the way out, the disk drive does not slide out of the system or expansion unit.

IPHAL504-0
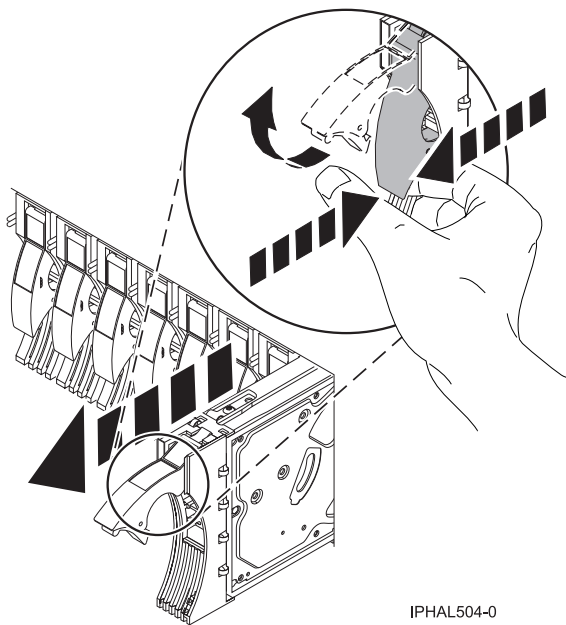
Figure 73. Removing a disk drive from a model or 7311-D20

9. Support the bottom of the disk drive as you slide it out of the system or expansion unit. Do not hold the disk drive by the handle.

10. If your replacement disk drive does not have a bezel preinstalled, then perform the following step.

    Loosen and pull out on the thumbscrew **(B)** to release the disk-drive bezel **(C)** from the disk drive, as shown in the following figure.

Figure 74. Removing a disk-drive bezel

11. Press Enter on the IBM Power RAID Configuration Utility to indicate that you have removed the disk drive.

Replace the disk drive

1. Find the package that contains the new disk drive.

   Attention: Disk drives are fragile. Handle them with care.

2. Remove the disk drive from its protective package.

3. Unlock the disk drive handle by squeezing and pulling it out toward you before you install the disk drive. If the handle is not all the way out, the disk drive does not slide into the system or expansion unit.

4. If your replacement disk drive does not have a bezel preinstalled, then follow these steps to install the disk-drive bezel on the replacement disk drive:

   a. Attach the bezel **(A)** to the disk drive, as shown in Figure 75 on page 88.

   b. Press in and then tighten the thumbscrew **(B)** to secure the bezel to the disk drive.
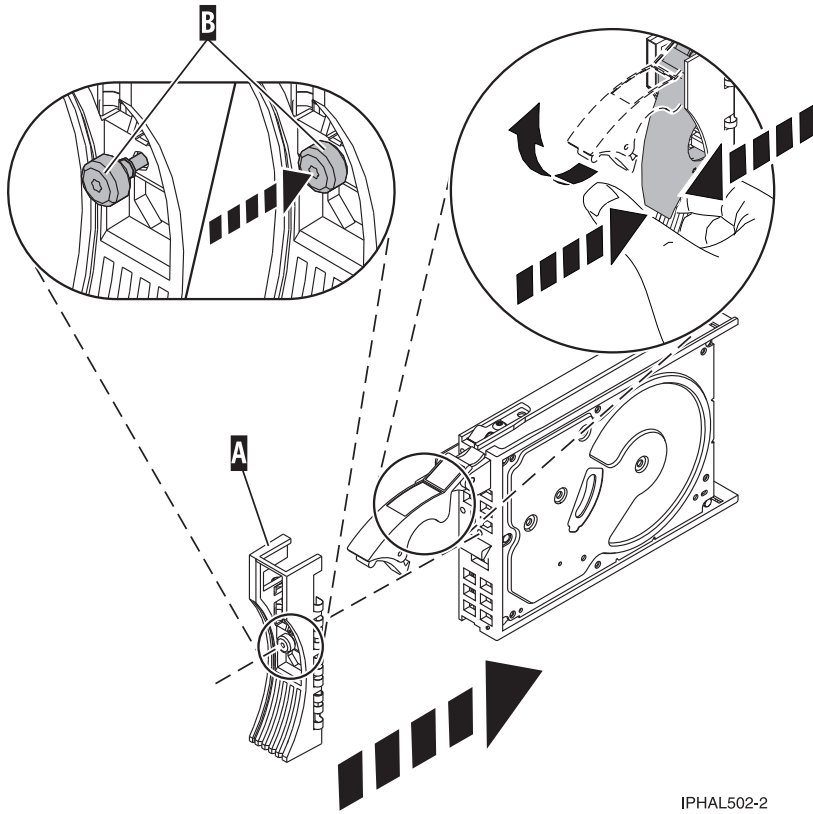
IPHAL502-2

Figure 75. Attaching a bezel to the disk drive

5. From the IBM Power RAID Configuration Utility display, select **Work with disk unit recovery**. Press Enter.
6. From the Work with Disk Unit Recovery display, select **Concurrent add device**. Press Enter.

   A Concurrent Device Add display like the following sample is shown.

```
                          Concurrent Device Add

Choose a single location for add operations
  1=Select

OPT Name    PCI/SCSI Location            Description              Status
--- ------  --------------------------   ------------------------ -----------------
            0000:41:01.0.1/0:5:                                   Empty
            0000:41:01.0.1/1:8:                                   Empty
            0001:61:01.0.2/0:8:                                   Empty
```

Figure 76. Example Concurrent Device Add display

7. Type option1 (Select) next to the location from which you removed the disk drive.

   The Verify Device Concurrent Add display is shown.
8. Press Enter on the Verify Device Concurrent Add display. The Complete Device Concurrent Add display is shown.
9. Support the bottom of the disk drive as you align it with the guide rails in the system or expansion unit. Do not hold the disk drive by the handle.
10. Slide the disk drive all the way into the system or expansion unit and then lock it in place by pushing in the disk drive handle, as shown in Figure 77 on page 89.

IPHAL503-0
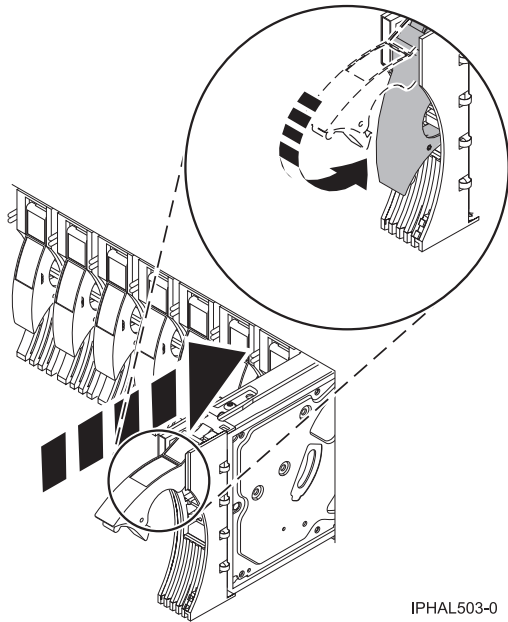
Figure 77. Installing a disk drive in a model or 7311-D20

11. Press Enter on the Complete Device Concurrent Add display to indicate that the disk drive is installed.

Perform the procedure

1. Rebuild the data on the replacement disk drive. For instructions, go to "Rebuilding data on a replacement disk drive using Linux" on page 137.
2. Replace the front cover.
3. Install or close the system, expansion unit, or rack front door.

Related concepts

Removing and replacing covers and doors
Use these procedures to remove and replace the covers on IBM Power Systems servers that contain the POWER7 processor.

Related reference

"Removing and replacing the expansion unit cover or door" on page 205
You might need to remove, replace, or install covers or doors on an expansion unit as a part of accessing components or performing a service action.

Replacing a disk drive with the IBM i system or logical partition powered on

Learn how to replace a Small Computer System Interface (SCSI) or serial-attached SCSI (SAS) disk drive in a system or expansion unit while the IBM i operating system or logical partition that controls the disk drive location is powered on. Use the procedure in this information to perform this task.

Attention: If you are installing a new or upgraded disk drive, see "Installing a disk drive or solid-state drive with the IBM i system or logical partition powered on" on page 37. If you are removing a disk drive as part of a service procedure, continue to use the following procedure.

DANGER

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

Electrical voltage and current from power, telephone, and communication cables are hazardous. To avoid a shock hazard:
- Connect power to this unit only with the 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.
- Connect all power cords to a properly wired and grounded electrical outlet. Ensure that the outlet supplies proper voltage and phase rotation according to the system rating plate.
- Connect any equipment that will be attached to this product to properly wired outlets.
- When possible, use one hand only to connect or disconnect signal cables.
- Never turn on any equipment when there is evidence of fire, water, or structural damage.
- Disconnect the attached power cords, telecommunications systems, networks, and modems before you open the device covers, unless instructed otherwise in the installation and configuration procedures.
- Connect and disconnect cables as described in the following procedures when installing, moving, or opening covers on this product or attached devices.

  To Disconnect:
  1. Turn off everything (unless instructed otherwise).
  2. Remove the power cords from the outlets.
  3. Remove the signal cables from the connectors.
  4. Remove all cables from the devices

  To Connect:
  1. Turn off everything (unless instructed otherwise).
  2. Attach all cables to the devices.
  3. Attach the signal cables to the connectors.
  4. Attach the power cords to the outlets.
  5. Turn on the devices.

  (D005)

Attention: The powered-on procedure is a complex set of steps that must be performed exactly to avoid potential data loss or system damage. You might also consider the powered-off procedure, which is a simpler task that involves less risk of data loss or system damage. For instructions, see "Replacing a disk drive with the system or logical partition powered off" on page 106.

Note: Some of the figures in these procedures might not look exactly like the system or expansion unit that you have. However, the steps to perform the task are the same.

Prepare the system

1. Perform prerequisite tasks as described in "Before you begin" on page 189.
2. If applicable, remove the system unit door, expansion unit door, or the rack door.
3. If applicable, remove the front cover.
   - If you have a front cover from any other models, remove the front cover.

Remove the disk drive

1. If you are removing a solid-state device located on a PCIe RAID and SSD SAS adapter, go to Removing and replacing the PCIe RAID and SSD SAS adapterRemoving and replacing the PCIe RAID and SSD SAS adapter and perform that procedure, then return here and perform the following steps.

2. Locate the disk drive to be replaced and record the location information, then use the location information to activate the identify light for that disk drive. For instructions, see "Identifying a failing part in an IBM i system or logical partition" on page 195.

3. Determine if the disk drive to be removed is a non-configured unit by performing the following steps:

    a. Type strsst on the command line of the IBM i session and press Enter.

    b. Type your service tools user ID and service tools password and press Enter.

    c. Select **Work with disk units** and press Enter.

    d. Select **Display Disk Configuration** and press Enter.

    e. Select **Display non-configured units** and press Enter.

      Is the failed drive a non-configured unit?

      • No: Continue to Verify disk is suspended.

      • Yes: Continue to next step.

    f. Determine if the disk drive to be removed was replaced by a hot spare when it failed. An xxxx9031 error logged close to the same time of the original disk failure indicates the automatic Rebuild of the data to a hot spare device.

4. Verify that the disk drive you are replacing has been suspended before continuing with this procedure. For instructions, see "Preparing to remove a disk drive from a system or logical partition controlled by IBM i" on page 61.

5. Did you find the service action log entry related to this problem?

    • **No**: Exit the service action log and go to step 7.

    • **Yes**: Continue with the next step.

6. Select the concurrent maintenance option. This option fills in the disk drive location on the concurrent maintenance display. Go to step 9 on page 92.

7. Select **Device Concurrent Maintenance** from the Hardware Service Manager display. Press Enter. The Device Concurrent Maintenance display is shown, as shown in the following figure.

```
                  Device Concurrent Maintenance

Type the choices, then press Enter.

Specify either physical location or resource name.
     Physical location:
U787A.001.1234567-P3-D4
           or
     Device resource name:

Specify action as 1=Remove device  2=Install device
     Action to be performed . . . . . . . .: 1

Enter a time value between 00 and 19.
     Time delay needed in minutes . . . . .: 01

F3=Exit     F5=Refresh     F12=Cancel
```
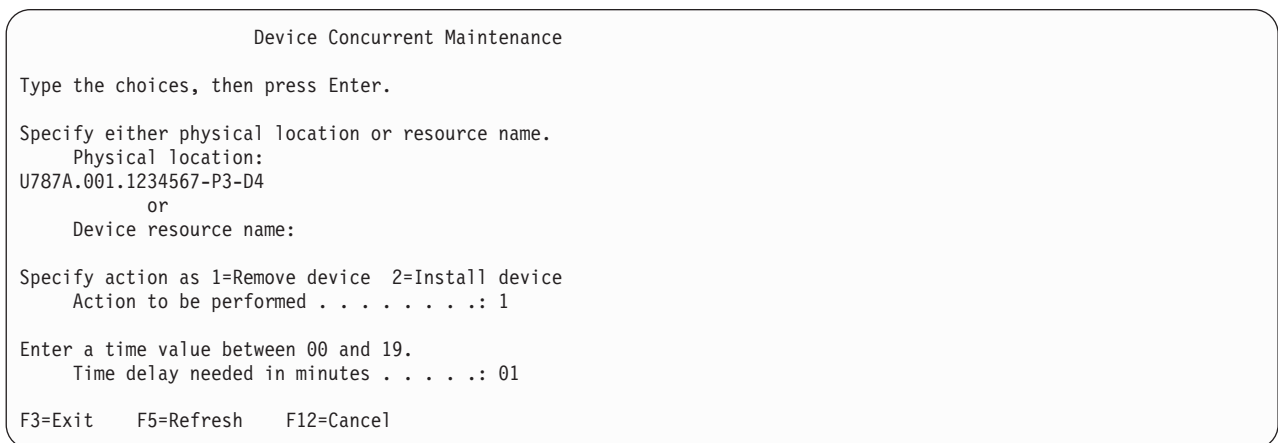
Figure 78. Example Device Concurrent Maintenance display

8. If the physical location does not appear in the Device Concurrent Maintenance display, type the physical location where you are replacing the disk drive as shown in the preceding example, Figure 78.

The physical location has the following form: U787A.001.*AAAXXXX*-P3-D4 where P3-D4 is the position of the disk drive in the system unit or expansion unit. You can get the U787A.001.*AAAXXXX* location information from the control panel display on the system unit or expansion unit.

If you cannot get the information from the control panel, find the feature code (FC) and sequence number (SN or SEQ) on the label that appears on the front of the system unit or expansion unit as shown in the following figure.

Figure 79. Example system or expansion unit label

In this example, U787A.001.AAAXXXX-P3-D4, U787A.001 comes from the feature code (FC) on the label, AAAXXXX comes from the last seven digits of the sequence number (SN or SEQ) on the label, and P3–D4 is the slot where you are replacing the disk drive as shown in "Disk drive locations and concurrent maintenance lights" on page 125.

In the example, U5074.001.*AAAXXXX*-DB3-D32, you would replace a disk drive in the expansion unit with type 5074, model 001, sequence number *AAAXXXX*, and disk drive position DB3–D32.

9. Select option **1** (Remove device) for the **Action to be performed**.
10. Set the time delay for one minute: 01.

   Important: Do not press Enter at this time.
11. Locate the concurrent maintenance light that corresponds to the position of the disk drive that you are replacing. To view the locations of the concurrent maintenance lights, select the appropriate model from the following list:
   - "Disk drive locations and concurrent maintenance lights for the 5786, 5787, 7031-D24, and 7031-T24 SCSI disk-drive enclosures" on page 133

   Important: When you press Enter, after a 1-minute delay, this light comes on and begins to flash rapidly. You then have nine seconds to remove the disk drive.
12. Press Enter on the console.
   Attention:
   - Attach a wrist strap to an unpainted surface of your hardware to prevent electrostatic discharge (ESD) from damaging your hardware.
   - When using a wrist strap, follow all electrical safety procedures. A wrist strap is 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 a wrist strap, just prior to removing the product from ESD packaging and installing or replacing hardware, touch an unpainted surface of the system for a minimum of 5 seconds.
13. When the concurrent maintenance light starts blinking, squeeze and pull the handle of the disk drive out toward you before you remove the disk drive, as shown in the following figure. If the handle is not all the way out, the disk drive cannot slide out of the system or expansion unit.
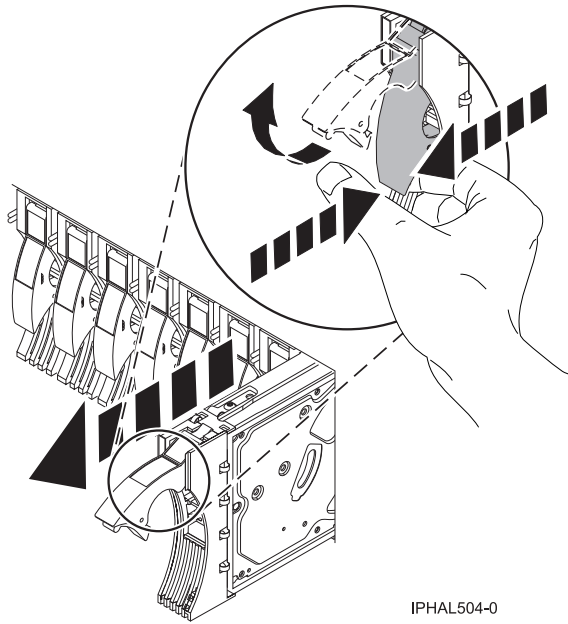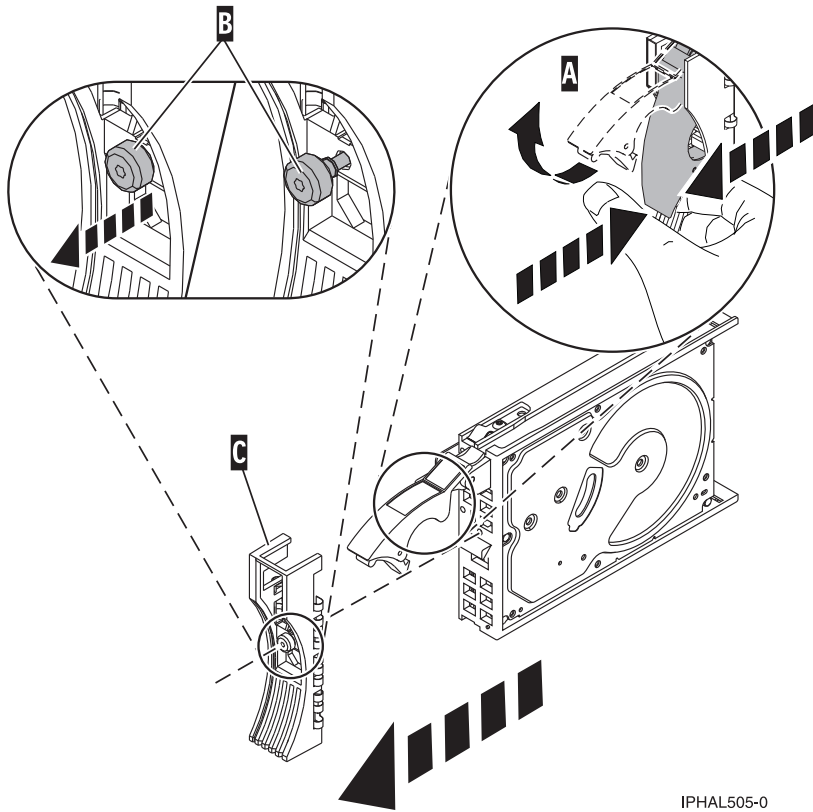
Figure 80. Removing a disk drive

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

    Note: The concurrent maintenance light will stop blinking and remain off when the disk drive is removed.

15. Loosen and pull out on the thumbscrew **B** to release the disk-drive bezel **C** from the disk drive, as shown in the following figure.

    Important: If the disk drive bezel does not have a thumbscrew it is not removable and is a SAS disk drive. The replacement drive should come with an attached bezel.

Figure 81. Removing a disk-drive bezel

Replace the disk drive

1. Return to the console and wait until the Concurrent Maintenance Results display is shown.

   Press F12.

2. The physical locations you entered in step 8 on page 91 of this procedure might still appear on the display. If not, retype the physical location where you will be installing the new disk drive.

   In the example, `U787A.001.1234567-P3-D4`, you would install a disk drive in the system unit with type 9406, Model 520, sequence number 1234567, and disk drive position P3–D4.

   In the example, `U5074.001.1234567-DB3-D32`, you would install a disk drive in the expansion unit with type 5074, model 001, sequence number 1234567, and disk drive position DB3–D32.

3. Select option **2** (Install device) for the Action to be performed.

4. Set the time delay for one minute:01.

   Important: Do not press Enter at this time.

5. Locate the concurrent maintenance light that corresponds to the position of the disk drive that you are replacing.

   Important: When you press Enter, after a one minute delay, this light comes on and begins to blink rapidly. You then have nine seconds to slide the disk drive all the way in and then lock it in place by pushing in the disk drive handle.

6. Find the package that contains the new disk drive.

   Attention: Disk drives are fragile. Handle with care.

7. Remove the disk drive from its protective package.

8. Unlock the disk drive handle by squeezing and pulling it out toward you before you install the disk drive. If the handle is not all the way out, the disk drive can not slide into the system or expansion unit.

9. Follow these steps to install the disk-drive bezel on the replacement disk drive:

   a. Attach the bezel **A** to the disk drive, as shown in the following figure.

   b. Press in and then tighten the thumbscrew **B** to secure the bezel to the disk drive.

IPHAL502-2

Figure 82. Installing a disk-drive bezel

10. Support the bottom of the disk drive as you align it with the guide rails in the system or expansion unit. Do not hold the disk drive by the handle.

11. Slide the disk drive halfway into the system or expansion unit.

12. Press Enter on the console.

13. When the light starts blinking, slide the disk drive all the way in. Then, lock the disk drive in place by pushing in the disk drive handle, as shown in the following figure.

    Note: The light stops blinking and remains on when you have installed the disk drive properly.
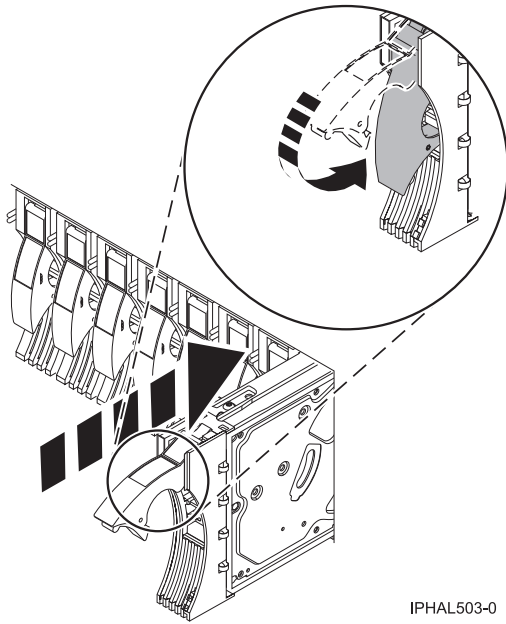
Figure 83. Installing a disk drive

Complete the procedure

1. Replace the front cover.
2. Install or close the system, expansion unit or rack front door.
3. Return to the console and wait until the Concurrent Maintenance Results display is shown. Press Enter.
4. If you return to the Service Action Log display, exit the service action log.
5. When the Hardware Service Manager display is shown, press F3.
6. To complete this procedure, go to "Rebuilding data on a replacement disk drive using IBM i" on page 47.

Related concepts

Removing and replacing covers and doors
Use these procedures to remove and replace the covers on IBM Power Systems servers that contain the POWER7 processor.

Related reference

"Removing and replacing the expansion unit cover or door" on page 205
You might need to remove, replace, or install covers or doors on an expansion unit as a part of accessing components or performing a service action.

Replacing a disk drive using hot spare in an IBM i system or logical partition

You can use the hot spare function to replace a disk drive in a system or expansion unit while the IBM i operating system or logical partition that controls the disk drive location is powered on. Use the procedure in this section to perform this task.

DANGER

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

Electrical voltage and current from power, telephone, and communication cables are hazardous. To avoid a shock hazard:
- Connect power to this unit only with the 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.
- Connect all power cords to a properly wired and grounded electrical outlet. Ensure that the outlet supplies proper voltage and phase rotation according to the system rating plate.
- Connect any equipment that will be attached to this product to properly wired outlets.
- When possible, use one hand only to connect or disconnect signal cables.
- Never turn on any equipment when there is evidence of fire, water, or structural damage.
- Disconnect the attached power cords, telecommunications systems, networks, and modems before you open the device covers, unless instructed otherwise in the installation and configuration procedures.
- Connect and disconnect cables as described in the following procedures when installing, moving, or opening covers on this product or attached devices.

    To Disconnect:
    1. Turn off everything (unless instructed otherwise).
    2. Remove the power cords from the outlets.
    3. Remove the signal cables from the connectors.
    4. Remove all cables from the devices

    To Connect:
    1. Turn off everything (unless instructed otherwise).
    2. Attach all cables to the devices.
    3. Attach the signal cables to the connectors.
    4. Attach the power cords to the outlets.
    5. Turn on the devices.

    (D005)

Note: Some of the figures in these procedures might not look exactly like the system or expansion unit

that you have. However, the steps to perform the task are the same.

Prepare the system

1. Perform prerequisite tasks as described in "Before you begin" on page 189.
2. Remove the front cover and door, if you need to, to access the disk drives. For instructions on removing the cover, see "System covers" on page 207.
3. Locate the disk drive to be replaced and record the location information, then use the location information to activate the identify light for that disk drive. For instructions, see "Identifying a failing part in an IBM i system or logical partition" on page 195

Remove the disk drive

1. If you are removing a solid state device located on a PCIe RAID and SSD SAS adapter, go to Removing and replacing the PCIe RAID and SSD SAS adapterRemoving and replacing the PCIe RAID and SSD SAS adapter and complete that procedure, then return here and perform the following steps.
2. Type strsst on the command line of the IBM i session and press Enter.
3. Type your service tools user ID and service tools password on the **Start Service Tools (STRSST)** Sign On display, and press Enter.
4. Select **Work with disk units** from the System Service Tools display, press Enter.
5. Select **Display Disk Configuration** from the Work with Disk Units display, and press Enter.
6. Select **Display non-configured units** from the Display Disk Configuration display, and press Enter.
7. Is the failed drive a non-configured unit?
   - No: Go to "Replacing a disk drive with the IBM i system or logical partition powered on" on page 89.
   - Yes: Determine if the disk drive to be removed was replaced by a hot spare when it failed. A xxxx9031 error logged close to the same time of the original disk failure indicates the automatic Rebuild of the data to a hot spare device, then go on to the next step.
8. Is the disk drive to be removed controlled by the load source adapter?
   - No: Go to step 11.
   - Yes: Go to the next step.
9. Is the disk drive to be removed located in a valid load source position?
   - No: Go to "Configuring a disk drive on a load source adapter for hot spare using the IBM i operating system" on page 145.
   - Yes: Go to step 11.
10. Choose the concurrent maintenance option. This option fills in the disk drive location on the concurrent maintenance display. Go to step 13 on page 99.
11. Select **Device Concurrent Maintenance** from the Hardware Service Manager display. Press Enter. The Device Concurrent Maintenance display is shown, as shown in the following figure.

```
                    Device Concurrent Maintenance

Type the choices, then press Enter.


Specify either physical location or resource name.
     Physical location:
U787A.001.1234567-P3-D4
            or
     Device resource name:


Specify action as 1=Remove device  2=Install device
     Action to be performed . . . . . . . .: 1


Enter a time value between 00 and 19.
     Time delay needed in minutes . . . . .: 01


F3=Exit    F5=Refresh    F12=Cancel
```
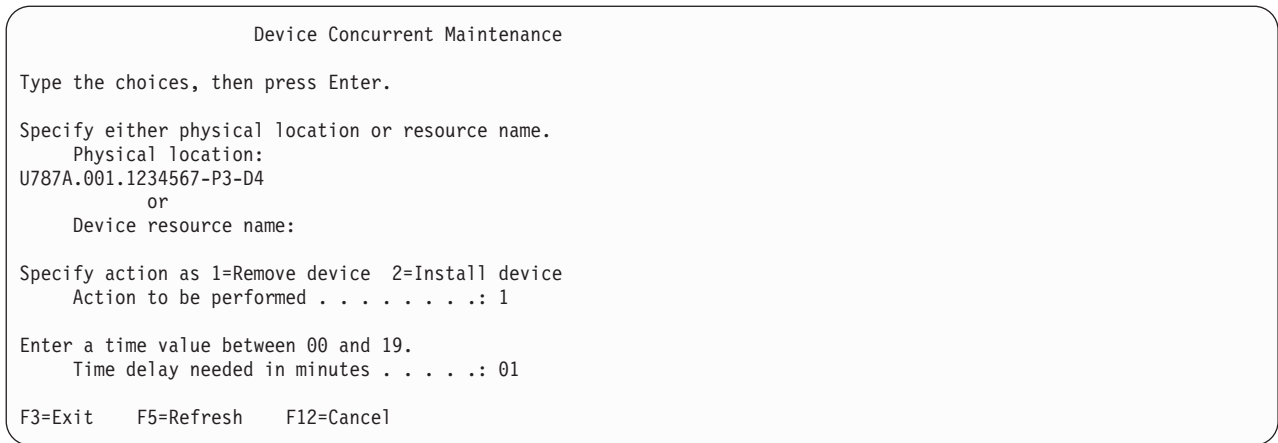
Figure 84. Example Device Concurrent Maintenance display

12. If the physical location does not appear in the Device Concurrent Maintenance display, type the physical location where you will be replacing the disk drive as shown in the preceding example, Figure 84.

    The physical location has the following form: U787A.001.*AAAXXXX*-P3-D4 where P3-D4 is the position of the disk drive in the system unit or expansion unit. You can get the U787A.001.*AAAXXXX* location information from the control panel display on the system unit or expansion unit.

    If you cannot get the information from the control panel, find the feature code (FC) and sequence number (SN or SEQ) on the label that appears on the front of the system unit or expansion unit as shown in the following figure.

```
PN: 97P4957
‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖       FC:  787A-001
SN: 00AAAXXXX
‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖
                                        IPHAL552-0
```

Figure 85. Example system or expansion unit label

In this example, U787A.001.AAAXXXX-P3-D4, U787A.001 comes from the feature code (FC) on the label, AAAXXXX comes from the last seven digits of the sequence number (SN or SEQ) on the label, and P3–D4 is the slot where you are replacing the disk drive as shown in "Disk drive locations and concurrent maintenance lights" on page 125.

In the example, U5074.001.*AAAXXXX*-DB3-D32, you would replace a disk drive in the expansion unit with type 5074, model 001, sequence number *AAAXXXX*, and disk drive position DB3–D32.

13. Select option **1** (Remove device) for the **Action to be performed**.

14. Set the time delay for one minute: 01.

    Important: Do not press Enter at this time.

15. Locate the concurrent maintenance light that corresponds to the position of the disk drive that you are replacing. To view the locations of the concurrent maintenance lights, select the appropriate model from the following list:

    • "Disk drive locations and concurrent maintenance lights for the 5786, 5787, 7031-D24, and 7031-T24 SCSI disk-drive enclosures" on page 133

    Important: When you press Enter, after a one minute delay, this light comes on and begins to blink rapidly. You then have nine seconds to remove the disk drive.

16. Press Enter on the console.

    Attention:

    - Attach a wrist strap to an unpainted surface of your hardware to prevent electrostatic discharge (ESD) from damaging your hardware.
    - When using a wrist strap, follow all electrical safety procedures. A wrist strap is 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 a wrist strap, just prior to removing the product from ESD packaging and installing or replacing hardware, touch an unpainted surface of the system for a minimum of 5 seconds.

17. When the concurrent maintenance light starts blinking, squeeze and pull the handle of the disk drive out toward you before you remove the disk drive, as shown in the following figure. If the handle is not all the way out, the disk drive cannot slide out of the system or expansion unit.

IPHAL504-0
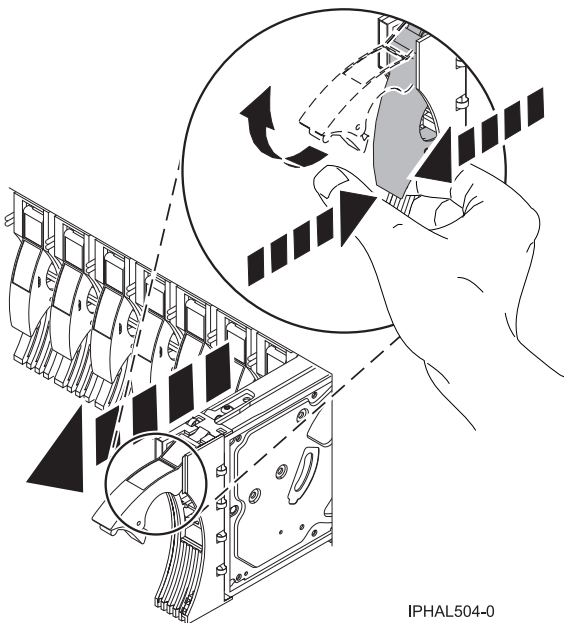
Figure 86. Removing a disk drive
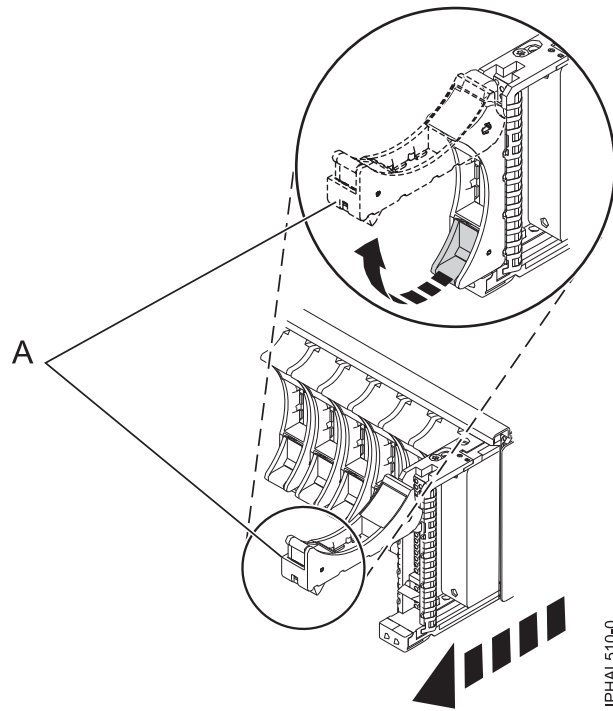
Figure 87. Removing a small-form factor disk drive from the 5803 expansion unit

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

    Note: The concurrent maintenance light will stop blinking and remain off when the disk drive is removed.

19. Loosen and pull out on the thumbscrew **B** to release the disk-drive bezel **C** from the disk drive, as shown in the following figure.

    Important: If the disk drive bezel does not have a thumbscrew it is not removable and is a SAS disk drive. The replacement drive should come with an attached bezel.

Figure 88. Removing a disk-drive bezel

Replace the disk drive

1. Return to the console and wait until the Concurrent Maintenance Results display is shown.
   Press F12.
2. The physical locations you entered in step 12 on page 99 of this procedure might still appear on the display. If not, retype the physical location where you will be installing the new disk drive.

   In the example, `U787A.001.1234567-P3-D4`, you would install a disk drive in the system unit with type 9406, Model 520, sequence number 1234567, and disk drive position P3–D4.

   In the example, `U5074.001.1234567-DB3-D32`, you would install a disk drive in the expansion unit with type 5074, model 001, sequence number 1234567, and disk drive position DB3–D32.
3. Select option **2** (Install device) for the Action to be performed.
4. Set the time delay for one minute:01.

   Important: Do not press Enter at this time.
5. Locate the concurrent maintenance light that corresponds to the position of the disk drive that you are replacing.

   Important: When you press Enter, after a one minute delay, this light comes on and begins to blink rapidly. You then have nine seconds to slide the disk drive all the way in and then lock it in place by pushing in the disk drive handle.
6. Find the package that contains the new disk drive.

   Attention: Disk drives are fragile. Handle with care.
7. Remove the disk drive from its protective package.

8. Unlock the disk drive handle by squeezing and pulling it out toward you before you install the disk drive. If the handle is not all the way out, the disk drive can not slide into the system or expansion unit.
9. Follow these steps to install the disk-drive bezel on the replacement disk drive:
   a. Attach the bezel **A** to the disk drive, as shown in the following figure.
   b. Press in and then tighten the thumbscrew **B** to secure the bezel to the disk drive.

IPHAL502-2

Figure 89. Installing a disk-drive bezel

10. Support the bottom of the disk drive as you align it with the guide rails in the system or expansion unit. Do not hold the disk drive by the handle.
11. Slide the disk drive halfway into the system or expansion unit.
12. Press Enter on the console.
13. When the light starts blinking, slide the disk drive all the way in. Then, lock the disk drive in place by pushing in the disk drive handle, as shown in the following figure.

   Note: The light stops blinking and remains on when you have installed the disk drive properly.
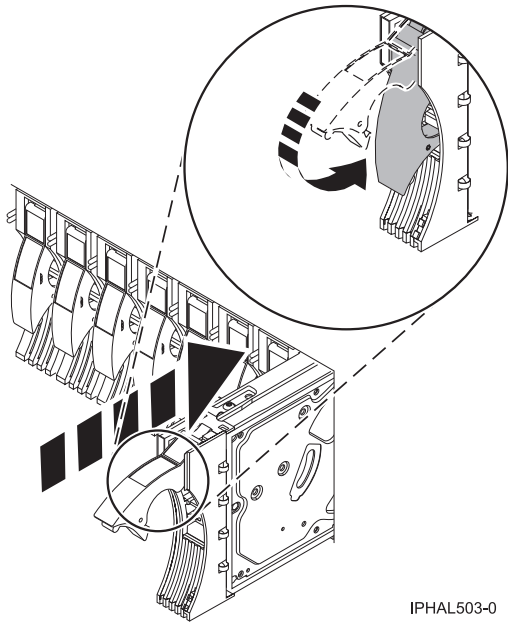
Figure 90. Installing a disk drive
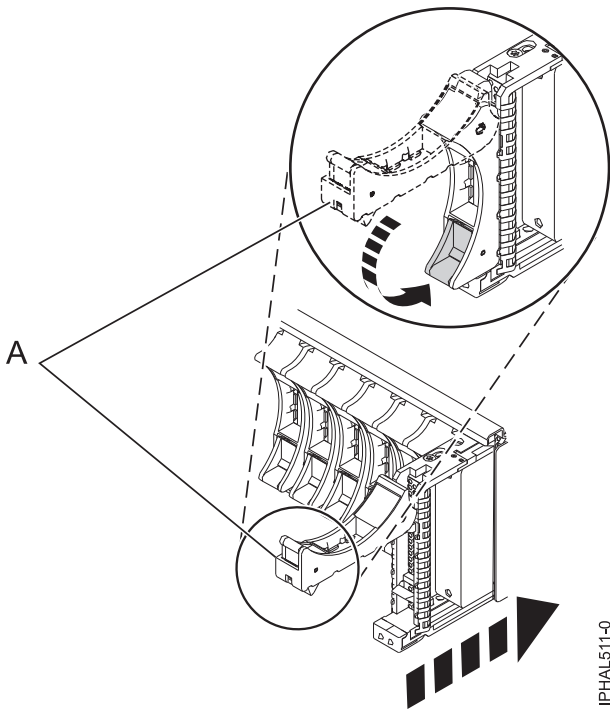
Figure 91. Installing a small-form factor disk drive in the 5803 expansion unit

Perform the procedure

1. Replace the front cover.
2. Install or close the system, expansion unit or rack front door.
3. Return to the console and wait until the Concurrent Maintenance Results display is shown, and press Enter if you used the concurrent maintenance process above, otherwise continue with the next step.

4. If you return to the Hardware Service Manager (HSM), exit the HSM.
5. Select **Work with disk units** from the Start System Service Tools display.
6. Select **Non-configured disk units** from the Work with Disk Units display, and press Enter.
7. Is the new disk unit displayed with a status of non-configured?

    Note: It may take several minutes for the new disk drive to display.
    - No: Contact your next level of support.
    - Yes: Continue with the next step.
8. Press **F3** to return to the Work with Disk Units display.
9. Select **Work with disk unit recovery** from the Work with Disk Units display, and press Enter.
10. Select **Disk unit problem recovery procedure**, and press Enter.
11. Select **Initialize and format disk unit**, and press Enter.
12. Select the new disk and press Enter.

    Note: This will take several minutes to complete.
13. When the disk drive is initialized and formatted, press **F3** to return to the Work with Disk Units display.
14. Select **Start hot spare**, and press Enter.
15. Select the IOA with the new disk, then press Enter and press Enter again.
16. Does the new hot spare disk drive have a smaller capacity than previous hot spare disk drive? Refer to the resource name identified in the xxxx9031 error which was logged close to the same time of the original disk failure.
    - No: The procedure is complete. Press F3 to return to the System service tools display.
    - Yes: Go to the next step.
17. Select **Display Device Parity Status**, and press Enter. If the new disk drive is not active and hot spare protected, do not continue. Call your next level of support.

    Restriction: You must complete the following steps to ensure your data is protected. The following steps will allow you to exchange the two disk drives so that the larger disk drive will become the hot spare, and the smaller disk drive will become a parity set member.
18. Fail the previous hot spare disk drive by unlocking the disk drive handle by squeezing it and pulling it out toward you.
19. Pull the drive out about one inch and wait ten seconds.
20. Push the disk drive back into the slot and close the handle.
21. Return to step 3 on page 104 and start hot spare on the larger drive.

Related concepts

Removing and replacing covers and doors
Use these procedures to remove and replace the covers on IBM Power Systems servers that contain the POWER7 processor.

Related reference

"Removing and replacing the expansion unit cover or door" on page 205
You might need to remove, replace, or install covers or doors on an expansion unit as a part of accessing components or performing a service action.

Replacing a disk drive with the system or logical partition powered off

You might need to install a Small Computer System Interface (SCSI) or serial-attached SCSI (SAS) disk drive in a system or logical partition that controls the disk drive location with the power off. Use the procedure in this section to perform this task.

Attention: If you are installing a new or upgraded disk drive, see "Installing a disk drive or solid-state drive with the system or logical partition power turned off" on page 49. If you are removing a disk drive as part of a service procedure, continue to use the following procedure.

DANGER

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

Electrical voltage and current from power, telephone, and communication cables are hazardous. To avoid a shock hazard:
- Connect power to this unit only with the 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.
- Connect all power cords to a properly wired and grounded electrical outlet. Ensure that the outlet supplies proper voltage and phase rotation according to the system rating plate.
- Connect any equipment that will be attached to this product to properly wired outlets.
- When possible, use one hand only to connect or disconnect signal cables.
- Never turn on any equipment when there is evidence of fire, water, or structural damage.
- Disconnect the attached power cords, telecommunications systems, networks, and modems before you open the device covers, unless instructed otherwise in the installation and configuration procedures.
- Connect and disconnect cables as described in the following procedures when installing, moving, or opening covers on this product or attached devices.

To Disconnect:
1. Turn off everything (unless instructed otherwise).
2. Remove the power cords from the outlets.
3. Remove the signal cables from the connectors.
4. Remove all cables from the devices

To Connect:
1. Turn off everything (unless instructed otherwise).
2. Attach all cables to the devices.
3. Attach the signal cables to the connectors.
4. Attach the power cords to the outlets.
5. Turn on the devices.

(D005)

Prepare the system

1. Perform prerequisite tasks as described in "Before you begin" on page 189.

2. If you cannot start the system or logical partition that controls the disk drive location, or if the system or logical partition are not powered on, go to step 6 on page 108.

3. Identify the disk drive to be replaced and record the location information. For information, see "Identifying a failing part" on page 193.

4. Prepare to remove the disk drive from the system or expansion unit as follows:
   - If the system or logical partition that controls the disk drive location is running AIX, follow the steps in "Preparing to remove a disk drive from a system or expansion unit controlled by AIX" on page 137.
   - If the system or logical partition that controls the disk drive location is running IBM i, follow the steps in "Preparing to remove a disk drive from a system or logical partition controlled by IBM i" on page 61.

- If the system or logical partition that controls the disk drive location is running Linux and the disk drive you want to replace is unprotected or in use, move the data from the disk drive before continuing with this procedure. For information, see the *PCI-X SCSI RAID Controller Reference Guide for Linux*.

  This guide is available from the SCSI PCI Adapters Web page at http://publib.boulder.ibm.com/infocenter/pseries/v5r3/index.jsp?topic=/com.ibm.pseries.doc/hardware_docs/scsipciadapters.htm.

5. Stop the system or logical partition that controls the disk drive location. For instructions, see "Stopping a system or logical partition" on page 201.

6. If you stopped the logical partition, do not disconnect the power source. If you stopped the system, disconnect the power source from the system by unplugging the system.

   Note: This system might be equipped with a second power supply. Before continuing with this procedure, ensure that all power sources to the system have been completely disconnected.

   (L003)
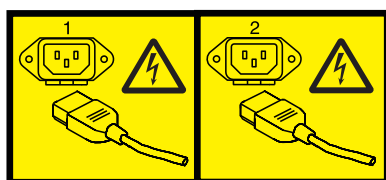
   or
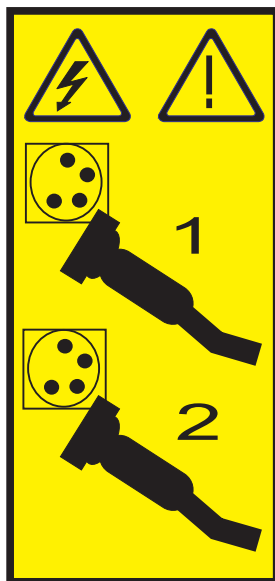
7. Remove the system unit door or expansion unit door or open the rack front door. For instructions, select the appropriate procedure from the following list:
   - "Removing and replacing the expansion unit cover or door" on page 205

8. Remove the front cover.

Remove the disk drive

1. If you are removing a solid state device located on a PCIe RAID and SSD SAS adapter, go to Removing and replacing the PCIe RAID and SSD SAS adapterRemoving and replacing the PCIe RAID and SSD SAS adapter and complete that procedure, then return here and perform the following steps.

2. Unlock the disk drive handle by squeezing it and pulling it out toward you, as shown in Figure 92 on page 109.

Attention:

- Attach a wrist strap to an unpainted surface of your hardware to prevent electrostatic discharge (ESD) from damaging your hardware.
- When using a wrist strap, follow all electrical safety procedures. A wrist strap is 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 a wrist strap, just prior to removing the product from ESD packaging and installing or replacing hardware, touch an unpainted surface of the system for a minimum of 5 seconds.

IPHAL504-0

Figure 92. Removing a disk drive from a model or 7311-D20

Figure 93. Removing a small-form factor disk drive from the 5803 expansion unit

3. Support the bottom of the disk drive as you slide it out of the system or expansion unit. Do not hold the disk drive by the handle.

4. If your replacement disk drive does not have a bezel preinstalled, then perform the following step.

   Loosen and then pull out on the thumbscrew **(B)** to release the disk-drive bezel **(C)** from the disk drive, as shown in the following figure.

   Important: If the disk drive bezel does not have a thumbscrew it is not removable and is a SAS disk drive. The replacement drive should come with an attached bezel.

Figure 94. Removing a disk-drive bezel

Replace the disk drive

1. Find the package that contains the new disk drive.

   Attention: Disk drives are fragile. Handle with care.

2. Remove the disk drive from its protective package.

3. Unlock the disk drive handle by squeezing and pulling it out toward you before you install the disk drive. If the handle is not all the way out, the disk drive will not slide into the system or expansion unit.

4. If your replacement disk drive does not have a bezel preinstalled, then follow these steps to install the disk-drive bezel on the replacement disk drive:

   a. Attach the bezel **(A)** to the disk drive, as shown in the following figure.

   b. Press in and then tighten the thumbscrew **(B)** to secure the bezel to the disk drive.

IPHAL502-2

Figure 95. Attaching a disk-drive bezel

5. Support the bottom of the disk drive as you align it with the guide rails in the system or expansion unit. Do not hold the disk drive by the handle.

6. Slide the disk drive into the system or expansion unit until it stops.

   Note: It is important to ensure that when installing a disk drive, that the drive is fully seated and all the way into the system.

7. Push the disk drive handle in until it locks, as shown in Figure 96 on page 113.
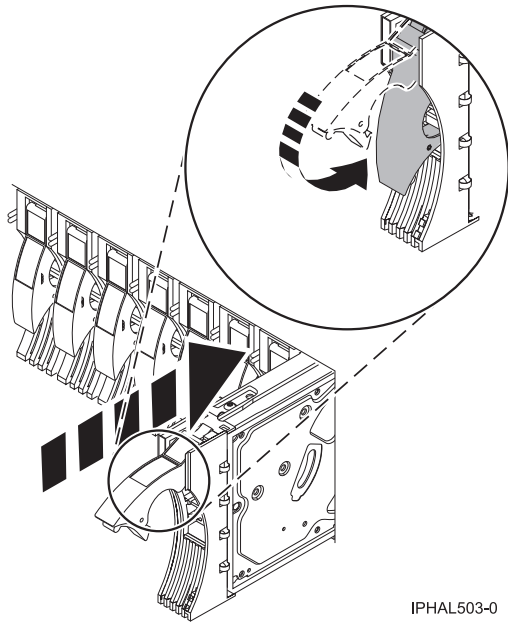
Figure 96. Installing a disk drive in a model or 7311-D20
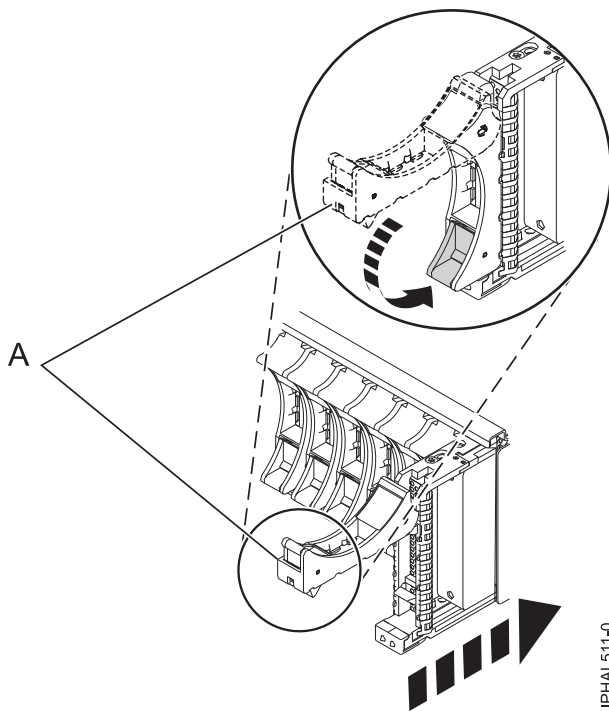
Figure 97. Installing a small-form factor disk drive in the 5803 expansion unit

Complete the procedure

1. Replace the front cover.
2. Install or close the system, expansion unit or rack front door.
3. Reconnect all system power cables.
4. Reconnect the system to the power supply by plugging it in.

5. Start the system or logical partition. For instructions, see "Starting the system or logical partition" on page 199.

6. If the system or logical partition that controls the disk drive you replaced is running AIX, verify that the disk drive is working as described in "Verifying an installed feature or replaced part in an AIX system or logical partition" on page 249. If it is not possible to run online diagnostics, for example if you replaced the root volume group (rootvg) disk drive, use standalone diagnostics as described in "Verifying an installed part by using stand-alone diagnostics" on page 253.

7. To rebuild the data on the replacement disk drive, select the operating system for the system or logical partition that controls the disk drive:
   - "Rebuilding data on a replacement disk drive using AIX" on page 137
   - "Rebuilding data on a replacement disk drive using IBM i" on page 47
   - "Rebuilding data on a replacement disk drive using Linux" on page 137

Related concepts

Removing and replacing covers and doors
Use these procedures to remove and replace the covers on IBM Power Systems servers that contain the POWER7 processor.

Related reference

"Removing and replacing the expansion unit cover or door" on page 205
You might need to remove, replace, or install covers or doors on an expansion unit as a part of accessing components or performing a service action.

Replacing a SCSI disk drive

Learn how to replace a Small Computer System Interface (SCSI) disk drive in a system or expansion unit. Use the procedure in this information to perform this task.

Remove the disk drive

1. Log in as root user.
2. At the command line, type `diag` and press Enter.
3. Press Enter to continue.
4. On the Function Selection display, select **Task Selection**.
5. On the Task Selection display, select **Hot Plug Task**.
6. Select **SCSI and SCSI RAID Hot Plug Manager**.
7. Select **Identify a Device Attached to a SCSI Hot Swap Enclosure Device**.
8. Select the disk drive you want to replace and press Enter.

   The disk drive slot enters the Identify state, indicated by the flashing concurrent maintenance light. To view the locations of the concurrent maintenance lights, go to "Disk drive locations and concurrent maintenance lights" on page 125.

9. Exit to the SCSI and SCSI RAID Hot Plug Manager display.
10. On the SCSI and SCSI RAID Hot Plug Manager display, select **Replace/Remove a Device Attached to a SCSI Hot Swap Enclosure Device**. A list of all slots from which you can remove a disk drive is shown.
11. Select the slot that contains the disk drive you want to remove. The disk drive slot enters the Remove state and power is removed from the slot. The concurrent maintenance light for the slot begins flashing rapidly.
12. Unlock the disk drive. Unlock the disk drive handle by squeezing it and pulling it out toward you as shown in the following figures.
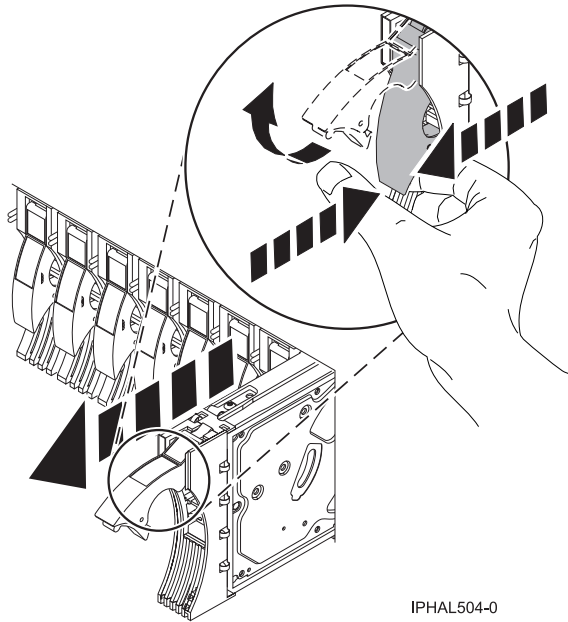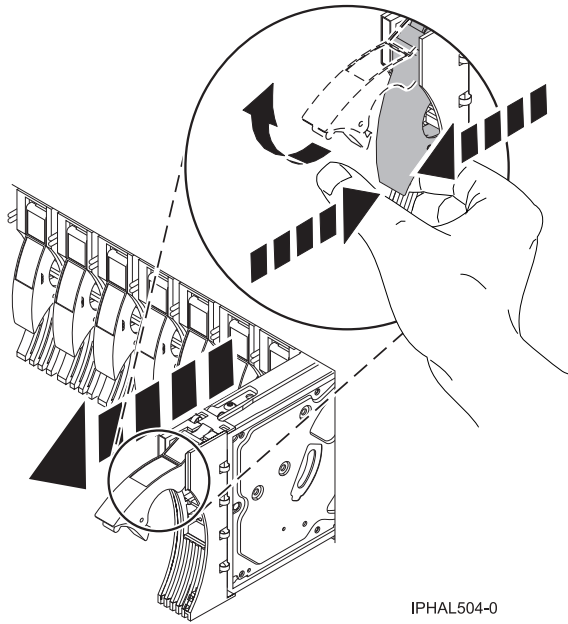
Figure 98. Removing a disk drive from a model or 7311-D20

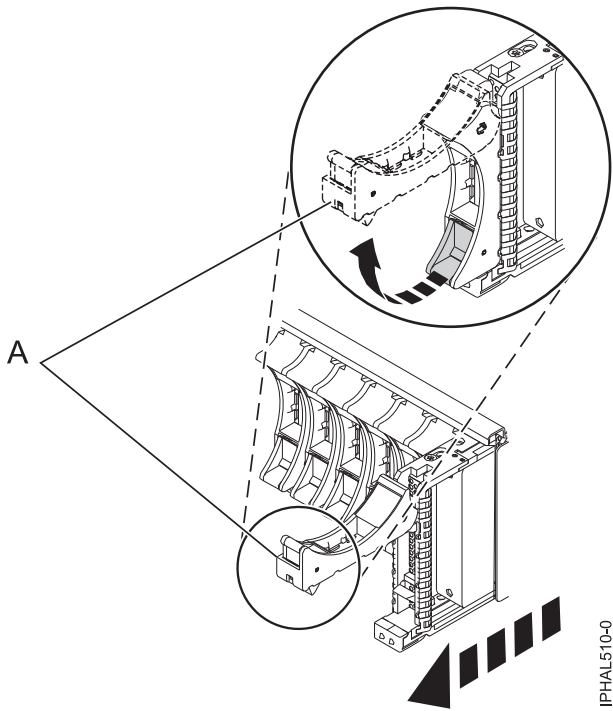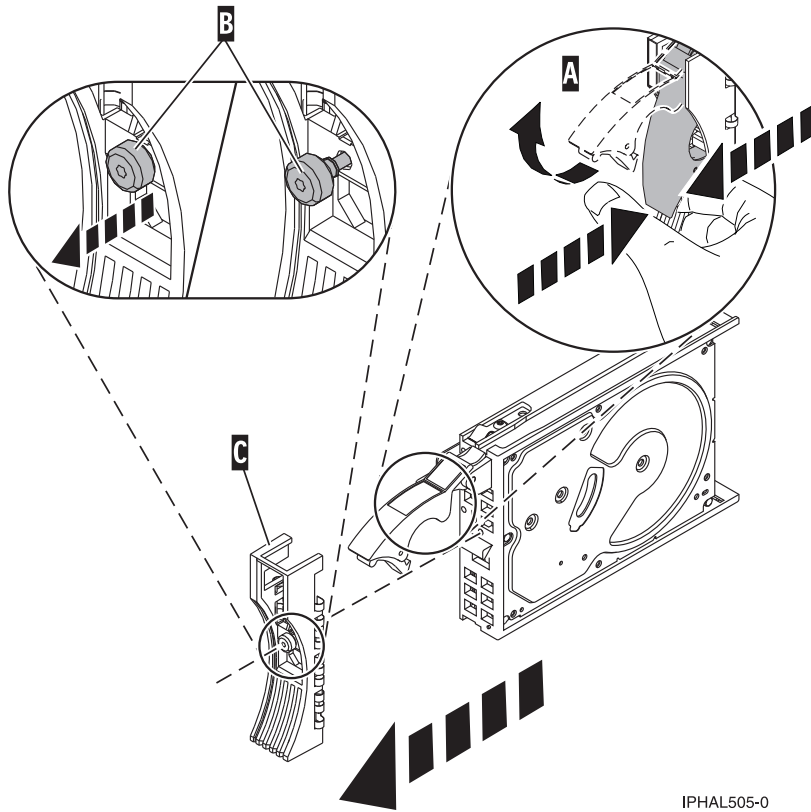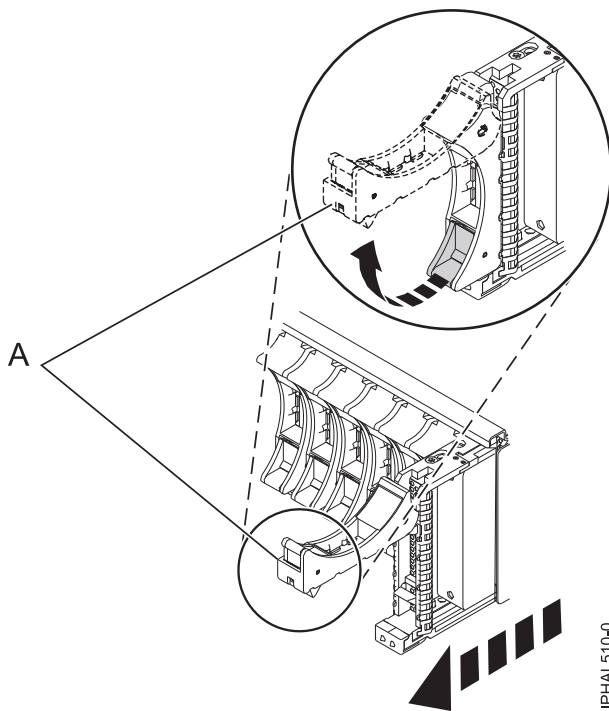*Figure 99. Removing a small-form factor disk drive from the 5803 expansion unit*

13. Support the bottom of the disk drive as you slide it out of the system or expansion unit. Do not hold the disk drive by the handle.

    Note: The concurrent maintenance light for the slot turns off when you remove the disk drive.

14. Loosen and pull out on the thumbscrew **B** to release the bezel **C** from the disk drive.
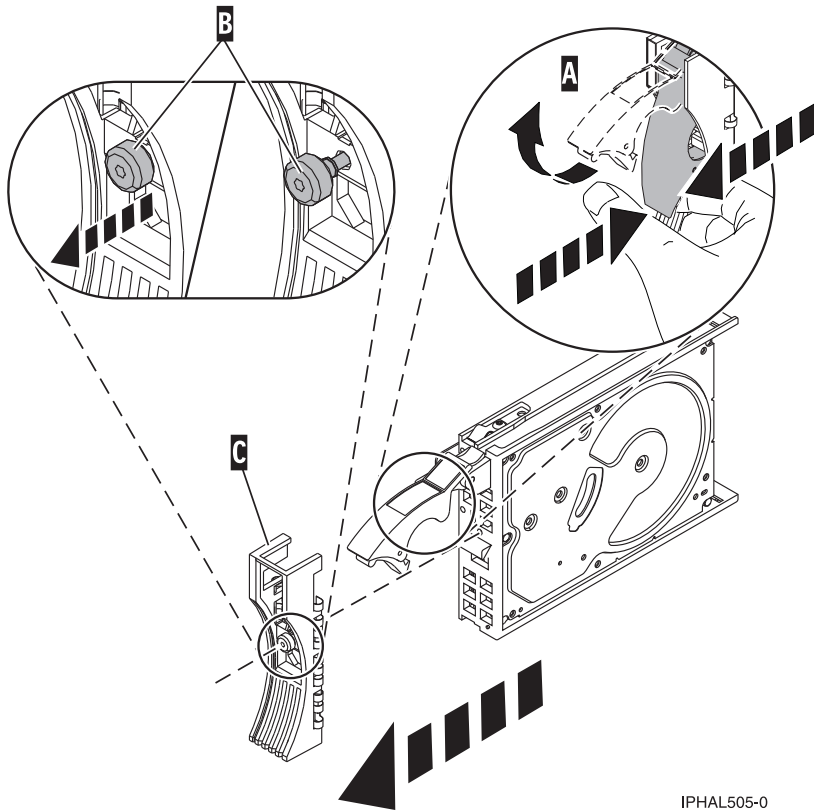
Figure 100. Removing a disk-drive bezel

Replace the disk drive

1. Find the package that contains the new disk drive.

   Attention: Disk drives are fragile. Handle with care.
2. Remove the disk drive from its protective package.
3. Unlock the handle of the replacement disk drive by squeezing and pulling it out toward you. If the handle is not all the way out, the disk drive cannot slide into the system.
4. Attach disk-drive bezel **A** to the replacement disk drive, as shown in the following figure.

IPHAL502-2

Figure 101. Attaching a disk-drive bezel

5. Press in and then tighten thumbscrew **B** to secure bezel **A** to the disk drive.
6. Install the disk drive as follows:
   a. Support the bottom of the disk drive as you align it with the guide rails in the system unit. Do not hold the disk drive by the handle.
   b. Slide the disk drive into the system until it stops.

      Note: It is important to ensure that when installing a disk drive, that the drive is fully seated and all the way into the system.
   c. Push the disk drive handle in until it locks, as shown in Figure 102 on page 118.
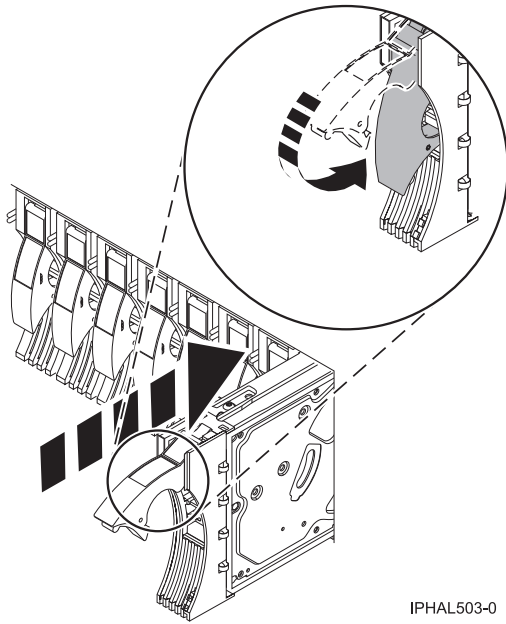
Figure 102. Installing a disk drive in a model a model or 7311-D20
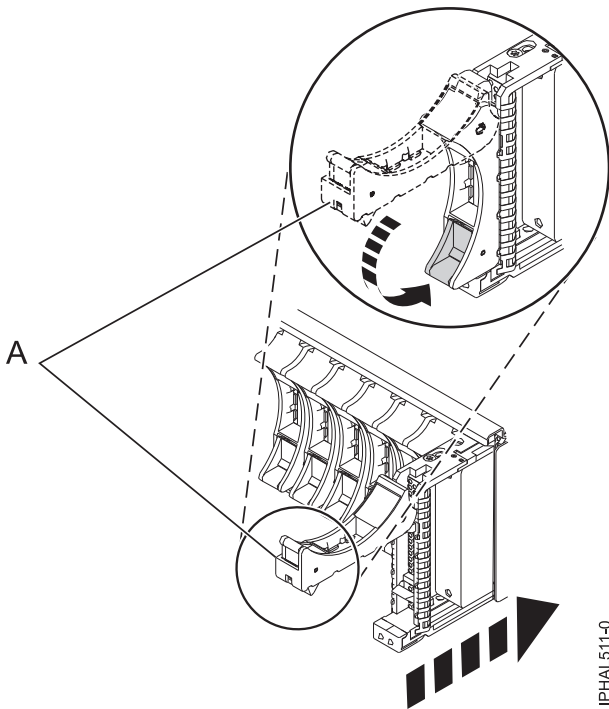
Figure 103. Installing a small-form factor disk drive in the 5803 expansion unit

7. Press Enter.
8. Exit to the SCSI and SCSI RAID Hot-Plug Manager menu.
9. Select **Configure Added/Replaced Devices**. Press Enter.
10. Select the disk drive that you replaced and then press Enter.
    The disk drive is now configured.
11. Exit to the Task Selection display.

12. Select **Log Repair Action**.
13. Select the disk drive that you replaced and then press Enter.
14. Select **Commit** after you have made your selection and then press Enter.
15. Exit to the command line.

Perform the procedure

1. Replace the front cover.
2. Install or close the system, expansion unit, or rack front door.
3. Verify that the disk drive is working. For instructions, see "Verifying an installed feature or replaced part in an AIX system or logical partition" on page 249. If it is not possible to run online AIX diagnostics, for example if you replaced the root volume group (rootvg) disk drive, use stand-alone diagnostics as described in "Verifying an installed part by using stand-alone diagnostics" on page 253.
4. To prepare the disk drive for use, go to "Rebuilding data on a replacement disk drive using AIX" on page 137.

Related concepts

Removing and replacing covers and doors
Use these procedures to remove and replace the covers on IBM Power Systems servers that contain the POWER7 processor.

Related reference

"Removing and replacing the expansion unit cover or door" on page 205
You might need to remove, replace, or install covers or doors on an expansion unit as a part of accessing components or performing a service action.

Removing or installing a disk-drive filler

You might need to remove or install a Small Computer System Interface (SCSI) disk-drive filler in the server or expansion unit. This section includes procedures so that you can perform these tasks.

Note: Refill the disk drive slots with either another disk drive or a disk-drive filler. Filling the disk drive slot will help ensure proper air flow for cooling and help maintain optimal EMI compliance.

Removing a disk-drive filler

Learn how to remove a disk-drive filler from the server or expansion unit. Use the procedure in this information to perform this task.

Note: Some of the figures in this procedure might not look exactly like the system or expansion unit that you have. However, the steps to perform the task are the same.

1. Remove the system unit door, expansion unit door, or open the rack front door. For instructions, see "Removing and replacing the expansion unit cover or door" on page 205.
2. Remove the front cover. For instructions on removing the cover, see "System covers" on page 207. If you have a front cover from any other models, remove the front cover.
3. Identify the disk-drive filler you want to remove.
4. Pull the disk-drive filler from the slot. Pull the disk-drive filler from the slot that you want to use, as shown in Figure 104 on page 122 and Figure 105 on page 122.

   Attention:

   - Attach a wrist strap to an unpainted surface of your hardware to prevent electrostatic discharge (ESD) from damaging your hardware.
   - When using a wrist strap, follow all electrical safety procedures. A wrist strap is 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 a wrist strap, just prior to removing the product from ESD packaging and installing or replacing hardware, touch an unpainted surface of the system for a minimum of 5 seconds.
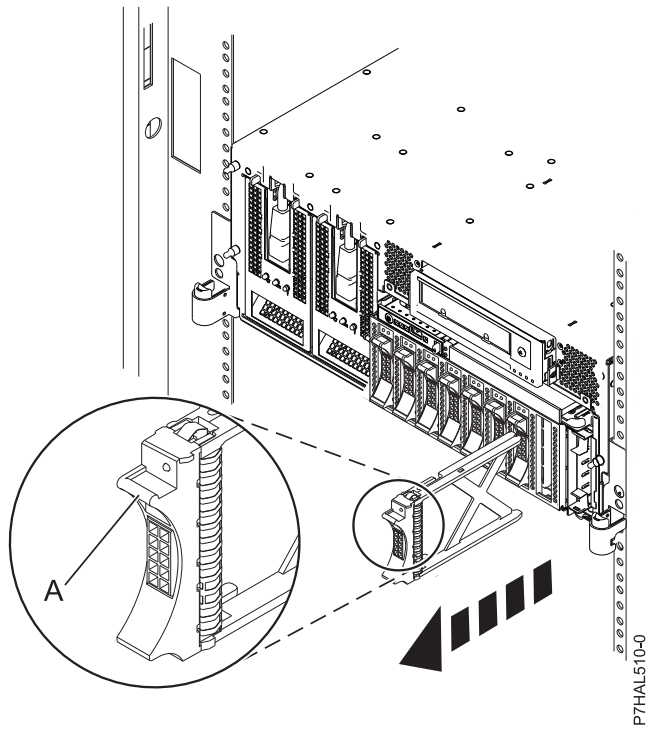
Figure 104. Removing a disk-drive filler from model 8233-E8B or 8236-E8C
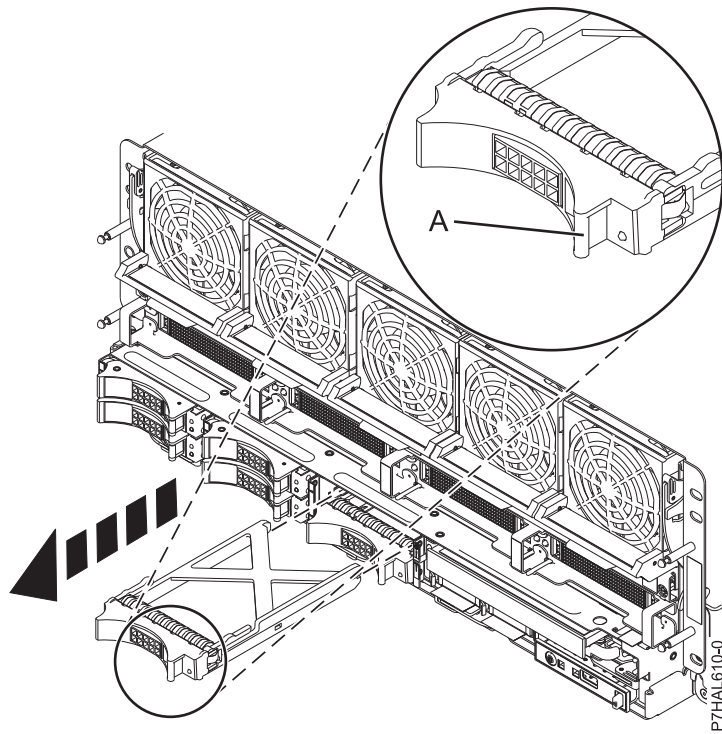
Figure 105. Removing a disk-drive filler from model 9117-MMB or 9179-MHB

Installing a disk-drive filler

You might need to install a disk-drive filler in the server or expansion unit. Use the procedure in this section to perform this task.

Note: Some of the figures in this procedure might not look exactly like the system or expansion unit that you have. However, the steps to perform the task are the same.

1. Remove the system unit door, expansion unit door, or open the rack front door. For instructions, see "Removing and replacing the expansion unit cover or door" on page 205.
2. Remove the front cover. For instructions on removing the cover, see "System covers" on page 207. If you have a front cover from any other models, remove the front cover.
3. Install the disk-drive filler in the system or expansion unit, as shown in the following figures.
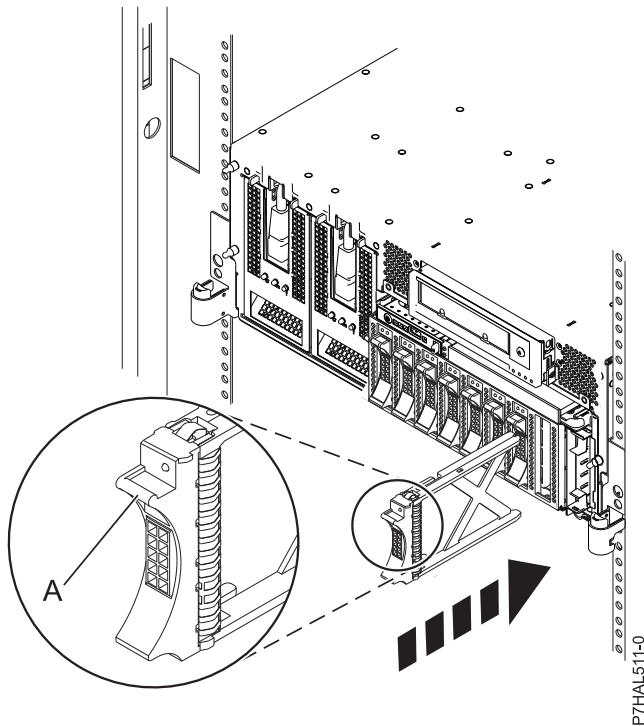
Figure 106. Installing a disk-drive filler for model 8233-E8B or 8236-E8C
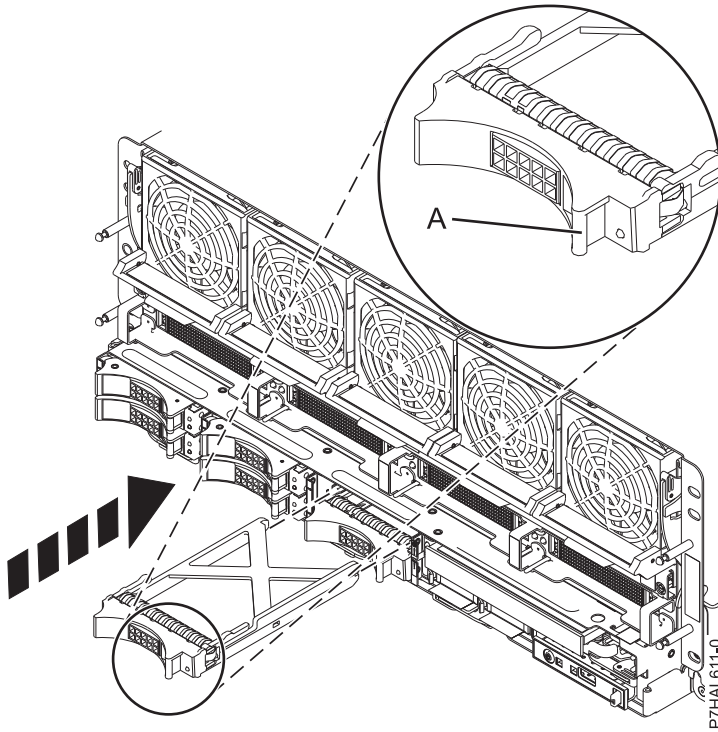
Figure 107. Installing a disk-drive filler for model 9117-MMB or 9179-MHB

4. Replace the front cover.
5. Install or close the system, expansion unit or rack front door.

Related concepts

Removing and replacing covers and doors
Use these procedures to remove and replace the covers on IBM Power Systems servers that contain the
POWER7 processor.

Related reference

"Removing and replacing the expansion unit cover or door" on page 205
You might need to remove, replace, or install covers or doors on an expansion unit as a part of accessing
components or performing a service action.

Disk drive locations and concurrent maintenance lights

Find out where the disk drives and concurrent maintenance lights are located on different models.

Locate your system or expansion unit to find the disk drive locations and where the concurrent maintenance lights are located.

PCIe RAID and SSD SAS adapter locations

Learn about the PCIe RAID and SSD SAS adapter locations and the location of the concurrent maintenance lights on the PCIe RAID and SSD SAS adapter.

The figure Figure 108 shows the PCIe RAID and SSD SAS adapter locations.
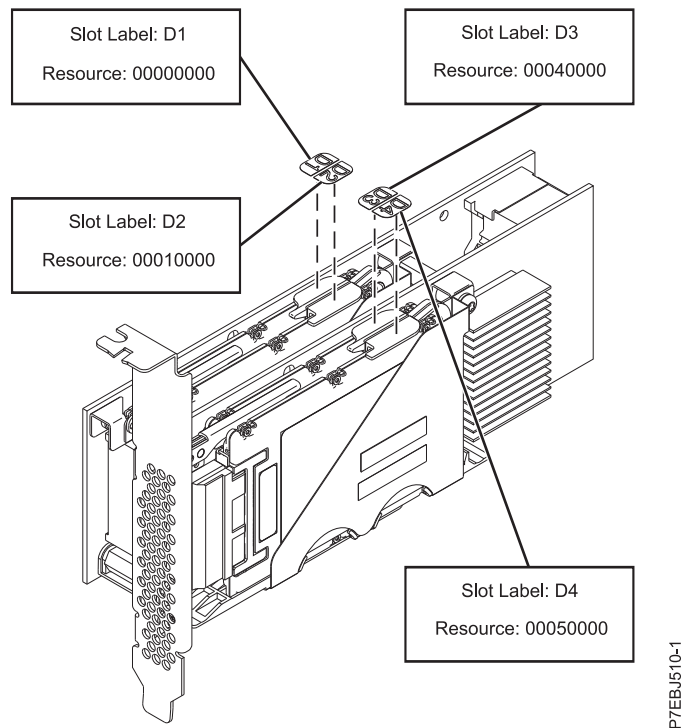
Figure 108. PCIe RAID and SSD SAS adapter locations

Disk drive locations and concurrent maintenance lights for an 8202-E4B or 8205-E6B system

Learn about the disk drive locations and understand where the concurrent maintenance lights are located for your system.

The following figures show the disk drive locations and concurrent maintenance lights for the 8202-E4B or 8205-E6B. Concurrent maintenance lights are located above the latch handle on the disk drives.
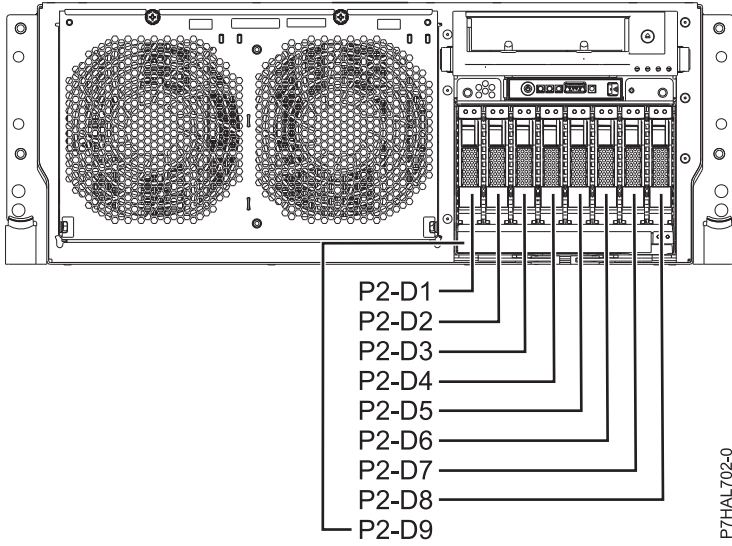
Figure 109. Disk drive locations for the rack model
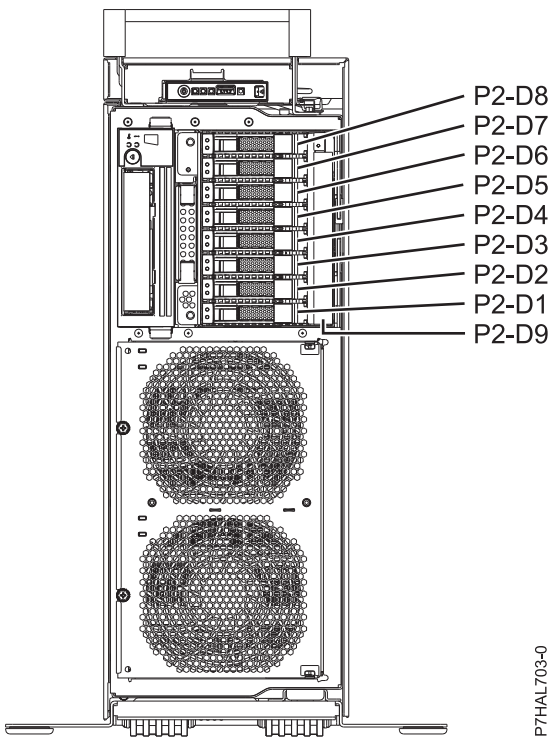
Figure 110. Disk drive locations for the tower model
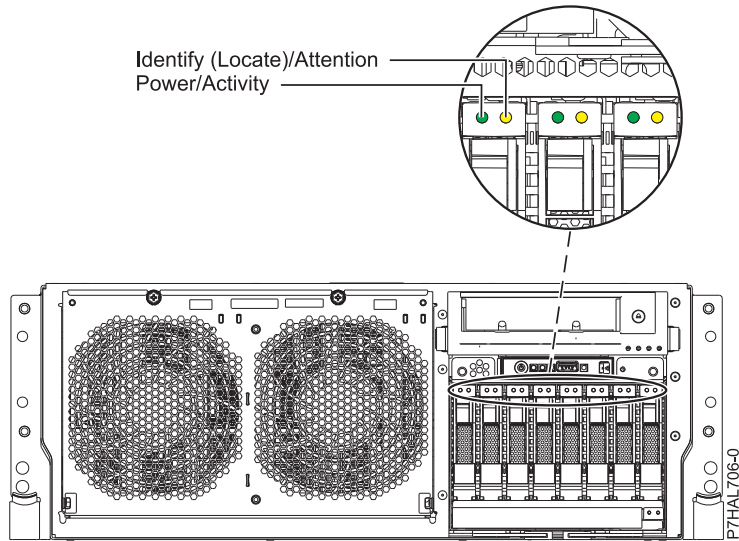
Figure 111. Concurrent maintenance light locations for the rack model
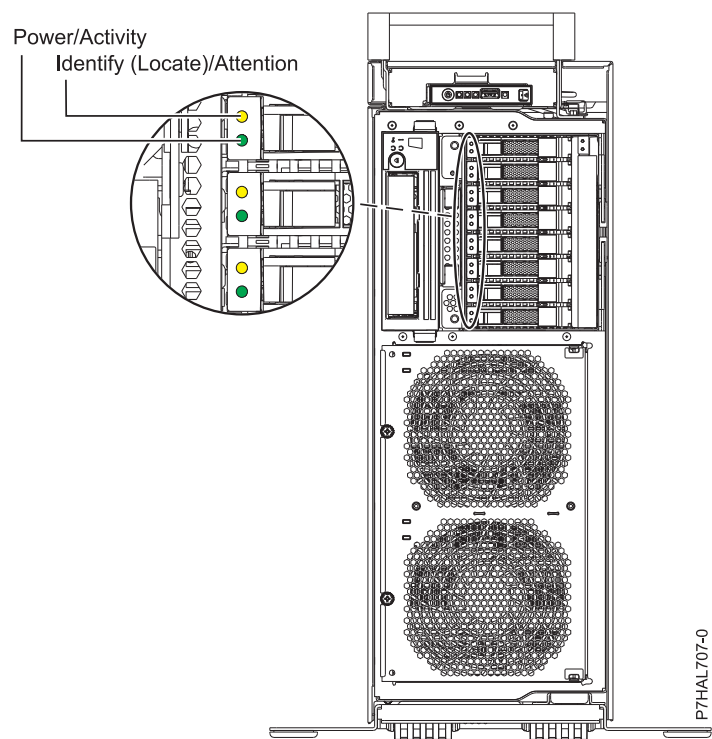
Figure 112. Concurrent maintenance light locations for the tower model

Disk drive locations and concurrent maintenance lights for 8231-E2B

Learn about the disk drive locations and the location of the concurrent maintenance lights on the system.

The following figures show the disk drive locations and concurrent maintenance lights for the 8231-E2B. Concurrent maintenance lights are located above the latch handle on the disk drives.
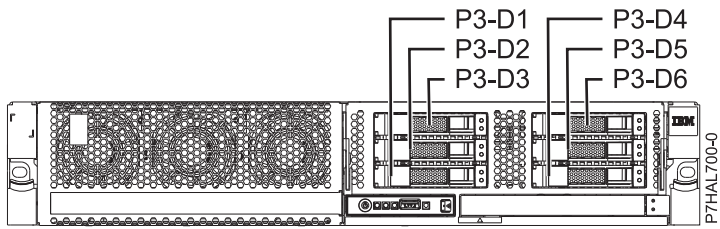
Figure 113. Disk drive locations for base model with six SFF bays
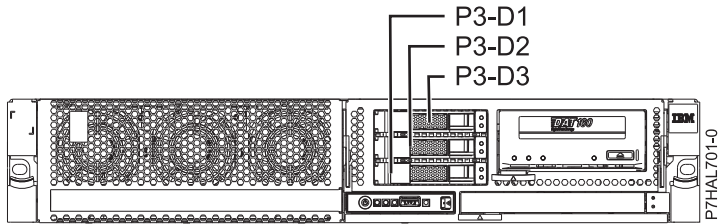
Figure 114. Disk drive locations for model with three SFF bays (optional)
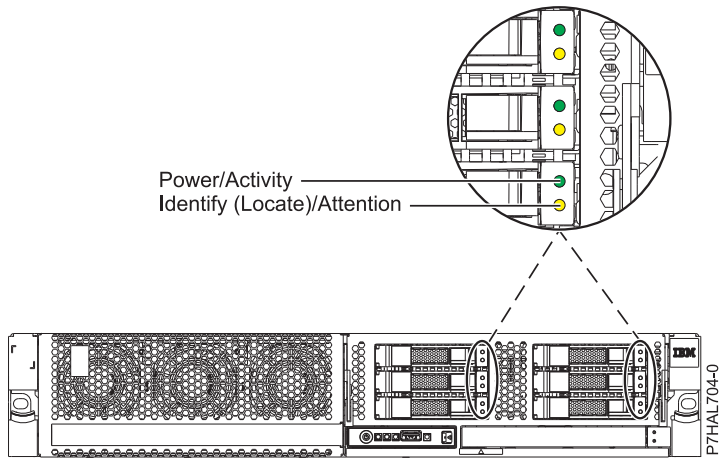
Figure 115. Concurrent maintenance light locations for base model with six SFF bays
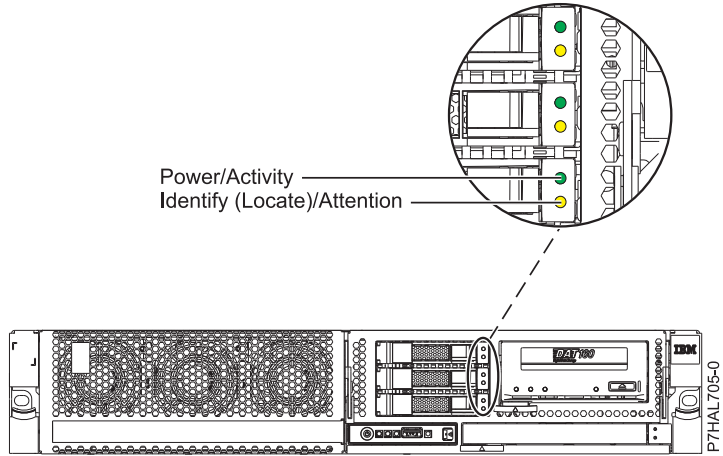
Figure 116. Concurrent maintenance light locations for model with three SFF bays (optional)

Disk drive locations and concurrent maintenance lights for 8233-E8B and 8236-E8C

Learn the disk drive locations and where the concurrent maintenance lights are located for your system.

The following figures show the disk drive locations and concurrent maintenance lights for the 8233-E8B and 8236-E8C. Concurrent maintenance lights are located above the latch handle on the disk drives.
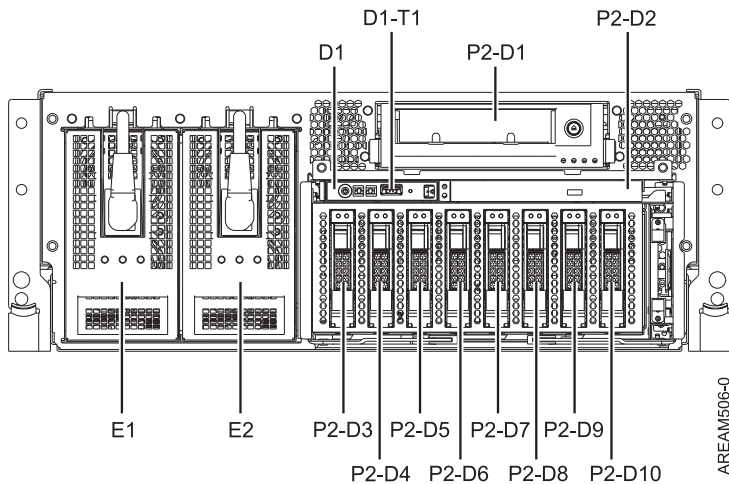
Figure 117. Disk drive locations

concurrent maintenance lights

P2-D3 P2-D5 P2-D7 P2-D9
P2-D4 P2-D6 P2-D8 P2-D10

IPHAL810-0
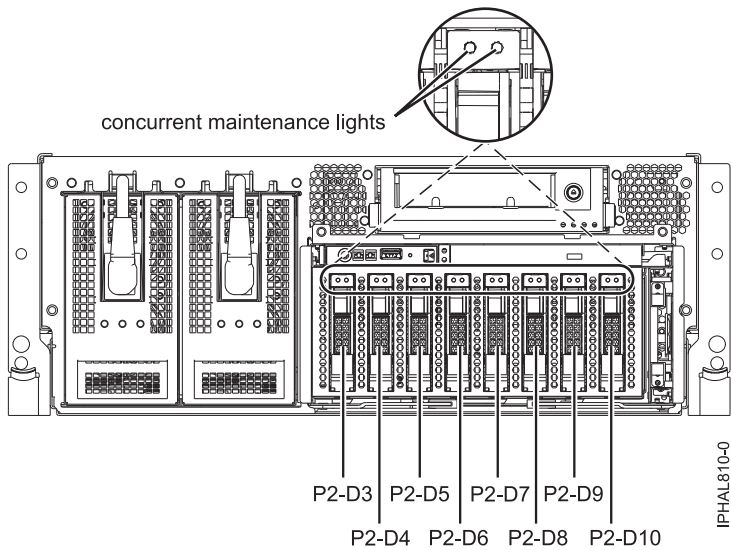
Figure 118. Concurrent maintenance light locations

Disk drive locations and concurrent maintenance lights for models 9117-MMB or 9179-MHB

Learn the disk drive locations for your system.

The following figures show the disk drive locations and concurrent maintenance lights for the IBM model 9117-MMB or 9179-MHB.

P3-T1   P3-T2   P3-T3   P3-T4
A1   A2   A3   A4   A5

P2-C9-D1   P2-C9-D2   P2-C9-D3   D1-T1
P2-C9-D4   P2-C9-D5   P2-C9-D6   D1
                                              P2-C9-D7
                                       P2-C9-C1-E2
                                       P2-C9-C1-E1

P7HAL601-0
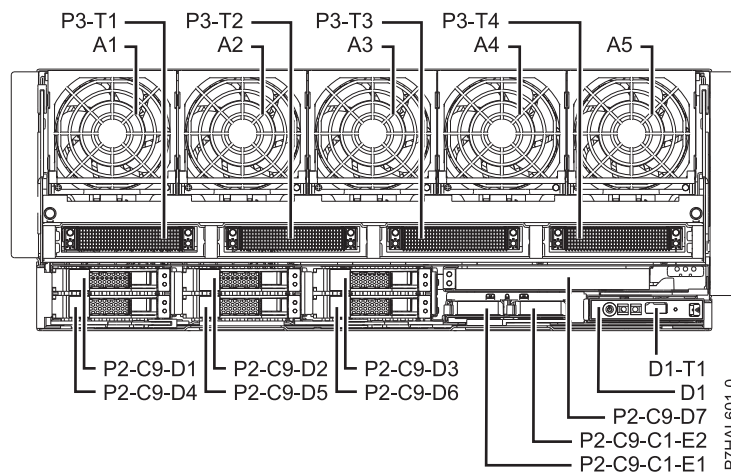
Figure 119. Disk drive locations
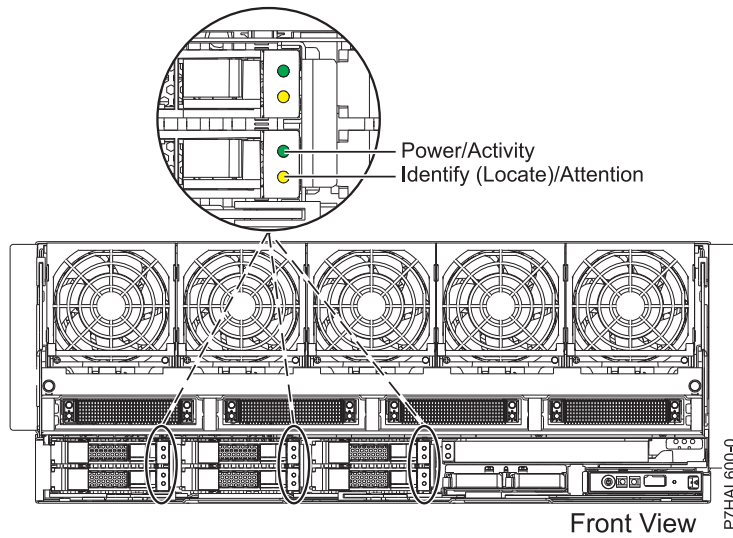
Figure 120. Concurrent maintenance light locations

Disk drive locations and concurrent maintenance lights for the 5886 disk enclosure

Learn the disk drive locations and where the concurrent maintenance lights are located for your disk enclosure.

The following figure shows the disk drive locations for the 5886 disk enclosure.
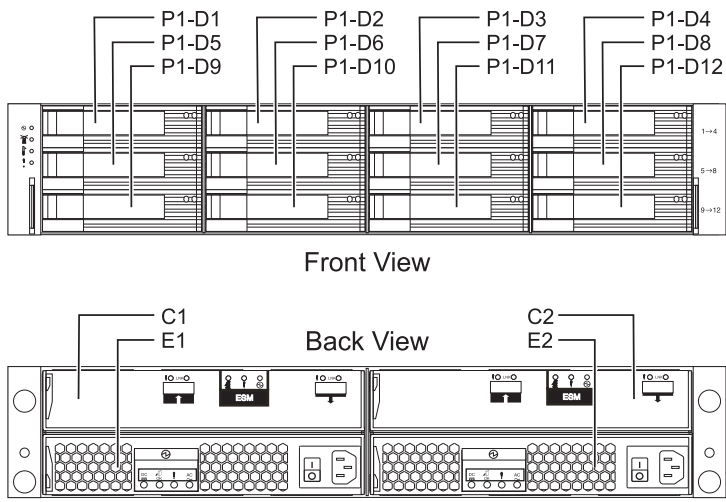
Figure 121. Disk drive locations for the 5886 disk enclosure

The following figure shows the locations of the disk-drive concurrent maintenance lights for the 5886 disk-drive enclosure.
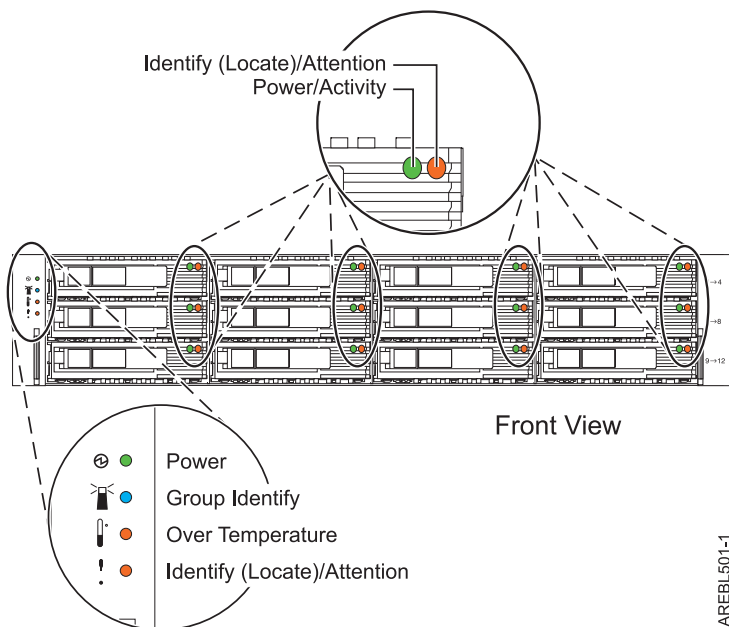
Figure 122. Front view of disk-drive enclosure concurrent maintenance lights for model 5886

Disk drive locations and concurrent maintenance lights for the 5786, 5787, 7031-D24, and 7031-T24 SCSI disk-drive enclosures

Learn the disk drive locations and where the concurrent maintenance lights are located for your disk-drive enclosure.

The availability of disk drive locations depends on the number of SCSI interface cards installed in the SCSI disk-drive enclosure. If the next available disk drive position is the first slot in a disk-drive enclosure, such as D21, D26, or D46, look at the disk-drive controller to verify that the enclosure is connected to a SCSI bus port. The controller end of the cable is clearly labeled with the disk-drive enclosure to which it connects. If the enclosure is not connected to a disk-drive controller, you must either install the disk drive in a different disk-drive enclosure or connect the enclosure to a SCSI bus port on a disk-drive controller. You might need to add a disk-drive controller before you can add disk drives to the expansion unit.

The following figures show the disk drive locations for the front and back of the 5786, 5787, 7031-D24, and 7031-T24 SCSI disk-drive enclosures.
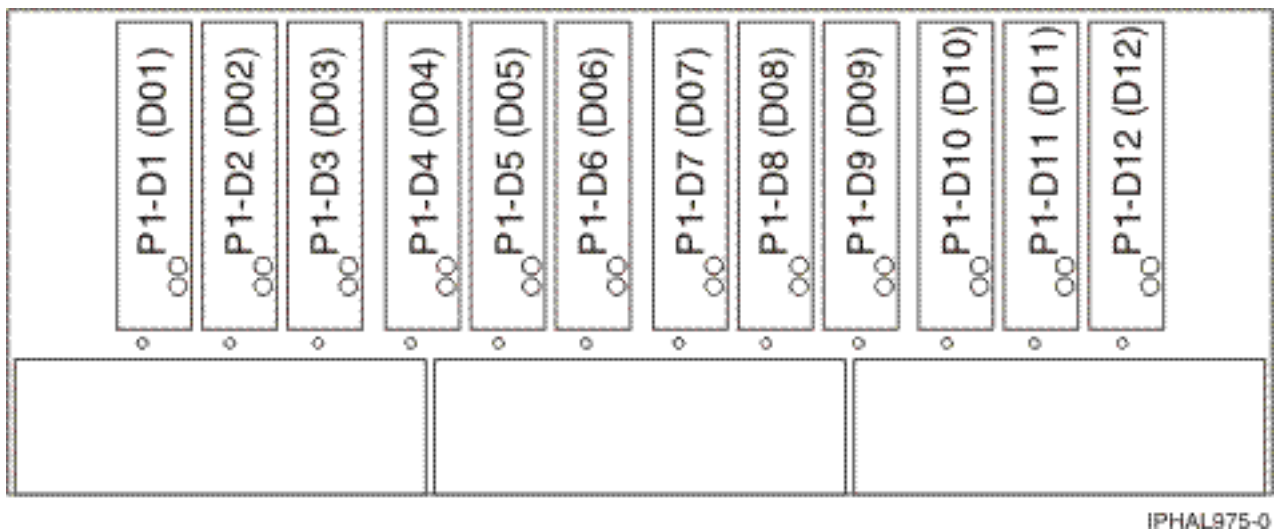
Figure 123. Front view of 5786, 5787, 7031-D24, and 7031-T24 SCSI disk-drive enclosures

IPHAL976-0
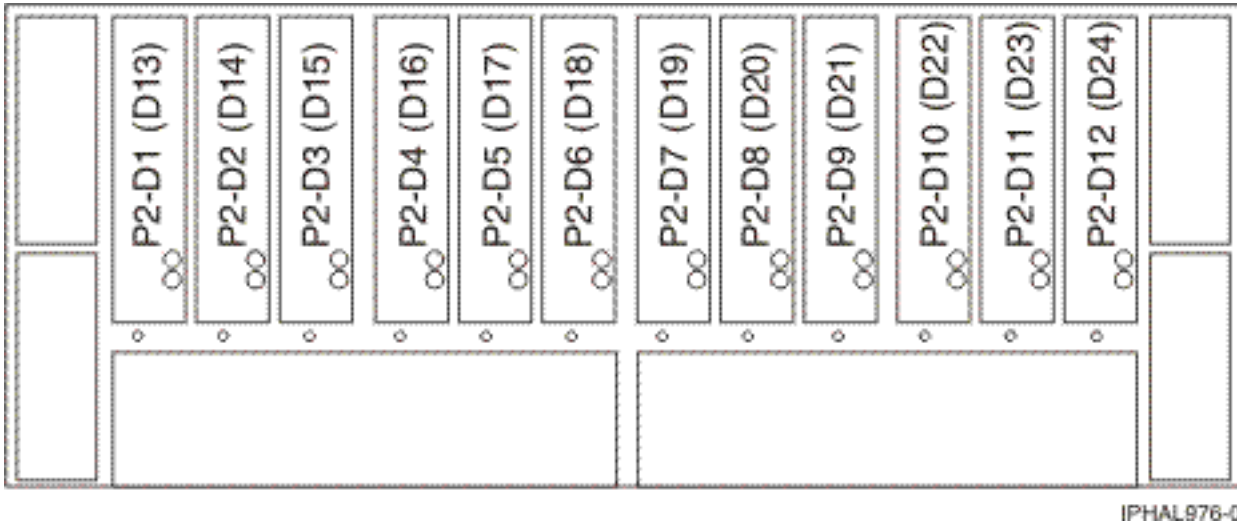
Figure 124. Back view of 5786, 5787, 7031-D24, and 7031-T24 SCSI disk-drive enclosures

The following figures show the locations of the disk-drive concurrent maintenance light **A** for the models 5786, 5787, 7031-D24, and 7031-T24 SCSI disk-drive enclosures.

IPHAL977-0
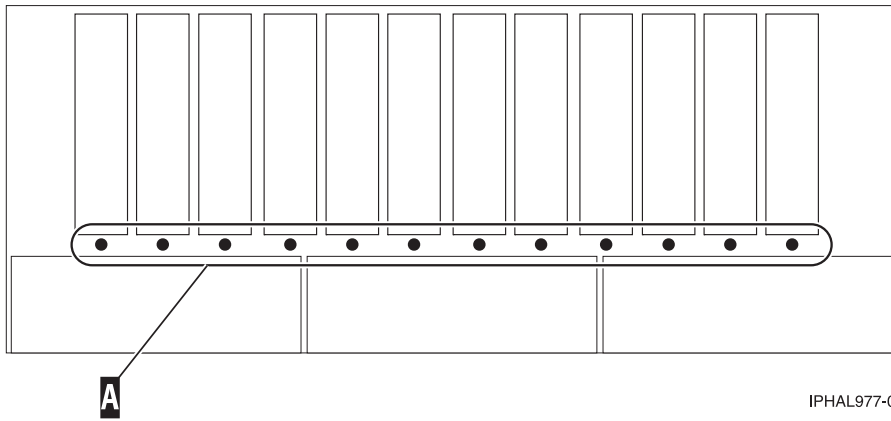
Figure 125. Front view of SCSI disk-drive enclosure concurrent maintenance lights for model 5786, 5787, 7031-D24, and 7031-T24

IPHAL978-0
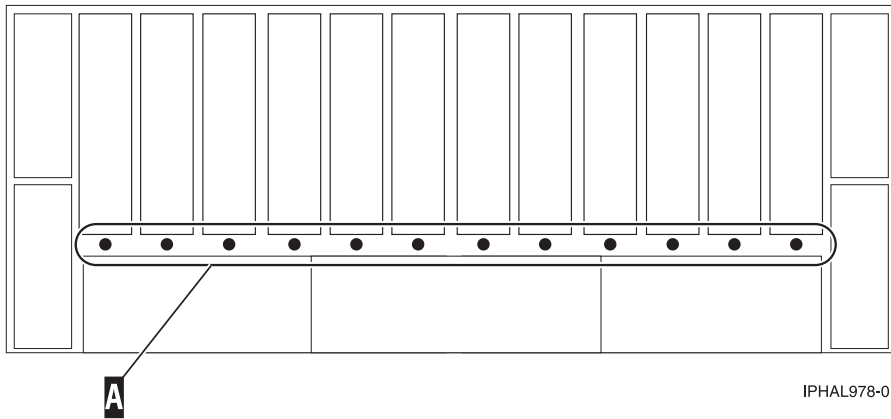
Figure 126. Back view of SCSI disk-drive enclosure concurrent maintenance lights for model 5786, 5787, 7031-D24, and 7031-T24

Disk drive locations and concurrent maintenance lights for the 5802 expansion unit

Learn the disk drive locations and where the concurrent maintenance lights are located for your expansion unit.

The following figure shows the disk drive locations for the 5802.

Concurrent maintenance lights are located at the bottom of the latch handle on each disk drive.
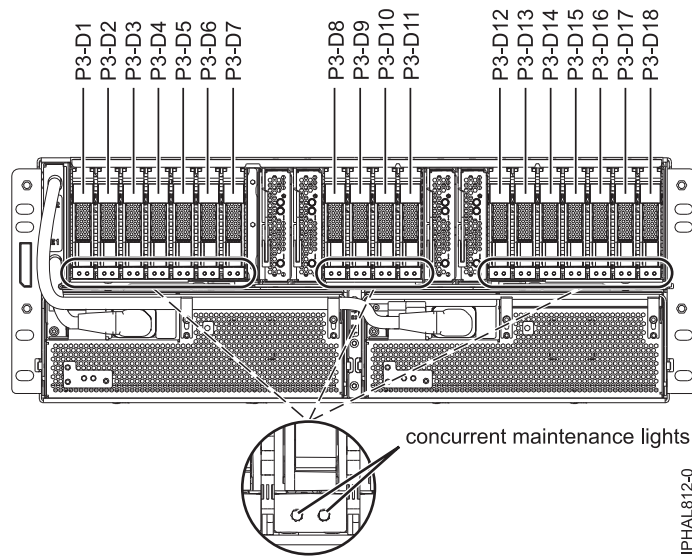
Figure 127. Disk drive locations

Related information

Cabling the 5802 disk subsystem

Related information

Locate additional disk-drive related information and instructions you might need.

Preparing a disk drive for use in an AIX system or logical partition

Configure the newly installed disk drive for your environment.

If the disk drive is attached to a PCI-X SCSI RAID controller, see the *PCI-X SCSI RAID Controller Reference Guide for AIX*. If the disk drive is attached to another controller, see the *AIX System Management Guide: Operating System and Devices*. These guides are available at the System p and AIX Information Center. (http://publib.boulder.ibm.com/infocenter/pseries/v5r3/index.jsp)

Preparing to remove a disk drive from a system or expansion unit controlled by AIX

Learn the actions you need to take to properly remove a disk drive.

Before removing a disk drive from a system or expansion unit that is controlled by AIX, ensure that all data on that disk drive or the array that contains the drive is backed up and removed from the disk drive and that the disk drive is in the Defined state.

If the disk drive is attached to a PCI-X SCSI RAID controller, see the *PCI-X SCSI RAID Controller Reference Guide for AIX*. If the disk drive is attached to another controller, see the information for that controller or the *AIX System Management Guide: Operating System and Devices*. These guides are available at the System p and AIX Information Center. (http://publib.boulder.ibm.com/infocenter/pseries/v5r3/index.jsp)

Rebuilding data on a replacement disk drive using AIX

To rebuild data on the replacement disk drive, refer to the information for the controller to which the disk drive is attached.
- If the disk drive is attached to a PCI-X SCSI RAID controller, see the *PCI-X SCSI RAID Controller Reference Guide for AIX*.
- If the disk drive is attached to a PCI SCSI RAID adapter (feature code 2498), see the *PCI 4–Channel Ultra3 SCSI RAID Adapter Reference Guide*.

For more information, see the *AIX System Management Guide: Operating System and Devices*.These guides are available at the System p and AIX Information Center. (http://publib.boulder.ibm.com/infocenter/pseries/v5r3/index.jsp)

Rebuilding data on a replacement disk drive using Linux

Use this procedure to rebuild data on the replacement disk drive.

To rebuild data on the replacement disk drive, complete the steps below.

For an unprotected disk drive

If the disk drive you are replacing is in a RAID Level 0 disk array or in a failed RAID Level 5 or RAID Level 10 disk array, perform these tasks:
1. Re-create the disk array.

2. Re-create the file systems on the disk array.
3. Copy the data back to the restored disk array from your backup media.

For information on these tasks, see the *PCI-X SCSI RAID Controller Reference Guide for Linux*. This guide is available from the SCSI PCI Adapters Web page at http://publib.boulder.ibm.com/infocenter/pseries/v5r3/index.jsp?topic=/com.ibm.pseries.doc/hardware_docs/scsipciadapters.htm.

For a disk drive in a RAID Level 5 or RAID Level 10 disk array, select the appropriate procedure:

Rebuilding data on a disk drive using Linux kernel 2.4

Complete the steps listed here to rebuild your data.

If a hot-spare disk drive was available and protected the disk array throughout the disk drive failure, you can configure the newly installed disk drive as a hot spare. For instructions, see the *PCI-X SCSI RAID Controller Reference Guide for Linux*.

This guide is available from the SCSI PCI Adapters Web page at http://publib.boulder.ibm.com/infocenter/pseries/v5r3/index.jsp?topic=/com.ibm.pseries.doc/hardware_docs/scsipciadapters.htm.

If a hot spare rebuild was not initiated by the controller, you need to initiate a rebuild on the newly installed disk drive. To initiate the rebuild, follow these steps:

1. Log in as root user.
2. Type `iprconfig` on the command line of the Linux session and press Enter. The Work with Disk Units display is shown.
3. From the Work with Disk Units display, select **Work with disk unit recovery**. The Work with Disk Unit Recovery display is shown.
4. From the Work with Disk Unit Recovery display, select **Rebuild disk unit data**.

   A Rebuild Disk Unit Data display similar to the following figure is shown below.

```
                      Rebuild Disk Unit Data

 Select the units to be rebuilt

 Type choice, press Enter.
   1=Rebuild

         Vendor    Product             Serial    PCI    PCI    SCSI   SCSI   SCSI
 Option    ID        ID                Number    Bus    Dev    Bus     ID    Lun
          IBM      IC35L036UCDY10-0  E3V0J55B     353    01      0      5      0




 e=Exit    q=Cancel     f=PageDn    b=PageUp
```

Figure 128. Example Rebuild Disk Unit Data display

5. Type option **1** (Rebuild) next to the disk drive you want to rebuild and press Enter.

   Note: Performing a rebuild on a disk drive overwrites the data currently on the disk drive.
   A Confirm Rebuild Disk Unit Data display similar to the following figure shown below.

```
                    Confirm Rebuild Disk Unit Data

Rebuilding the disk unit data could take several minutes for
each unit selected.

Press Enter to confirm having the data rebuilt.
Press q=Cancel to return and change your choice.

        Vendor   Product          Serial   PCI   PCI   SCSI  SCSI  SCSI
Option   ID        ID             Number   Bus   Dev   Bus    ID   Lun
    1    IBM      IC35L036UCDY10-0 E3V0J55B  353    01    0     5    0




q=Cancel     f=PageDn    b=PageUp
```

Figure 129. Example Confirm Rebuild Disk Unit Data display

6. To confirm that you want to rebuild the data on the disk drive, press Enter.

   The message that the rebuild has begun is shown at the bottom of the Work with Disk Unit Recovery display. The rebuild process might take several minutes to complete.

Rebuilding data on a disk drive using Linux kernel 2.6

Learn the steps to rebuild your data on a disk drive.

If a hot-spare disk drive was available and protected the disk array throughout the disk drive failure, you can configure the newly installed disk drive as a hot spare. For instructions, see the *PCI-X SCSI RAID Controller Reference Guide for Linux*.

This guide is available from the SCSI PCI Adapters Web page at http://publib.boulder.ibm.com/ infocenter/pseries/v5r3/index.jsp?topic=/com.ibm.pseries.doc/hardware_docs/scsipciadapters.htm.

If a hot-spare rebuild was not initiated by the controller, you need to initiate a rebuild on the newly installed disk drive. To initiate the rebuild, follow these steps:

1. Log in as root user.
2. Type iprconfig on the command line of the Linux session and press Enter. The IBM Power RAID Configuration Utility display is shown.
3. Select **Work with disk unit recovery** from the IBM Power RAID Configuration Utility display. Press Enter. The Work with Disk Unit Recovery display is shown.
4. From the Work with Disk Unit Recovery display, select **Rebuild disk unit data**.

   A Rebuild Disk Unit Data display similar to the following is shown.

```
                    Rebuild Disk Unit Data

Select the disks to be rebuilt

Type choice, press Enter.
  1=Rebuild

OPT Name   PCI/SCSI Location         Description              Status
--- ------ ------------------------- ------------------------ -------------
 1         0000:58:01.0.0/0:4:0      RAID  Array Member       Failed




e=Exit    q=Cancel    t=Toggle
```

Figure 130. Example Rebuild Disk Unit Data display

5. Type option **1** (Rebuild) next to the disk drive you want to rebuild and press Enter.

   Note: Performing a rebuild on a disk drive overwrites the data currently on the disk drive.

   A Confirm Rebuild Disk Unit Data display similar to the following is shown.

```
                 Confirm Rebuild Disk Unit Data

Rebuilding the disk unit data might take several minutes for each disk
selected.

Press Enter to confirm having the data rebuilt.
  q=Cancel to return and change your choice.

OPT Name   PCI/SCSI Location         Description              Status
--- ------ ------------------------- ------------------------ ---------------
 1         0000:58:01.0.0/0:4:0      RAID  Array Member       Failed




q=Cancel    t=Toggle
```

Figure 131. Example Confirm Rebuild Disk Unit Data display

6. To confirm that you want to rebuild the data on the disk drive, press Enter.

   The message that the rebuild has begun is shown at the bottom of the Work with Disk Unit Recovery display. The rebuild process might take several minutes to complete.

Rebuilding data on a replacement disk drive using IBM i

Learn how to rebuild data on replacement disk.

To rebuild data on the replacement disk drive, complete the following steps:
1. If necessary, start System Service Tools (SST) by typing strsst on the command line of the IBM i session and pressing Enter.
2. Type your service tools user ID and service tools password on the Start Service Tools (STRSST) Sign On display. Press Enter.

   Note: The service tools password is case sensitive.
3. Select **Work with disk units** from the Start System Service Tools (SST) display. Press Enter.
4. Select **Work with disk unit recovery** from the Work with Disk Units display. Press Enter.

5. If you determined that the disk drive you replaced had **device parity protection (RAID)**, follow these steps to restore device parity protection (RAID) on the disk drive:

   a. Select **Rebuild disk unit data** on the Work with Disk unit recovery display. Press Enter.

   b. Select **1** to rebuild the disk drive displayed (the disk drive displayed is the disk drive that you **removed**) on the Rebuild Disk Unit Data display. Press Enter.

   c. Press Enter on the Confirm Rebuild Disk Unit Data display. The rebuild process might take several minutes to complete.

   d. Press F5 to refresh the display until the **Percent complete** shows 5%.

   e. When the display shows at least 5% complete, you can either continue to monitor this display to completion, or press F3 (Exit) to return to the Work with disk units display.

   f. Press F3 (Exit) to return to the System service tools display.

   g. Press F3 (Exit) to return to the Exit SST display and press Enter.

   h. Return to the procedure that sent you here.

6. If the disk drive that you replaced had **mirrored protection**, follow these steps:

   a. Select **Replace configured unit** on the Work with Disk unit recovery display. Press Enter.

   b. Select the configured disk drive that you are exchanging (suspended drive) on the Select Configured Unit to Replace display. Press Enter.

   c. Select the disk drive that you just installed on the Select Replacement Unit display. This drive has a non-configured status.

      Note: In some cases, it might take several minutes for a new disk drive to display. Repeat these steps until the new drive is shown.
      Press Enter.

   d. Press Enter on the Confirm Replace of Configured Unit display to confirm your choice for replacement.

      The replacement process might take several minutes to complete. When the process is complete, the Work with Disk unit recovery display is shown.

   e. Press F3 (Exit) to return to the Work with disk units display.

   f. Select **Display disk configuration** on the Work with disk units display.

   g. Select **Display disk configuration status** on the Display Disk Configuration display.

      Mirrored status shows Resuming. When complete, the mirrored status shows Active. This process might take several minutes to complete. You can either monitor this display to completion, or press F3 (Exit) three times, and then press Enter to return to the IBM i main menu.

Configuring a disk drive in an system or logical partition

To configure a newly installed disk drive into an existing device parity set, follow these steps:

If you want to start a new device parity set or change the protection on your disks, see Manage device parity protection or Start device parity protection in the Disk Management section of the IBM i

Information Center website at http://www.ibm.com/systems/i/infocenter .

1. If necessary, start System Service Tools (SST) by typing `strsst` on the command line of the IBM i session and pressing Enter.

2. Type your service tools user ID and service tools password on the Start Service Tools (STRSST) Sign On display. Press Enter.

   Restriction: The service tools password is case sensitive.

3. Select **Work with Disk Units** on the System Service Tools display. Press Enter.

4. Select **Display disk configuration** on the Work with Disk Units display. Press Enter.

5. Select **Display non-configured units** on the Display disk configuration display. Press Enter.

6. The disk drive that you installed is listed. The serial number should match the serial number you recorded (the last 4 digits).

   Note: The new disk drive might take up to five minutes to appear in the list. If the disk drive is not listed, ensure that the disk drive was properly installed.

7. Press F12 twice.

8. Select **Work with disk configuration** on the Work with Disk Units display. Press Enter.

9. Are you adding a disk drive to an existing device parity set?
   - **Yes**: Continue with the next step.
   - **No**: Go to step 23 on page 46 for mirroring or no protection, go to 1 on page 47 for hot spare.

   Tip: Select **No** for mirroring, hot spare or no protection.

10. Select **Work with device parity protection** on the Work with Disk Configuration display. Press Enter.

11. Select **Include unit in device parity protection** on the Work with Device Parity Protection display. Press Enter.

12. Did the Include Device Parity Protection Failed display appear?
    - **Yes**: Continue with the next step.
    - **No**: Go to step 15 on page 46.

13. The following conditions must be met before you can start device parity protection.
    - If there are enough disk drives available to create a new parity set, the drives are eligible for *Start Device Parity Protection* operation and not for the *Include Device Parity Protection* operation.
    - All disk drives in a parity set must be the same capacity with a minimum number of three or four disk drives and maximum of 10 or 18 disk drives in the resulting parity set, depending on the disk drive type.
    - Not all disk drives attached to an advanced function input output processor have reported to the system. Retry the operation.
    - The type or model of the disk drives cannot be used for the requested operation.

    When these conditions are met, press F12 to return to the Work with Disk Configuration display.

14. Select **Include unit in device parity protection** on the Work with disk configuration display. Press Enter.

15. On the Include Disk Units in Device Parity Protection display, select the disk drives to be included in Device Parity Protection. Type a **1** in the Option column. Press Enter.

16. Press Enter to confirm your choice. The configuration starts and might take 30 to 60 minutes to complete.

17. When the device parity protection is complete, the message "Selected drives have been included successfully" is shown on the Work with device parity protection display. Press F12.

18. Select **Display disk configuration** on the Work with disk configuration display. Press Enter.

19. Select **Display disk configuration status** on the Display disk configuration display.

20. If you have more than one ASP, determine the auxiliary storage pool (ASP) to which you want to add the disk drive.

21. Press F12 twice to get to the Work with Disk Units display.

22. Select **Work with disk configuration** on the Work with Disk Units display. Press Enter.

23. Select the option to add units to ASPs and balance data on the Work with disk configuration display. Press Enter.

24. Specify the number of the ASP to which you want to add the disk drive. The system ASP is **ASP 1**. Press Enter.

    Notes:

    a. If ASP is mirror protected, disk drives must be added in pairs of the same size.

b. When one or more pairs of disk drives are added to a mirrored ASP, they automatically become mirror protected.

c. To start mirrored protection on an ASP, refer to **Recovering your system** in the IBM i Information Center.

To access the IBM i Information Center Web site, go to http://www.ibm.com/systems/i/infocenter and select from the following options:

- If you select V6R1, expand **IBM i 6.1 Information Center** > **Systems management** > **Backup and recovery** > **Recovering your system**
- If you select V5R4, expand **i5/OS Information Center** > **Systems management** > **Backup and recovery** > **Backing up and recovering your system** > **Recovering your system**

25. The Confirm Add Units display is shown showing the configuration your system will have when the add operation completes.

 Note: If you have selected the wrong ASP, press F12 to change your options. Press the Enter key to continue. The add process will take several minutes to complete.

26. When the message `Selected units have been added successfully` is shown, press F3 three times and press Enter to return to the Main Menu display.

27. If you have a printer, print the configuration list. A service provider might refer to the configuration list in the future.

 a. You need to sign on **with at least service level authority**

 b. Type `strsst` on the Main Menu command line. Press Enter.

 c. Type your service tools user ID and service tools password on the Start Service Tools (STRSST) Sign On display. Press Enter.

  Remember: The service tools password is case sensitive.

 d. Select **Start a service tool** on the System Service Tools (SST) display. Press Enter.

 e. Select **Hardware service manager** on the Start a Service Tool display. Press Enter.

 f. Press F6 (print the configuration) from the Hardware Service Manager display.

 g. To return to the Main Menu display, press F3 (Exit) twice and then press Enter.

 h. Place the configuration list where you can refer to it in the future.

28. If you are a service provider performing this task, return to the procedure that sent you here.

1. Select **Work with hot spare protection** from the **Work with disk configuration** menu.

2. Select **Start device parity protection - RAID 5 with hot spare** or **Start device parity protection - RAID 6 with hot spare** depending on the level of parity protection that is desired.

3. Return to the procedure that sent you here.

Preparing to remove a disk drive from a system or logical partition controlled by IBM i

Learn the actions you need to take to properly remove a disk drive.

Before removing a disk drive from a system or expansion unit that is controlled by IBM i, follow these steps:

1. Determine the protection status of the disk drive that you are replacing. For instructions, see "Determining the IBM i disk drive protection status" on page 48.

2. The service provider must perform one of the following tasks:

 - Save data and initialize the disk drive.
 - Initialize the disk drive and copy to disk.

3. **For mirrored disk drives** on an IBM i system or logical partition, follow these steps to verify that the disk drive you are replacing has been suspended:

a. Sign on with service level authority.

b. Type `strsst` on the command line of the IBM i session and press Enter.

c. Type your service tools user ID and service tools password on the Start Service Tools (STRSST) Sign On display. Press Enter.

> **Remember:** The service tools password is case sensitive.

d. Select **Work with disk units** from the System Service Tools (SST) display. Press Enter.

e. Select **Display Disk Configuration** from the Work with Disk Units display. Press Enter.

f. Select **Display Disk Configuration Status** from the Display Disk Configuration display. Press Enter.

g. Does the disk drive that is mirrored to the disk drive that you are replacing (same drive number) have a status of Active?

- **No**: The replacement must be performed by a service provider.
- **Yes**: Does the disk drive that you are replacing have a status of Suspended?
  - **Yes**: Continue with the next step.
  - **No**: Follow these steps to suspend mirrored protection on the disk drive that you are replacing:
    1) Press F3 from the Display Disk Configuration display to return to the Work with Disk Units display.
    2) Select **Work with Disk Unit Recovery** from the Work with Disk Units display. Press Enter.
    3) Select **Suspend mirrored protection** from the Work with Disk Unit Recovery display. Press Enter.
    4) Select the option to suspend the disk drive that you are replacing from the Suspend Mirrored Protection display. Press Enter.

h. Press F3 repeatedly to exit System Service Tools and return to the main menu.

Determining the IBM i disk drive protection status

To determine the protection status of the disk drives in your IBM i system or logical partition, follow these steps from the System Service Tools (SST) display:

Tip: If you do not know the protection status of the disk drives and you cannot get to the System Service Tools display, contact your next level of support.

1. Sign on **with at least service level authority**.

2. Type `strsst` on the command line of the IBM i session and press Enter.

3. Type your service tools user ID and service tools password on the Start Service Tools (STRSST) Sign On display. Press Enter.

> **Note:** The service tools password is case-sensitive.

4. Select **Work with disk units** from the System Service Tools (SST) display. Press Enter.

5. Select **Display Disk Configuration** from the Work with Disk Units display. Press Enter.

6. Select **Display Disk Configuration Status** from the Display Disk Configuration display. Press Enter.

A list of each auxiliary storage pool (ASP) displays, showing the disk drives that are members of the ASP. The Status column shows one of the following protection statuses for the ASP:

- **Mirrored**. These ASPs are configured for mirrored protection. If the failing disk drive has mirrored protection, record the status of both disk drives in the mirrored pair. You need this information in the recovery procedure.

- **Unprotected**. An ASP with a status of Unprotected might contain disk drives that are device parity protected. Record the status of the failing disk drive as it is shown in the Status column of the Display Disk Configuration Status display.

  A disk drive with one of the following statuses has device parity protection only if all other disk drives in the array are operational:
    – DPY/Active
    – DPY/Failed
    – DPY/HDW Failure
    – DPY/Degraded
    – DPY/Power Loss
    – DPY/Not Ready
    – DPY/Unknown

  A disk drive with any other status (such as DPY/Rebuild or DPY/Unprotected) does not have device parity protection.

  Examples:
    – Suppose one disk drive has a status of DPY/Failed while all other disk drives have a status of DPY/Unprotected. In this case, only the disk drive with the DPY/Failed status is protected. Servicing the failed disk drive does not result in data loss. Removing any of the unprotected disk drives might result in data loss.
    – All disk drives have a status of DPY/Active or DPY/Degraded, therefore, all disk drives are protected. In this case, exchanging any disk drive does not result in data loss.

  Tip: For more information about the meaning of a status for any disk drive, use the Help key on the display.

Configuring a disk drive on a load source adapter for hot spare using the IBM i operating system

To start hot spare protection on your load source adapter you will need to determine the status of the disk drive in the load source slot and configure or exchange that disk drive, which might require you to power down the system.

1. If necessary, start System Service Tools (SST) by typing `strsst` on the command line of the IBM i session and pressing Enter.

2. Type your service tools user ID and service tools password on the Start Service Tools (STRSST) Sign On display. Press Enter.

   Note: The service tools password is case sensitive.

3. Determine the protection status of all disks controlled by the load source adapter. Do all disk drives that are a member of a parity sets or mirror sets have a status of active?

   - No: Replace the disk using the following procedure in, "Replacing a disk drive with the IBM i system or logical partition powered on" on page 89.

   - Yes: Continue to the next step.

   Restriction: There must be a disk drive of the same or larger capacity located in a load source capable slot to act as a hot spare for the active load source disk drive. The next steps will have you change the disk drive in the desired slot if needed.
   Attention: If the disk drive acting as hot spare for the load source is of smaller capacity you can suffer data loss.

4. Determine whether a non-configured disk drive of the same or larger capacity is located in a load source capable slot but is not the active load source. Only parallel SCSI places a restriction on the location of the load source. Any SAS, Fibre Channel, or virtual disk drive does not have this restriction.

- No non-configured drive is located in a load source capable slot. Continue with the next step
- Yes a non-configured drive is located in a load source capable slot. Return to the procedure that sent you here, and continue to the next step of that procedure.

5. Choose the disk drive to be installed or exchanged with the drive in the load source slot by doing the following:
   a. Select a disk drive in a parity set located in a load source capable slot, but is not the active load source drive, and record the location of this disk drive.
   b. Select a non-configured disk drive of the same or larger capacity from either a non-load source slot or a failed drive you are replacing with a non-configured disk drive.
6. Stop the system. For instructions, see "Stopping a system or logical partition" on page 201.
7. Exchange the disk drives from the two locations you recorded in step 5 by removing both disk drives and placing them into the other disk drives slot.
8. Start the system. For instructions, see "Starting the system or logical partition" on page 199.
9. Return to the procedure that sent you here and continue with the next step in that procedure.

Internal disk drive sharing on model 8202-E4B or 8205-E6B system

Learn how to split the internal disks in the system unit enclosure into groups, which you can manage separately. Use the following information to perform the task.

DASD backplane supports Split DASD mode. FC 5631 split DASD enablement card is used to put DASD backplane in the Split DASD mode in which 3 SFF DASD on left (from front view) are assigned to the split DASD enablement card (CCIN 2BE0), and 3 SFF DASD on right are assigned to the integrated storage controller (CCIN 572C). A PCIe or PCIX SAS adapter (such as FC 5901, FC5904, or FC5912) can access the 3 SFF DASD through an external AI SAS cable, as shown in Figure 132 on page 148.

Important: This configuration is not supported with the 5630 backplane feature code.

Use the following information after the adapter is installed. For more information, see PCI adapters.

Perform the prerequisite tasks as described in "Before you begin" on page 189.

Note: Internal cable FC 3670 for an 8202-E4B or 8205-E6B must be installed to enable the split DASD configuration. For installation instructions, see "Installing the external SAS port on model 8202-E4B or 8205-E6B" on page 153.

Perform the following tasks to split the internal disks in the system unit enclosure into groups, which you can manage separately.
1. Stop and turn off the power to the system, see Stopping the system or logical partition.
2. Cable the system by connecting the SAS cable to the adapter and then to the internal SAS connection, as shown in Figure 132 on page 148.
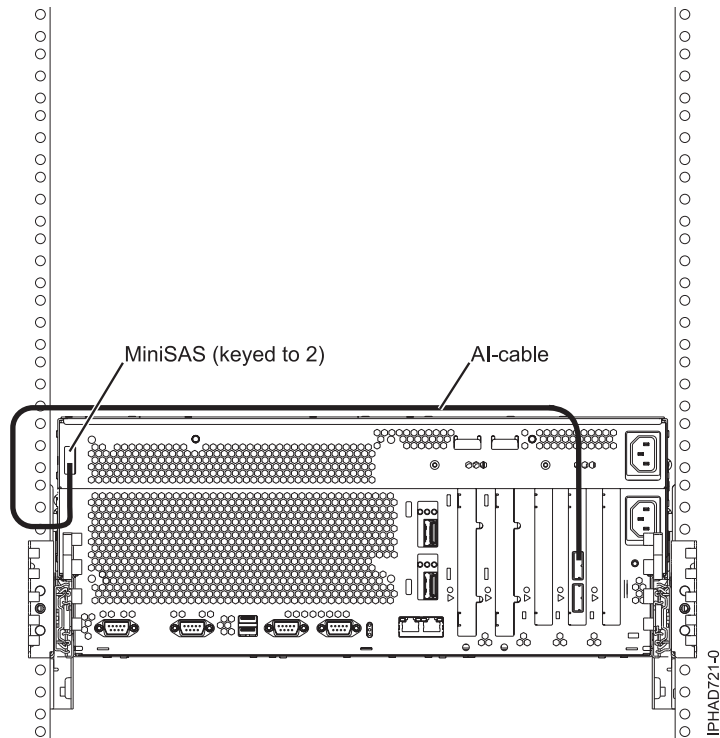
MiniSAS (keyed to 2)   AI-cable

IPHAD721-0

Notes: The second connector on the adapter can be used to attach a disk expansion or media expansion drawer.

Figure 132. SAS adapter to internal SAS disk slots through the system external SAS port

3. Start the system, see "Starting the system or logical partition" on page 199.
4. Verify that the feature is installed and working, see "Verifying the installed part" on page 249.

After performing this procedure, three disks in the system enclosure is managed by the split DASD enablement card and three disks is managed by the internal system.

You can now manage the disks as you would manage any other disks.

Internal disk drive sharing on an 8233-E8B or 8236-E8C

You might need to cable and understand the function of this feature. Use the following information to complete these tasks.

DASD backplane supports Split DASD mode. FC 3669 internal SAS cable for Split DASD mode is used to put DASD backplane in the Split DASD mode in which 4 SFF DASD on left (from front view) are assigned to the integrated SAS controller, and 4 SFF DASD on right are assigned to the external rear SAS port. A PCIe or PCIX SAS adapter (such as FC 5901, FC5904, or FC5912) can access the right 4 SFF DASD via an external AI SAS cable, as shown in the figure below.

The following information is for use after the adapter is installed. Install the adapter and then return here. See the PCI adapters topic for more information, PCI adapters.

You should also review the tasks in "Before you begin" on page 189 if you have not already done so.

Note: Internal cable FC3669 for model 8233-E8B or 8236-E8C must be installed to enable this configuration. For installation instructions, see Installing the external SAS port on a model 8233-E8B or 8236-E8C

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

1. Stop and power off the system if it is not already, see "Stopping a system or logical partition" on page 201.
2. Cable the system by connecting the SAS cable to the adapter and then to the internal SAS connection, as shown in the following graphic.
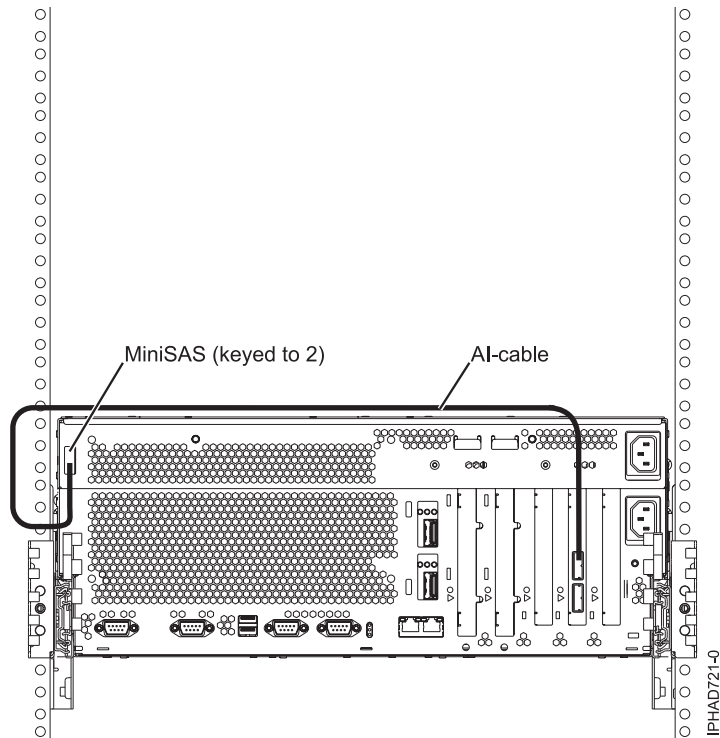
MiniSAS (keyed to 2)   AI-cable

IPHAD721-0

Notes:

• The second connector on the adapter can be used to attach a disk expansion or media expansion drawer.

Figure 133. SAS adapter to internal SAS disk slots through the system external SAS port

3. Start the system, see "Starting the system or logical partition" on page 199.
4. Verify that the feature is installed and working, see "Verifying the installed part" on page 249.

Once you have completed the procedure, four of the disks in the system enclosure will be managed by the PCI SAS adapter and four will be managed by the integrated SAS controller in the system unit.

Now, you can manage the disks as you would manage any other disks.

Related information

SAS RAID controllers for AIX on the 8233-E8B and 8236-E8C

Internal disk drive sharing in model 9117-MMB or 9179-MHB

You might need to cable and understand the function of this feature. Use the following information to complete these tasks.

Review the disk drive modes and supported disk drive locations, as shown in Table 1. The following figure shows the disk drive locations for the IBM model 9117-MMB or 9179-MHB.
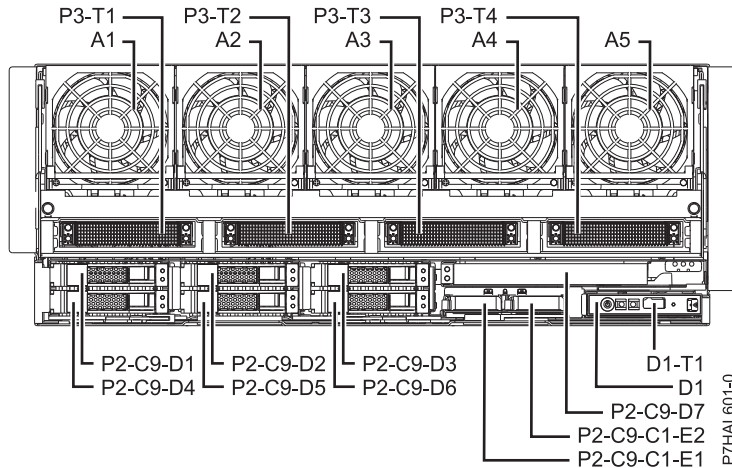
Figure 134. Disk drive locations

Table 4. Disk drive modes and supported disk drive locations

Disk drive mode	SAS Port Card	Adapter	SAS Cable	Disk drive location
RAID internal drives	None	Integrated Dual RAID controller	None	D1, D2, D3, D4, D5, and D6
RAID internal and external drives	SAS External Port feature (FC1819) - SAS Cable Assembly for SAS Port	Integrated Dual RAID controller	• YI Cable (FC3686) - System to SAS Enclosure, Single Controller/Dual Path 1.5 meter • YI Cable (FC3687) - System to SAS Enclosure, Single Controller/Dual Path 3 meter	D1, D2, D3, D4, D5, and D6
Dual Split Backplane	None	• Integrated SAS controller (SAS A) • Integrated SAS controller (SAS B)	None	• D1, D2, and D3 • D4, D5, and D6
Triple Split Backplane	SAS Internal Port feature (FC1815) - SAS Cable for triple split disk drive backplane	• Integrated SAS controller (SAS A) • Integrated SAS controller (SAS B) • (FC5901) - PCIe Dual-x4 SAS Adapter	AI Cable (FC3679) - Adapter to Internal drive 1 meter	• D1 and D4 • D2 and D5 • D3 and D6

The following information is for use after the FC5901 SAS Storage Adapter is installed. Install the adapter and then return here. See the PCI adapters topic for more information, PCI adapters.

You should also review the tasks in "Before you begin" on page 189 if you have not already done so.

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

1. Stop and power off the system if it is not already, see "Stopping a system or logical partition" on page 201.
2. Cable a single system unit enclosure by doing the following:
   a. Attach the cable to the SAS port on the rear bulkhead of the system unit enclosure to the top port in the SAS Storage Adapter, as shown in the following figure.

      Restriction: Internal disk drive sharing is only available when internal cable feature FC1815 is installed from the DASD backplane to the read bulkhead of the system unit enclosure. Also, feature FC5662 175 MB cache RAID - dual IOA enablement card must not be installed. The SAS Storage Adapter can be in any of the other slots that support it.
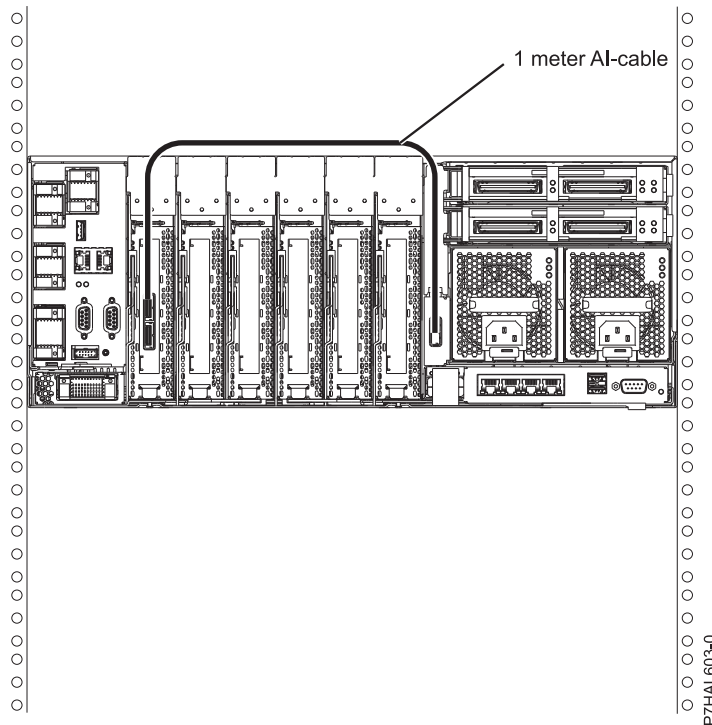
   b. Secure any extra cable.
3. Start the system, see "Starting the system or logical partition" on page 199.
4. Verify that the feature is installed and working, see "Verifying the installed part" on page 249.

With this function installed, 2 of the 6 of the disks in the system enclosure can be managed by the SAS Storage Adapter.

Note: The Removable Media device is always controlled by a separate embedded SAS controller on the system planar.

Now, you can manage the disks as you would manage any other disks.

Installing the external SAS port on model 8202-E4B or 8205-E6B

Use this procedure to install an external SAS port as a part of upgrading your disk-drive backplane, or to enable internal disk sharing.

Perform the prerequisite tasks as described in "Before you begin" on page 189.

Perform the following steps to install an external SAS port into the server:

1. Stop the system if it is running. For instructions on stopping the system, see "Stopping a system or logical partition" on page 201.
2. Remove all PCI adapter cassettes. See PCI adapter single-width, fourth-generation cassette.
3. If necessary, remove the existing SAS cable or filler, see Figure 135.
   a. Press the side tab and pull out the SAS shroud **(A)** from the SAS connection on the system backplane.
   b. Open the cable clamp **(B)** on the side wall. The cable clamp opens from the top.
   c. Pull the SAS cable **(D)** out of the system.
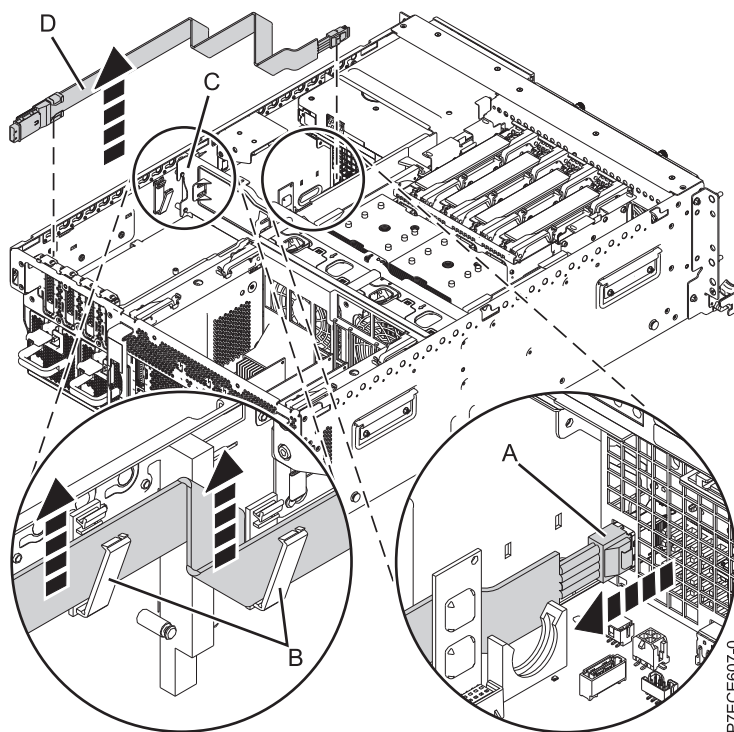
Figure 135. Removing the SAS cable

4. Install the new SAS cable, see Figure 136 on page 154.
   a. Connect the external port to the rear of the system until it snaps in place.
   b. Open the cable clamp **(C)** on the side wall, placing the cable **(A)** through the clamp. The cable clamp opens from the top.

c. Close the cable clamp **(C)** and continue to slide the cable towards the SAS connection on the system backplane.

d. Push the SAS shroud **(D)** into the SAS connection on the system backplane until it snaps in place.
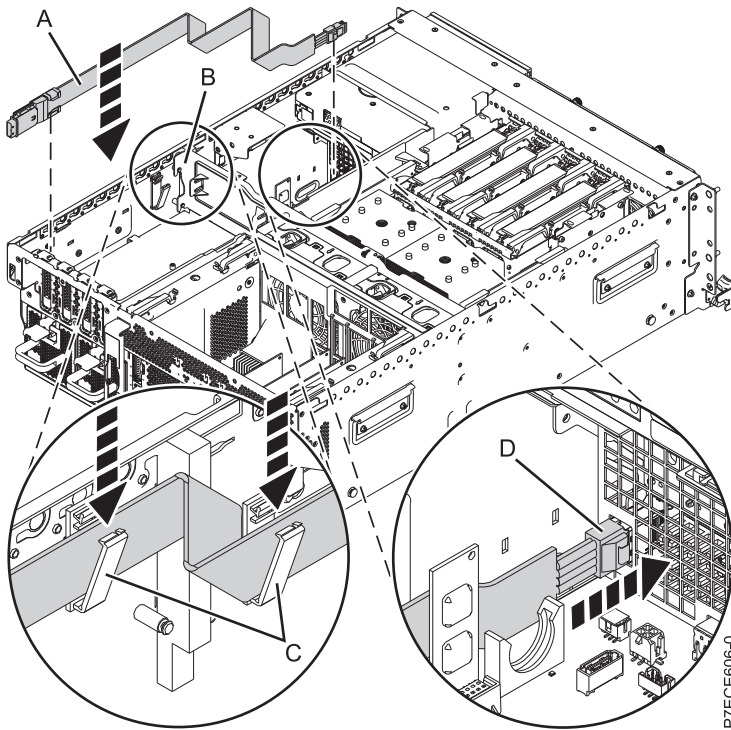
Figure 136. Replacing the SAS cable

5. Replace all PCI adapter cassettes. See PCI adapter single-width, fourth-generation cassette.
6. Start the system. See http://publib.boulder.ibm.com/infocenter/powersys/v3r1m5/topic/p7haj/crustartsys.htm

You can now attach other supported SAS features to the system.

Installing the external SAS port on model 8231-E2B

Use this procedure to install an external SAS port as a part of upgrading your disk-drive backplane, or to enable internal disk sharing.

Perform the prerequisite tasks as described in "Before you begin" on page 189.

Perform the following steps to install the external SAS port into the server:

1. Stop the system if it is running. For instructions on stopping the system, see "Stopping a system or logical partition" on page 201.
2. Remove all PCI adapter cassettes. See PCI adapter single-width, fourth-generation cassette.
3. If necessary, remove the existing SAS cable or filler, see Figure 137.
   a. Press the side tab and pull the SAS shroud out of the SAS connection on the system backplane.
   b. Open the cable clamp on the side wall and pull out the cable **(B)**. The cable clamp opens from the top.
   c. Push the external SAS port down **(A)** and then pull the SAS cable out of the system.
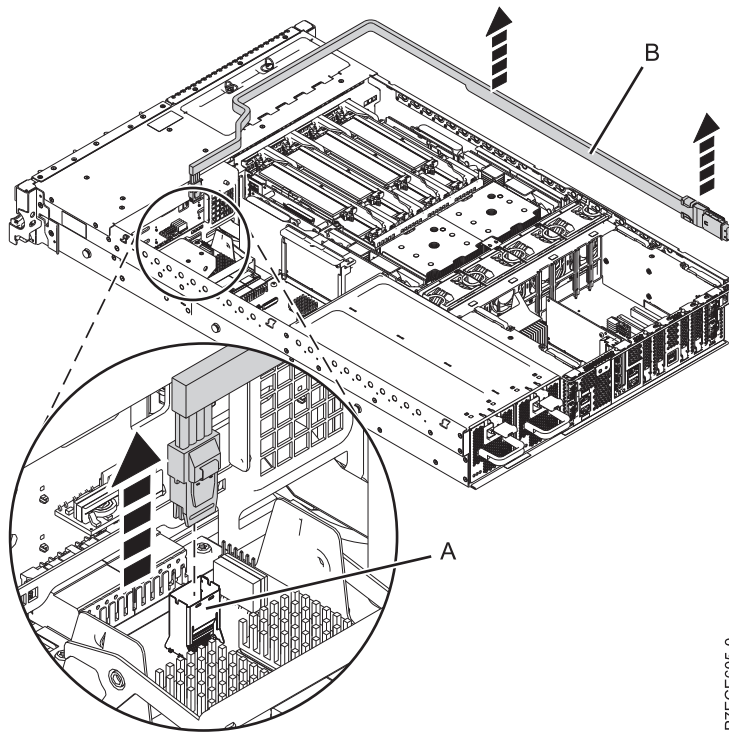
Figure 137. Removing the SAS cable

4. Install the new SAS cable. See Figure 138 on page 156.
   a. Connect the external port to the back of the system **(B)** until it snaps in place.
   b. If necessary, open the cable clamp on the side wall, placing the cable through the clamp. The cable clamp opens from the top.
   c. Close the cable clamp and continue to slide the cable **(A)** back to the SAS connection on the system backplane.
   d. Push the SAS shroud into the SAS connection **(B)** on the system backplane until it snaps in place.
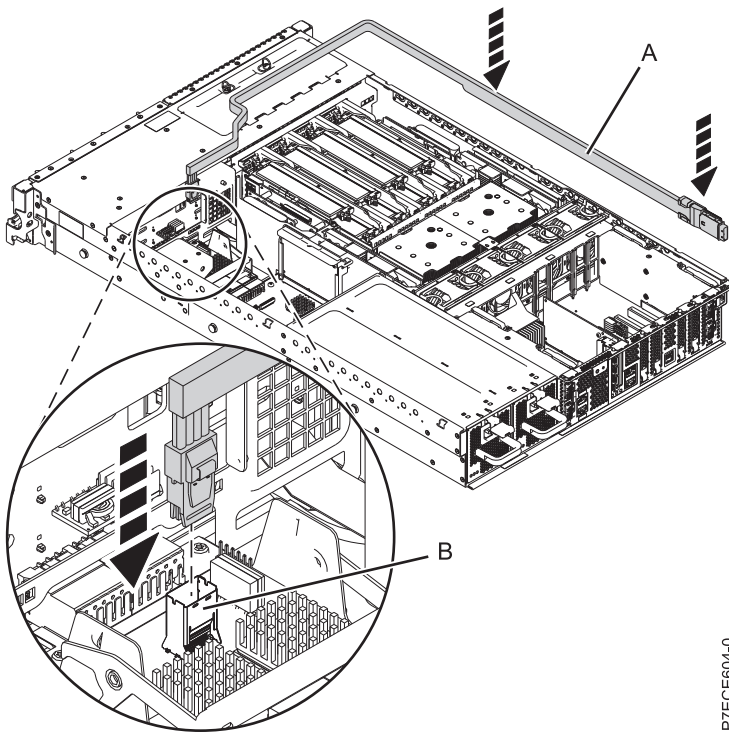
Figure 138. Replacing the SAS cable

5. Replace all PCI adapter cassettes. See PCI adapter single-width, fourth-generation cassette.

6. Start the system. See http://publib.boulder.ibm.com/infocenter/powersys/v3r1m5/topic/p7haj/ crustartsys.htm

You can now attach other supported SAS features to the system.

Installing the external SAS port on an 8233-E8B or 8236-E8C

You might need to install an external SAS port as a part of upgrading your disk-drive backplane, or to enable internal disk sharing. Use the procedure in this section to perform this task.

If your system is managed by the Hardware Management Console (HMC), use the HMC to complete the steps to install the SAS feature 3699 into the server. For instructions, see "Removing a part by using the Hardware Management Console" on page 247.

If you do not have an HMC, complete the following steps to install SAS feature 3699 into the server:

1. Perform the prerequisite tasks described in "Before you begin" on page 189.
2. Stop the system. For instructions, see "Stopping a system or logical partition" on page 201.
3. If the system is rack-mounted, place the system into the service position. For instructions, see "Placing a 8233-E8B or 8236-E8C in the service position" on page 236.
4. Remove the service access cover. For instructions, see "Removing the service access cover from an 8233-E8B or 8236-E8C system" on page 219.
5. Remove the system processor assembly or filler in position P1-C16 by lifting the handle **(A)** and lifting the assembly out of the system, as shown in the following figure.

   Note: You only need to remove the one assembly or filler in P1-C16. To remove a filler, grasp the filler in the center and lift the filler out of the system.

P7HAL502-0
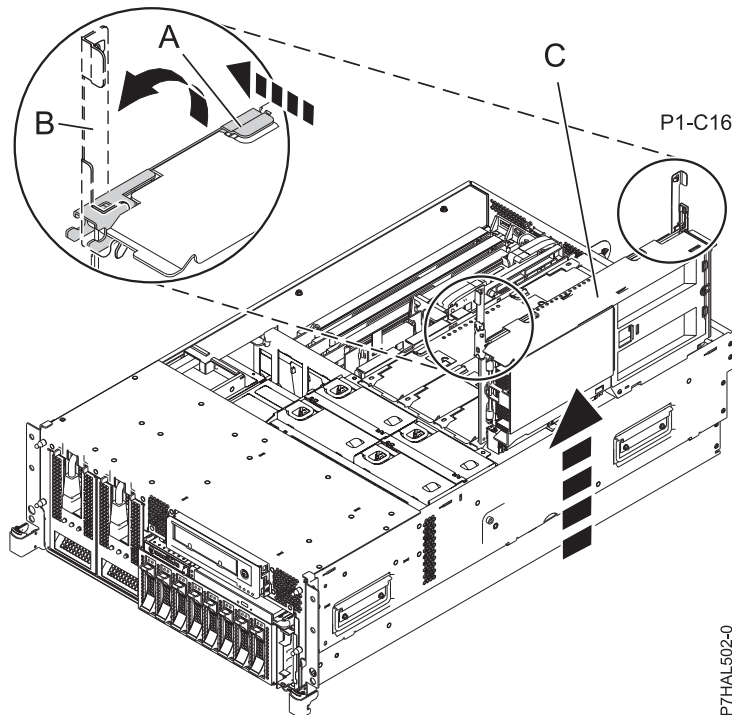
6. Remove the fans and fan cage from the system by doing the following steps:
   a. To remove the fans, squeeze the tab **(A)** and lift the fan out of the fan cage as shown in the following figure.
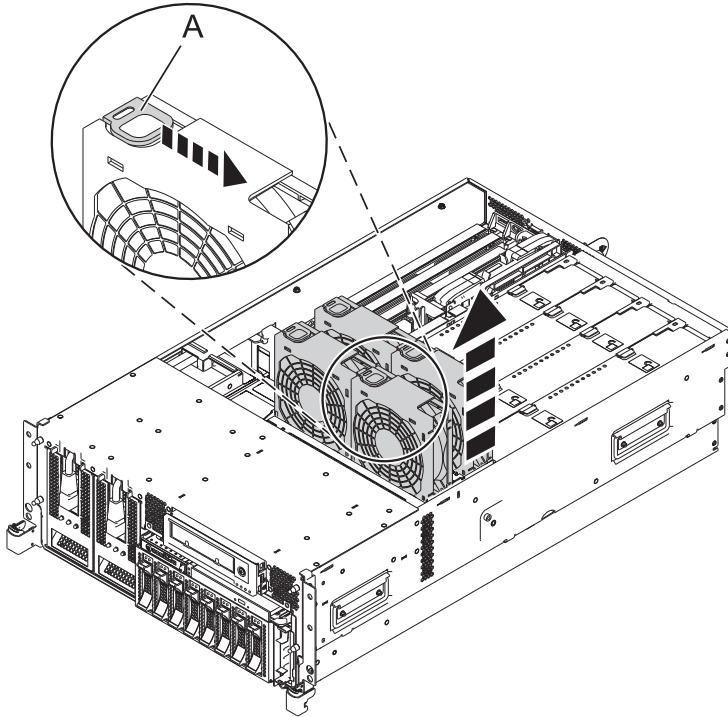
Figure 139. Removing the fan from the 8233-E8B or 8236-E8C fan cage

b. To remove the air baffles, grasp and pull the air baffle out of the fan cage, as shown in the following figure.
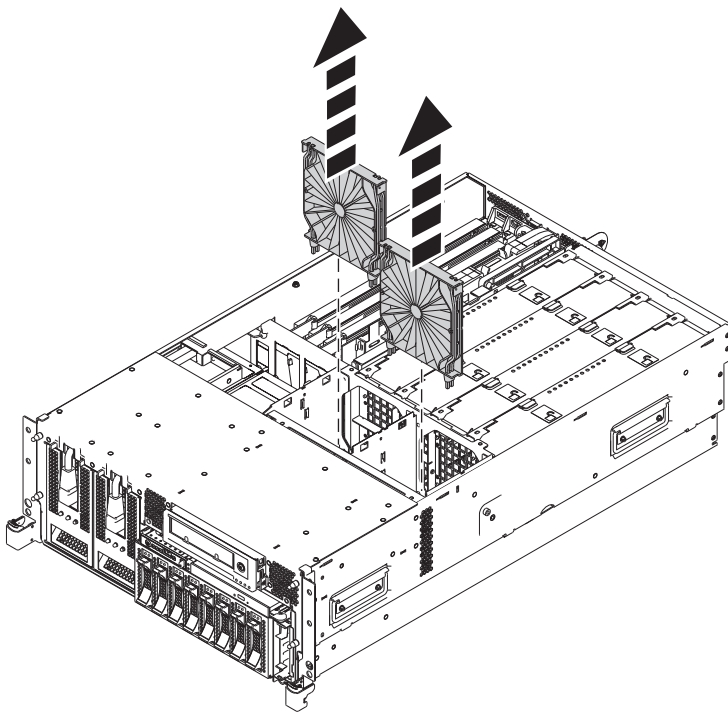
Figure 140. Removing the air baffles from the 8233-E8B or 8236-E8C fan cage

c. To remove the fan cage, loosen the two thumbscrews **(A)** and lift the fan cage **(B)** out of the system as shown in the following figure.
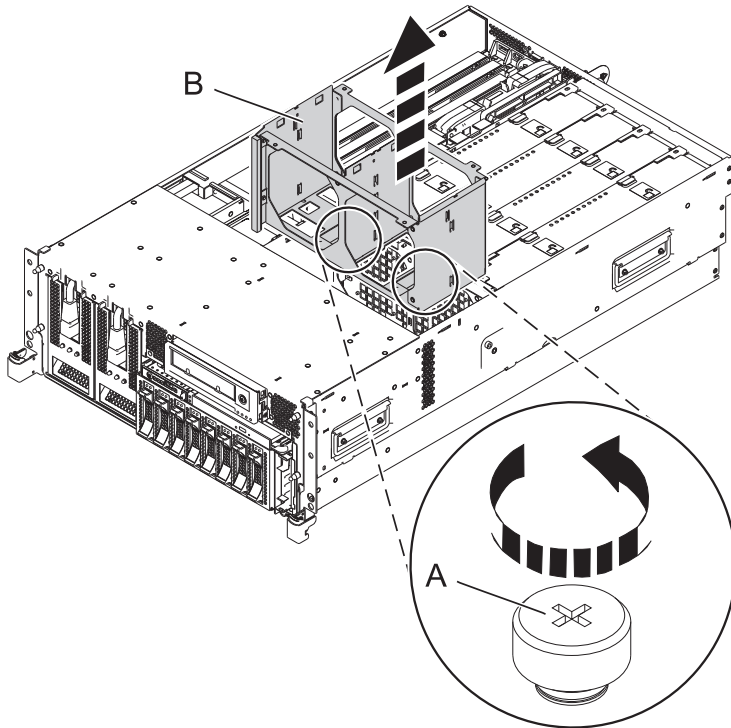
Figure 141. Removing the fan cage from the 8233-E8B or 8236-E8C system

7. Slide the front of the cable, with the male connector, though the opening between the processor cage and the side of the system.

   Tip: Refer to Figure 142 on page 160 to complete the next few steps.

8. Insert the pins **(A)** on the side of the system into the slots **(B)** on the SAS cable assembly.

9. Slide the cable assembly back until the pins **(A)** are seated and the latch **(C)** snaps in place.

   Tip: The port on the back of the cable assembly should be seated in the slot at the back of the system.

10. Attach the cable bracket **(H)** by placing the notch on the bracket over the post on the side of the system, aligning the screw hole **(I)** with the hole on the side of the system, and securing the cable bracket with the screw.

    Note: The bracket should fit snugly over the SAS cable assembly.
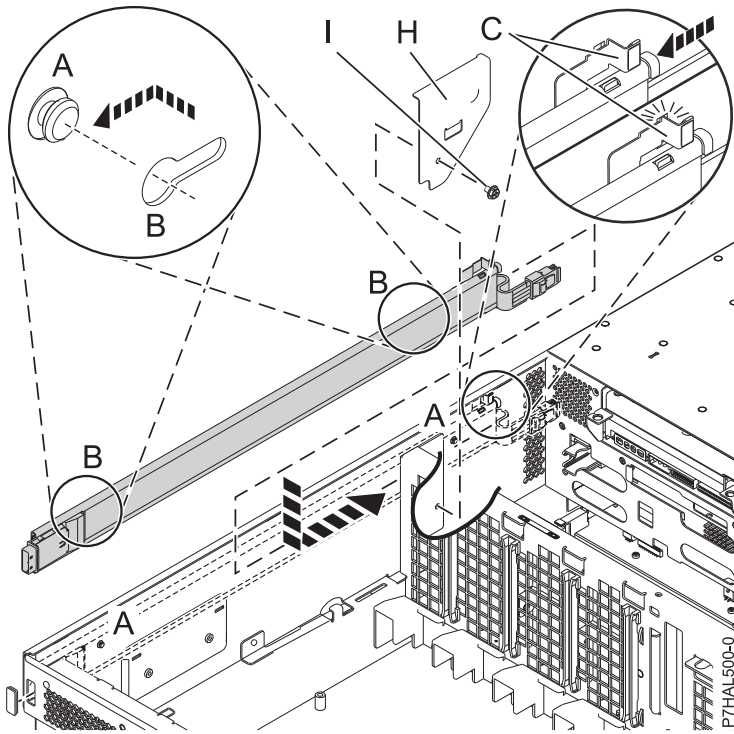
Figure 142. Attaching the SAS cable

11. Depending on the disk-drive backplane you have, complete one of the following choices:

    Tip: Refer to Figure 143 on page 161 to complete this step.
    - If you can see the SAS connection in the center of the disk-drive backplane **(D)**, attach the cable to the connection and continue to step 12 on page 161.
    - If you can see the SAS cable shroud **(E)** extending from the disk-drive backplane, continue to step 11a.
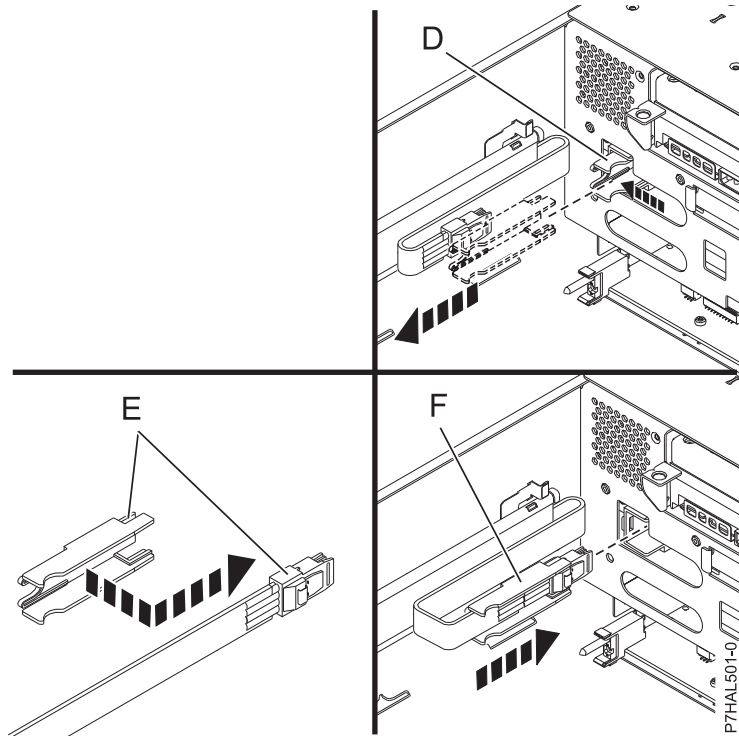
Figure 143. SAS cable connections

    a. Locate the SAS cable shroud **(E)** on the disk-drive backplane and pull the back of the shroud away from the side of the system to unseat the shroud.

    b. Pull the shroud out of the SAS port.

    c. Attach the shroud to the male SAS connector **(F)** on the cable assembly by sliding the shroud over the top of the cable connector **(F)** from behind. The SAS connector on the cable should fit into the two slots at the front of the shroud, and the connector should extend away from the shroud so it can be seated in the port.

    d. Slide the cable and shroud **(G)** into the SAS port until it is firmly seated in place.

12. Replace the fans and the fan cage, by doing the following steps:

    a. To install the fan cage **(A)** into the system, align the locator pins through the holes, and tighten the two thumbscrews **(B)**, as shown in the following figure.
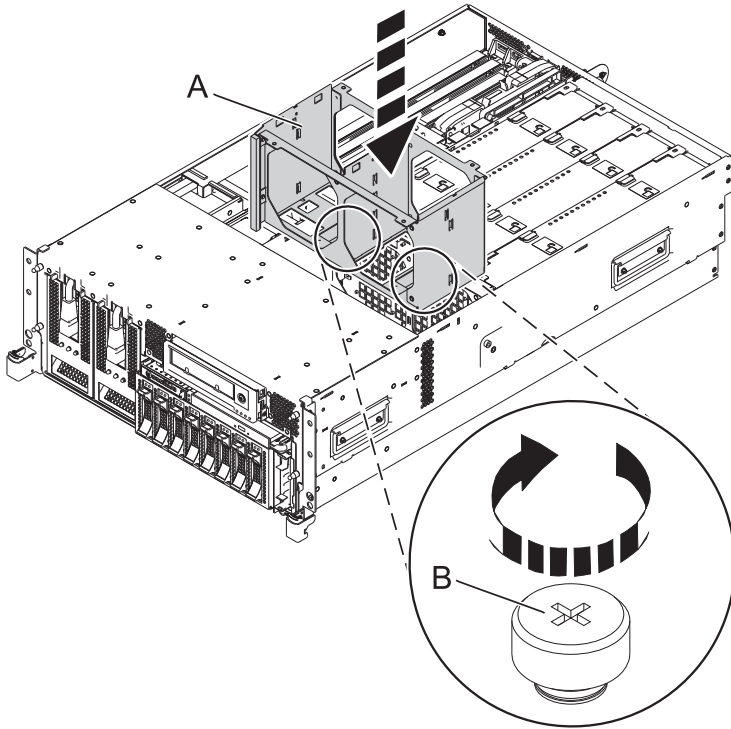
Figure 144. Installing the fan cage in the 8233-E8B or 8236-E8C system

      b. To install the air baffles, insert the air baffles into their location in the fan cage, and push down until they lock into place, as shown in the following figure.
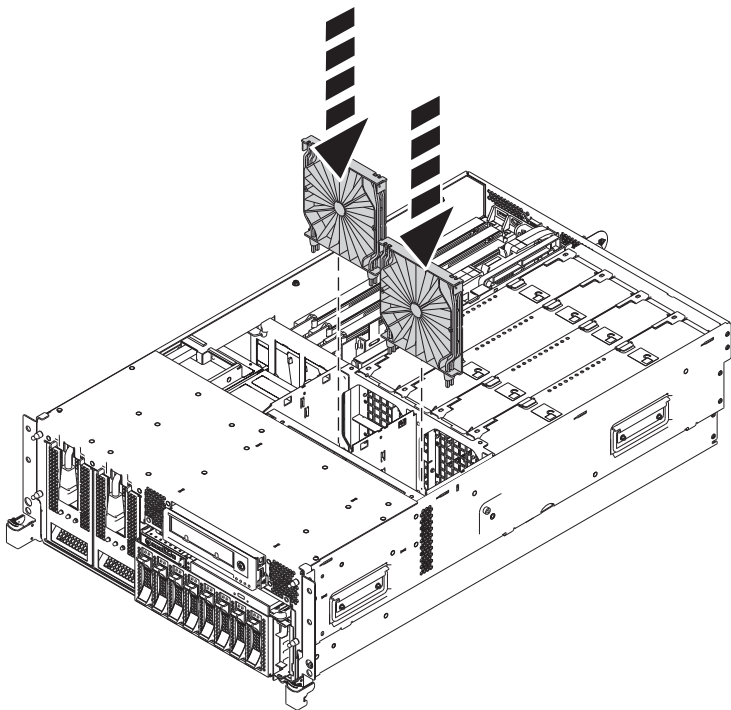
Figure 145. Installing the air baffles in the 8233-E8B or 8236-E8C fan cage

c. To install the fans, insert the fans into their location in the fan cage, and push down on the fan until it locks into place, as shown in the following figure.
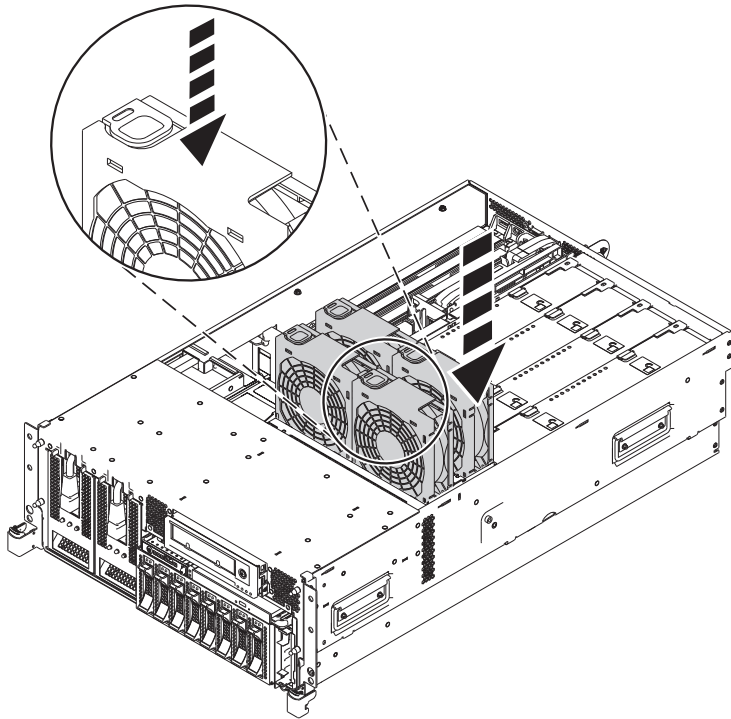
Figure 146. Installing the fans in the 8233-E8B or 8236-E8C fan cage

13. Install the system processor **(B)** and secure both latches **(C)**, as shown in the following figure.
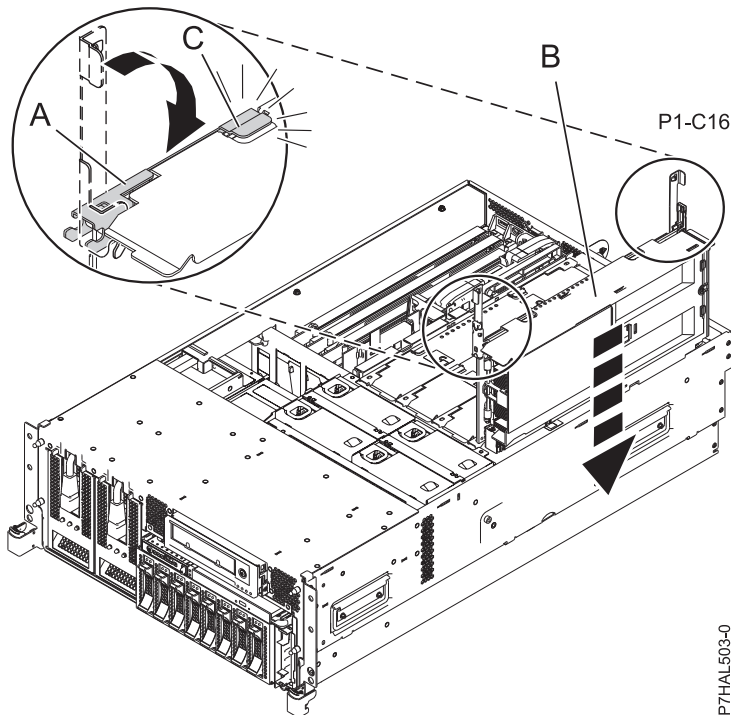
14. Replace the service access cover. For instructions, see "Installing the service access cover on an 8233-E8B or 8236-E8C system" on page 220.

15. Place the system back into the operating position. For instructions, see "Placing the 8233-E8B or 8236-E8C in the operating position" on page 239.

You may now attach supported SAS features to your system. Return to the instructions that sent you here or start your system. For instructions, see "Starting the system or logical partition" on page 199.

Installing the external SAS port on a 9117-MMB or 9179-MHB

Use this procedure to install an external SAS port as a part of upgrading your disk-drive backplane, or to enable internal disk sharing.

Complete the following steps to install the external SAS port into the server:

1. Perform the prerequisite tasks described in "Before you begin" on page 189.
2. Stop the system. See "Stopping a system or logical partition" on page 201.
3. Remove all PCI adapter cassettes. See PCI adapter single-width, fourth generation cassette.
4. If necessary, remove the existing SAS cable or filler.
   a. Press the side tab and pull the SAS shroud **(A)** out of the SAS connection on the system backplane.
   b. Open the cable clamp on the side wall and pull the cable out. The cable clamp opens from the top.
   c. Push the external SAS port down **(B)** and then pull the SAS cable out of the system.
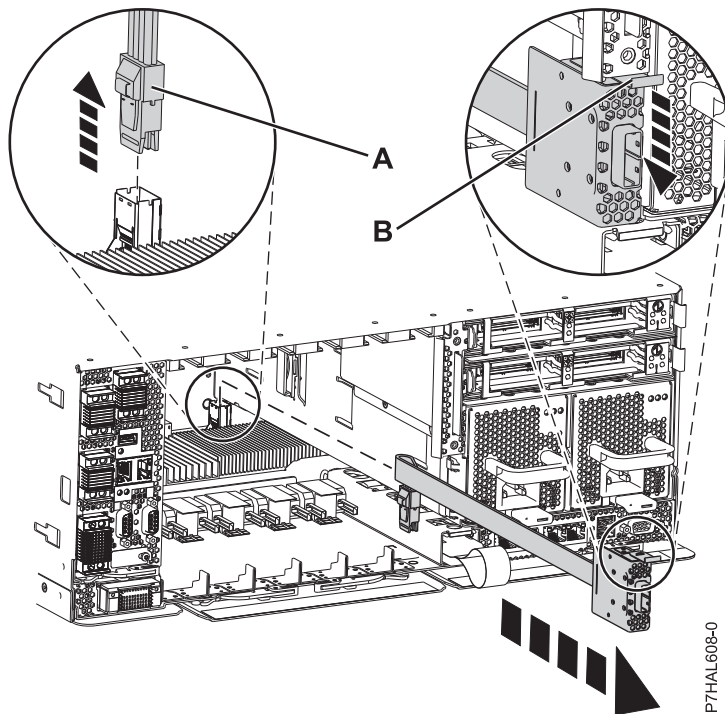
Figure 147. Removing the SAS cable

5. Install the new SAS cable.
   a. Connect the external port to the back of the system **(B)** until it snaps in place.
   b. If necessary, open the cable clamp on the side wall, placing the cable through the clamp. The cable clamp opens from the top.
   c. Close the cable clamp and continue to slide the cable back to the SAS connection on the system backplane.
   d. Push the SAS shroud **(A)** into the SAS connection on the system backplane until it snaps in place.
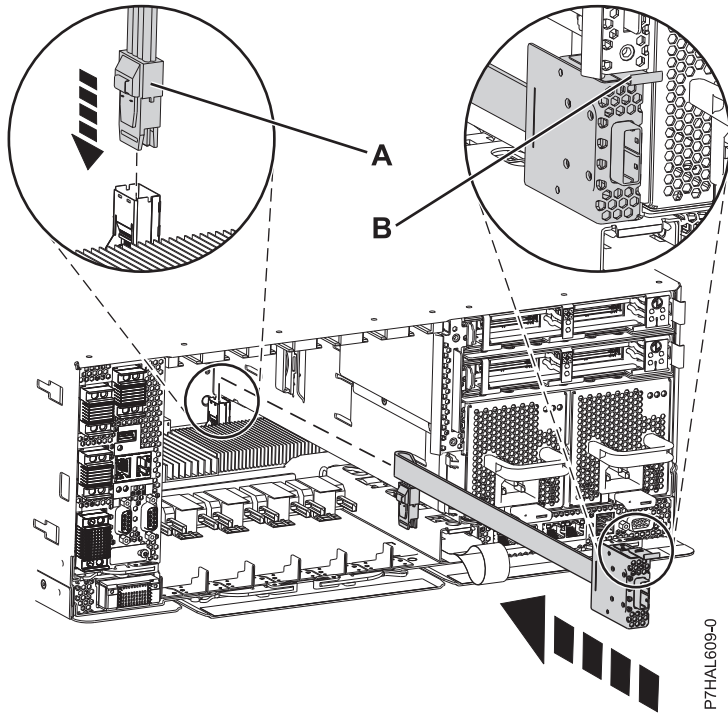
Figure 148. Replacing the SAS cable

6. Replace all PCI adapter cassettes. See PCI adapter single-width, fourth generation cassette.
7. Start the system. See "Starting the system or logical partition" on page 199

You may now attach other supported SAS features to your system.

Replacing a SAS conduit card in a 5802 expansion unit with power off

Learn how to replace a SAS conduit card in a 5802 expansion unit with power off.

Review the requirements in "Before you begin" on page 189.

If your system is managed by the Hardware Management Console (HMC), use the HMC to replace the card. For instructions see, "Removing a part by using the Hardware Management Console" on page 247

1. Stop the system if it is running. For instructions see, "Stopping a system or logical partition" on page 201.
2. Disconnect the power source from the system by unplugging the system.

   Attention: This system might be equipped with a second power supply. You must disconnect the power source from the system by disconnecting all power cords to prevent system damage during this procedure.

   (L003)
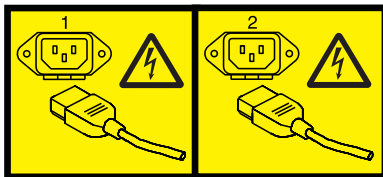
   or

3. Place the card connector **(C)** onto the on the midplane connection **(D)** using the guide track **(B)** to ensure a good connection. Then lift the handle **(A)** to seat and secure the SAS conduit card to the midplane as shown in the following figure.
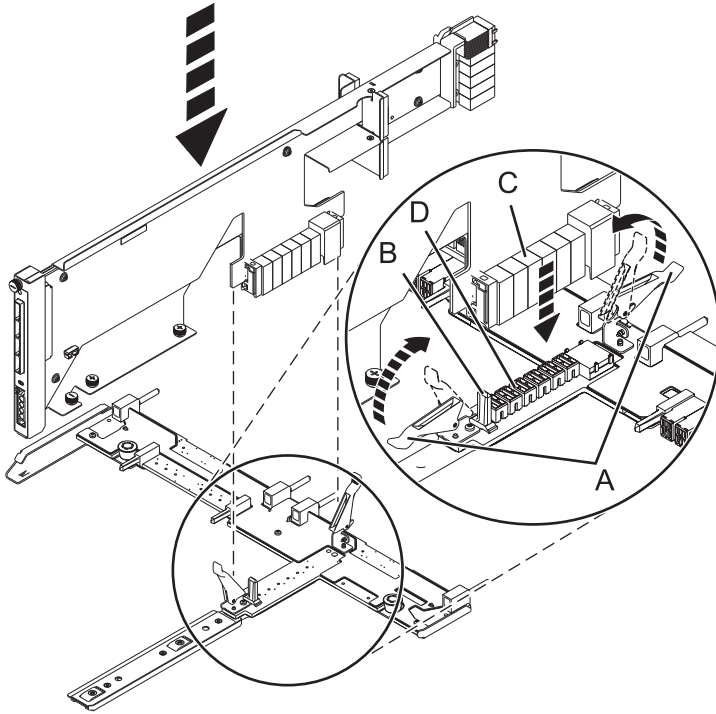
Figure 149. Installing the SAS conduit card into the midplane

4. Place the midplane and SAS conduit card back into the system by doing the following steps:
    a. Align the midplane with the track and ensure the slot **(A)** on the midplane attaches to the post **(B)** in the system.
    b. Secure the thumbscrews **(C)** and **(D)** on the SAS conduit card.
    c. Secure the thumbscrews **(E)** on the sides of the midplane.
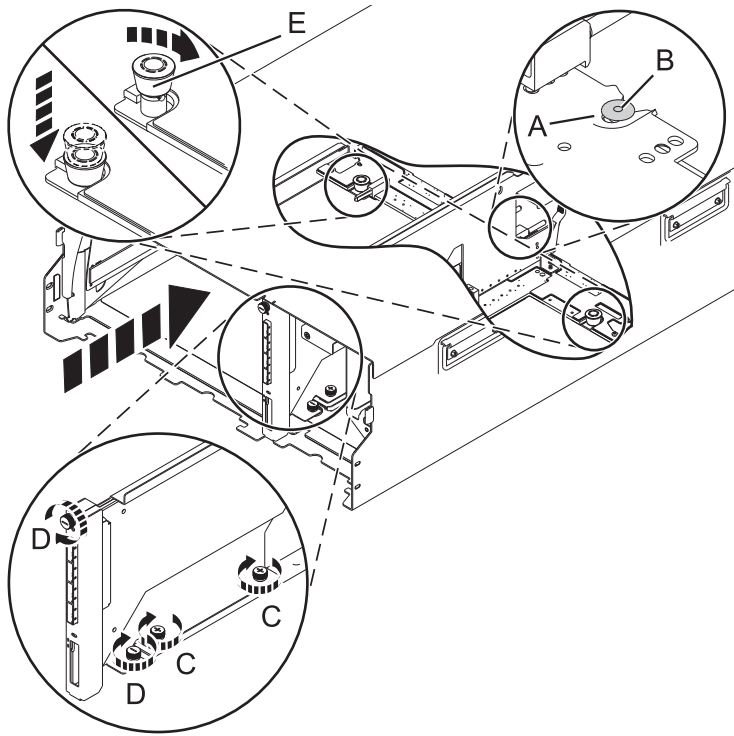
Figure 150. Installing the SAS conduit card and the midplane

5. Attach the power cord cover and secure the thumbscrew **(A)** to the system.
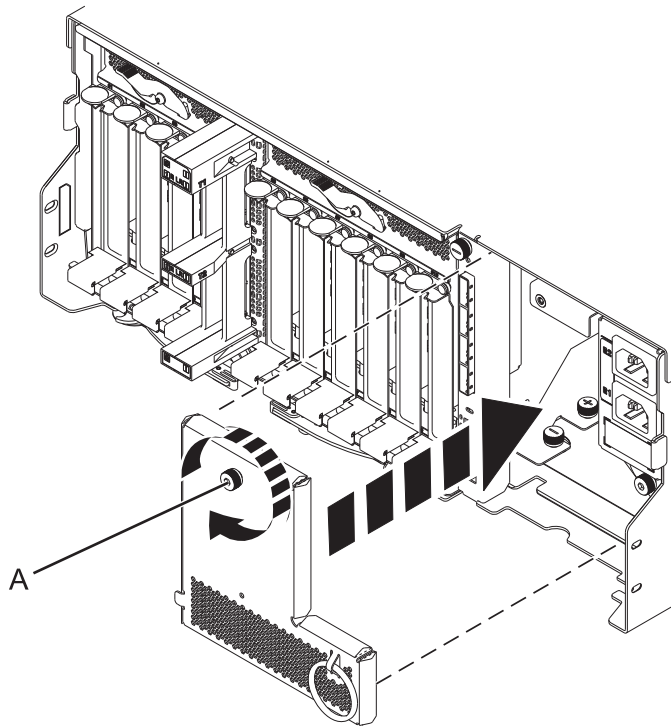
Figure 151. Installing the power cord plate

6. Carefully slide the enclosure management controller into the system and close the latch **(A)** as shown in the following figure.
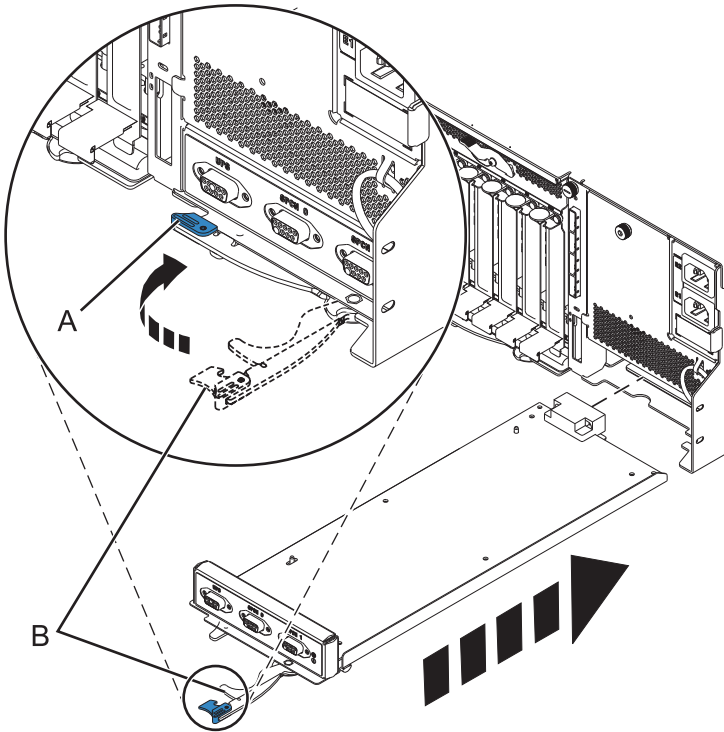
Figure 152. Replacing the enclosure management controller

7. Carefully lift and align the I/O planar with the slot at the back of the expansion unit.
8. Insert the I/O planar firmly into the server, as shown in the following figure.
9. Secure the I/O planar with the locking tabs **(A)** as shown in the following figure.
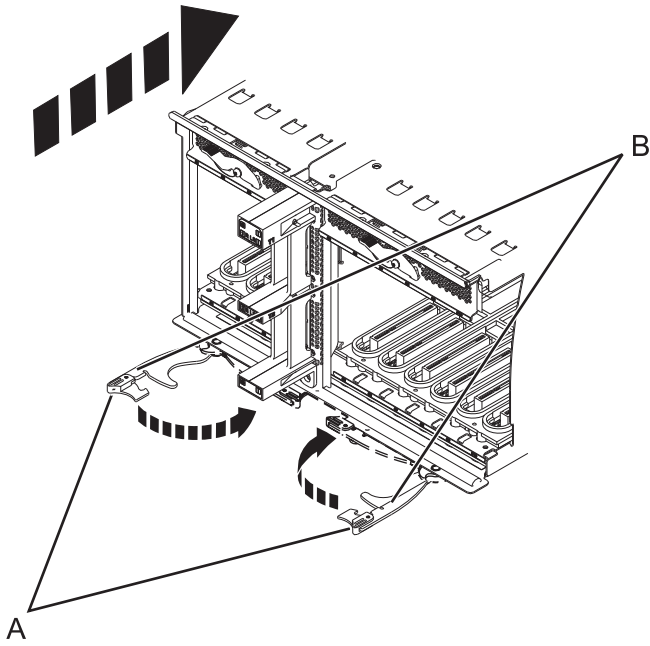
Figure 153. Install the I/O planar on a rack mounted model

10. To replace the power supply, with the locking handle **(A)** in the open position, push the power supply into the expansion unit as shown in the following figure.

11. Close the locking handle **(A)** until the power supply locks into position.
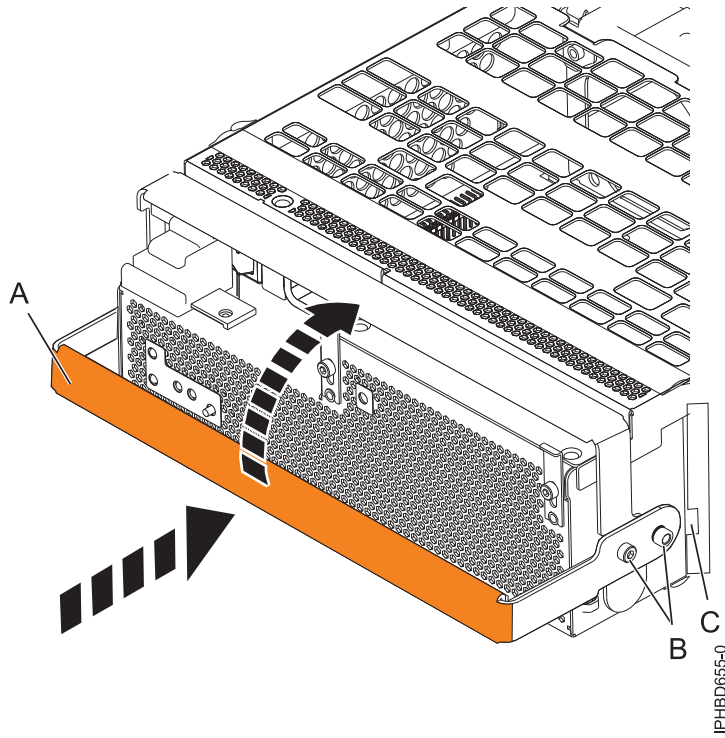
Figure 154. Replacing a power supply

12. To replace the disk drive backplane, lift the backplane along the two sides and align with the guide rails in the expansion unit.

    CAUTION:
    The backplane may be heavy. Ensure that you can safely perform this task before you begin.

13. Using your hand to support the bottom of the backplane, slide it into the expansion unit as shown in the following figure.

14. Secure the backplane in place by moving the locking tabs from the open position **(B)** to the locked position **(A)**.
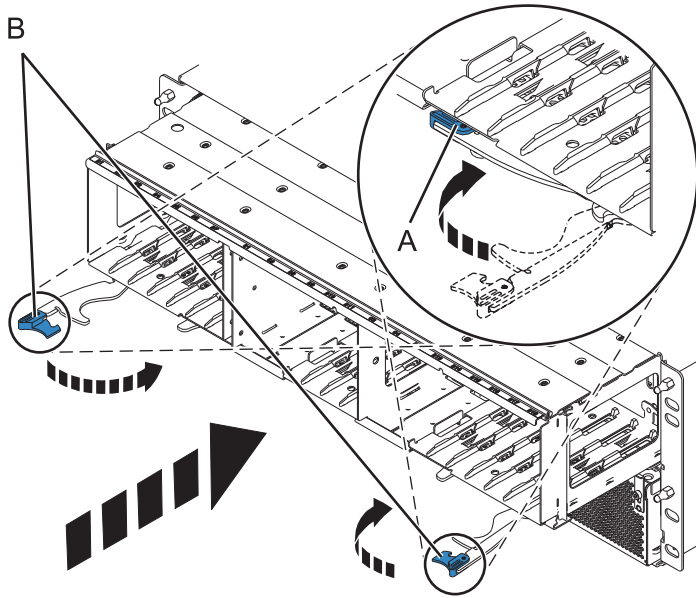
Figure 155. Installing the backplane on a rack-mounted model

15. Replace all disk drive units and fillers, if you removed them earlier.
    a. Support the bottom of the disk drive unit as you align it with the guide rails in the backplane.
    b. Slide the disk drive unit all the way into the backplane.
    c. Push the handle **(A)** toward the disk drive unit to lock it into place.
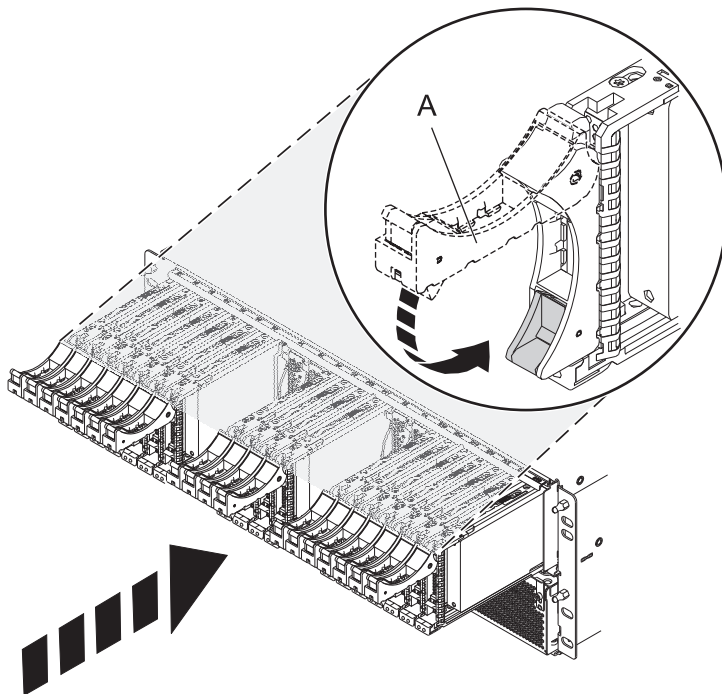
16. Replace all expander cards and fillers, if you removed them earlier.
    a. Supporting the bottom of the expander card with your hand, align it with the guide rails in the backplane.
    b. Slide the expander card all the way into the backplane.
    c. Push the handle **(A)** toward the card to lock it into place.
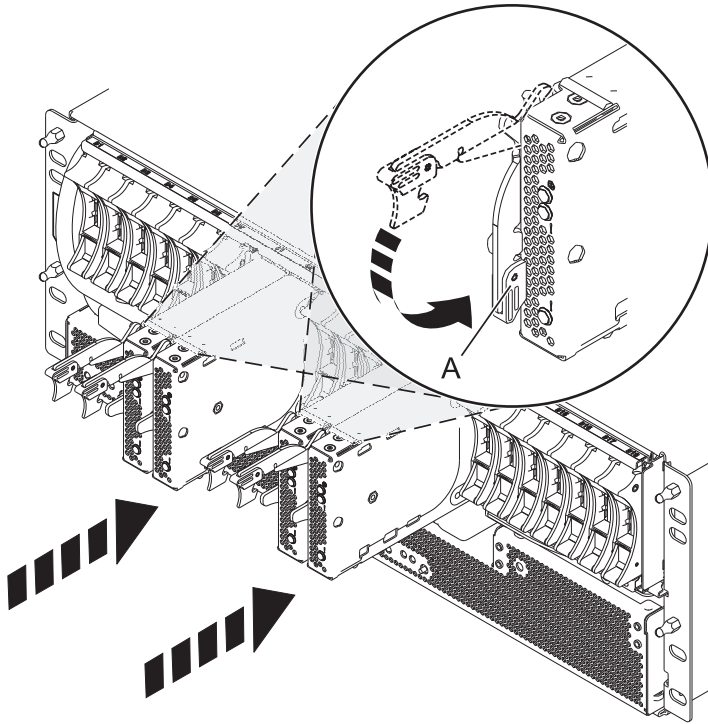
17. Start the system. For instructions see, "Starting the system or logical partition" on page 199.

Continue with any other service actions you need to perform.
- For information on connecting the system see Connecting your expansion units
- For information an installing the PCI adapters into the planar, see Model 5802 and 5877 expansion units, PCI adapters, and cassettes.

Removing a SAS conduit card from a 5802 expansion unit with power off

Learn how to remove a SAS conduit card from a 5802 (rack-mounted) expansion unit if you need to replace a failing part with power off.

If your system is managed by the Hardware Management Console (HMC) use the HMC to remove the SAS conduit card. For instructions see, "Removing a part by using the Hardware Management Console" on page 247.

1. Perform the prerequisite tasks as described in "Before you begin" on page 189.
2. Identify the card you are going to remove. For instructions see, "Identifying a failing part" on page 193.
3. Stop the system. For instructions see, "Stopping a system or logical partition" on page 201.
4. Remove the disk drives and fillers as shown in the following figure.
   a. Squeeze the latch of the disk drive and pull the handle **(A)** toward you to release the drives.
   b. Supporting the bottom of the disk drive with your hand, slide it out of the backplane.
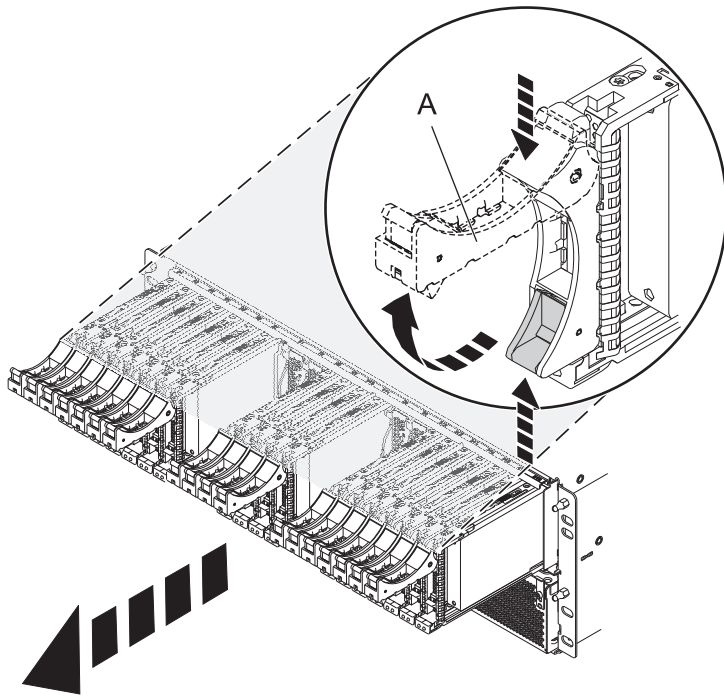
Figure 156. Removing the disk drives from the backplane

5. Remove the port cards and fillers as shown in the following figure.
   a. Grasp the end of the latching handle **(A)** and pull it upward to unlock the port card.
   b. Using your hand to support the bottom of the port card, slide it out of the backplane.
   c. Place the port card on an electrostatic discharge (ESD) surface.
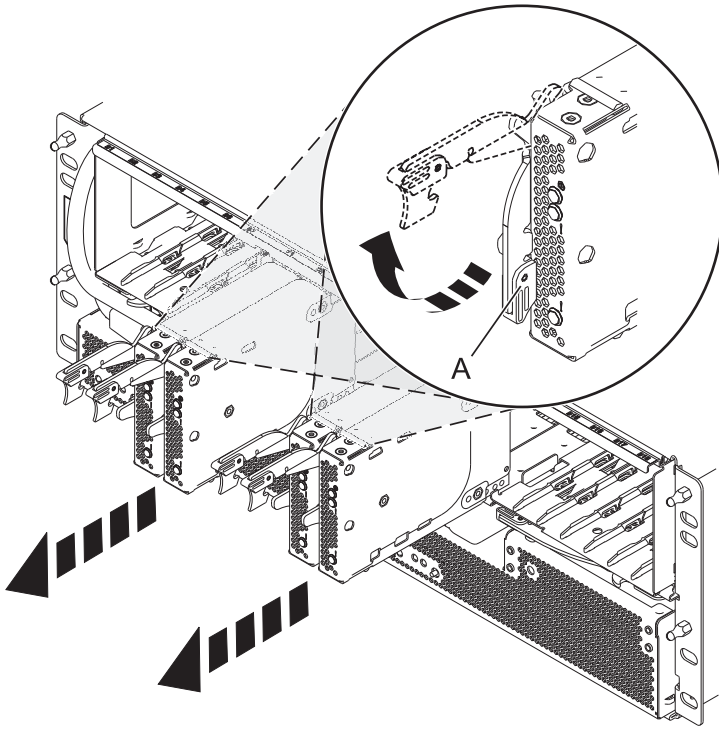
Figure 157. Removing the port card from the backplane

6. Remove the backplane as shown in the following figure.

   CAUTION:

   The backplane might be heavy. Ensure that you can safely complete the procedure.

   a. Squeeze the blue latches **(A)** to unlock the handles.

   b. Pull the handles **(B)** outward in the direction shown to release the backplane.

   c. Slide the backplane out of the enclosure, using your hand to support the bottom of the backplane.
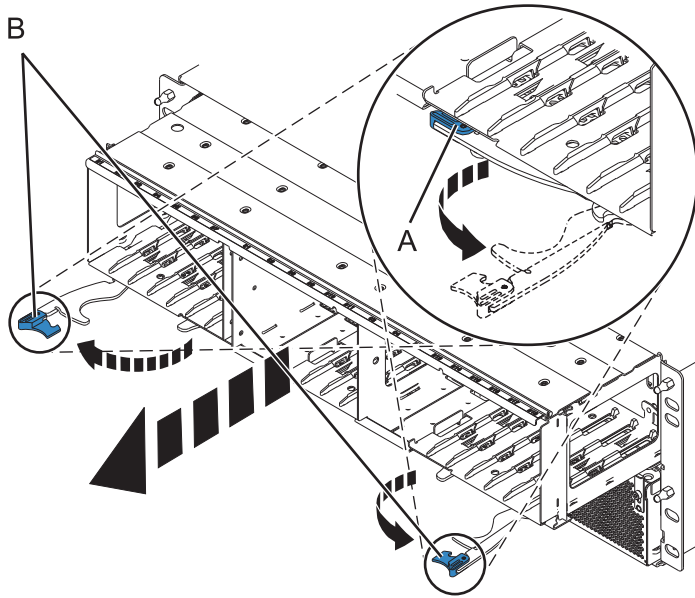
Figure 158. Removing the backplane from the enclosure

7. Disconnect both offline converter assembly (OCA) power cords by doing the following:
   a. On the front of both OCAs, slide the power cord holders **(A)** to the left.
   b. Label and disconnect both OCA power cords **(B)** from each OCA.
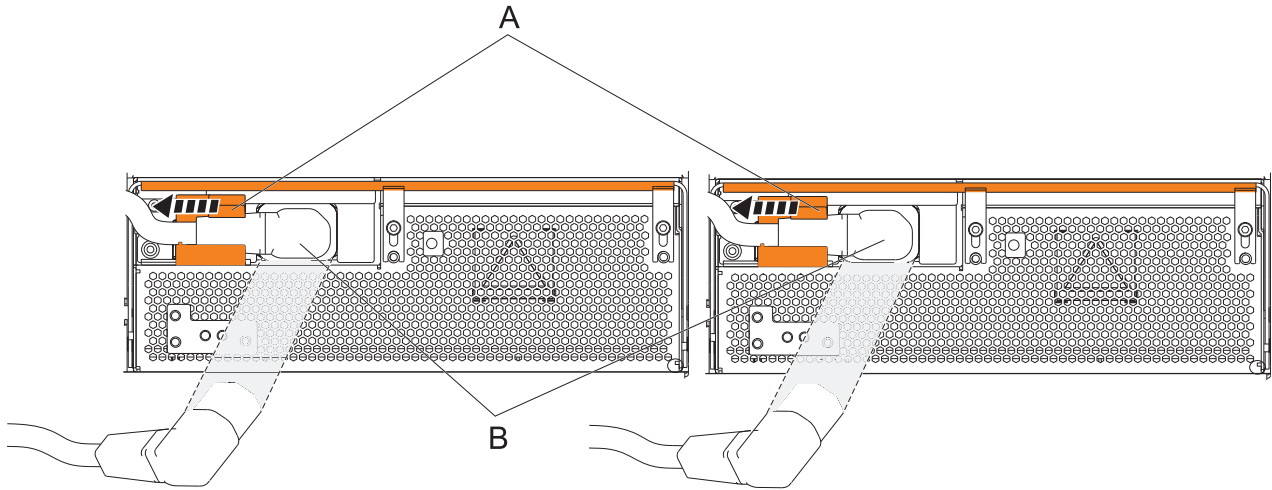
Figure 159. Disconnecting the OCA power cords

8. Remove the offline converter assemblies by doing the following steps:
   a. Pull the OCA handle **(A)** all the way down in the direction shown to unseat the OCA.
   b. Grasp both sides of the OCA and pull it out of the enclosure.

      Note: Use 2 hands to support the OCA as it is pulled out of the enclosure.
   c. Repeat these steps to remove both OCAs.
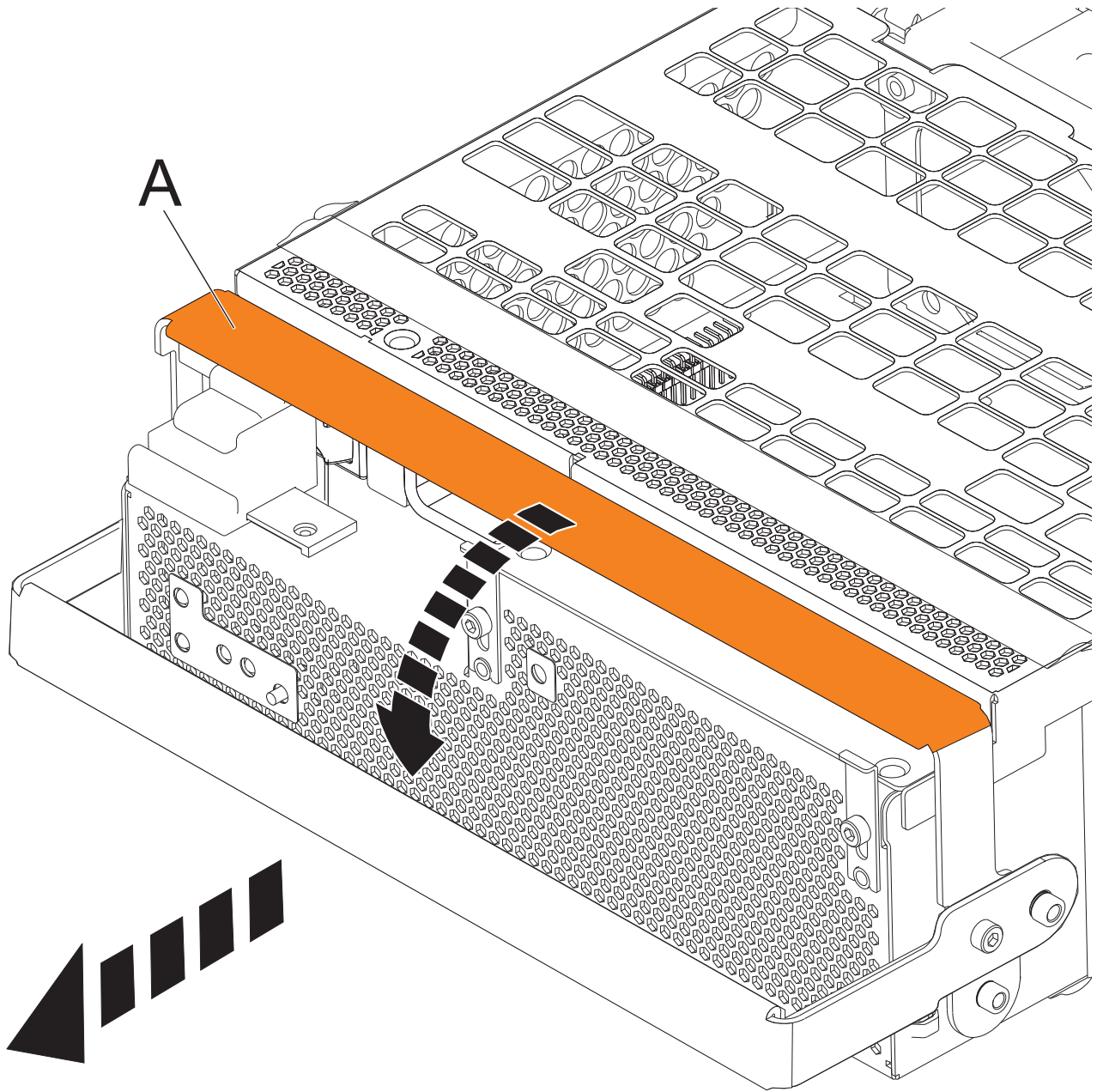
Figure 160. Remove the offline converter assemblies

9. Remove the enclosure management controller by doing the following steps:
   a. Label and disconnect any cables connected to the enclosure management controller card.
   b. Pinch the latch **(A)** to unlock the handle **(B)**.
   c. Pull the handle outward in the direction shown to unseat the EMC card.
   d. Slide the enclosure management controller card straight out of the enclosure.
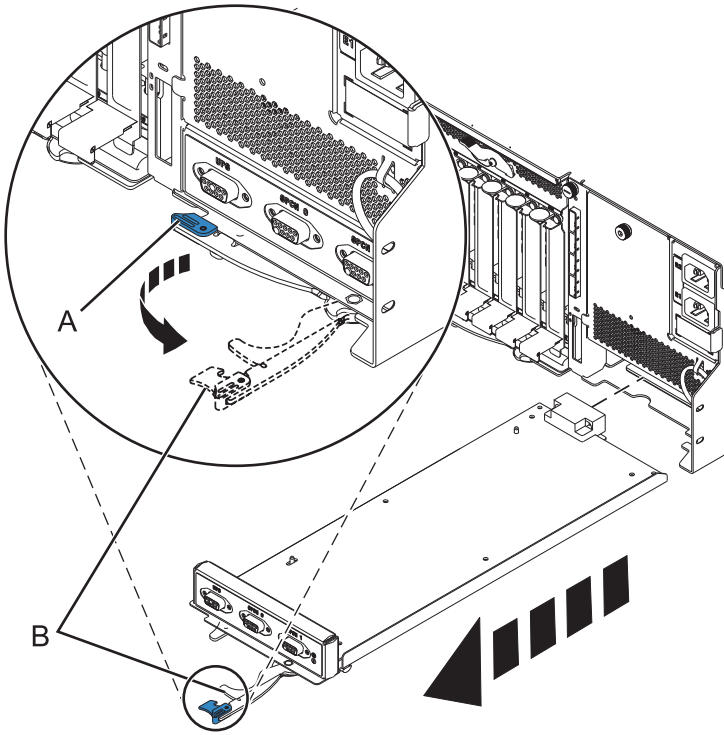
Figure 161. Remove the enclosure management controller

10. Remove the power cord plate by turning the thumbscrew **(A)** and pulling the plate away from the system.
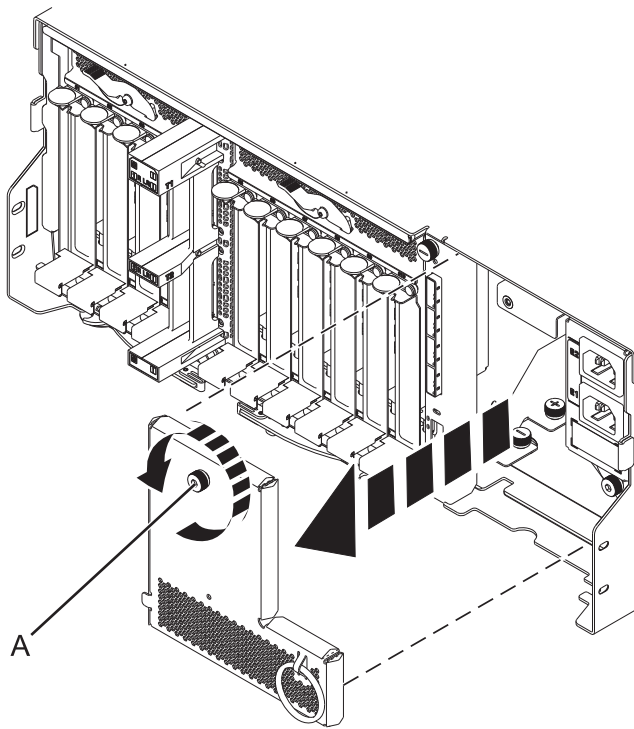
Figure 162. Removing the power cord plate

11. Disconnect the cables from the back of the I/O planar.

12. Squeeze the release latches **(A)** and pull the levers **(B)** out away from the system, as shown in the following figure.
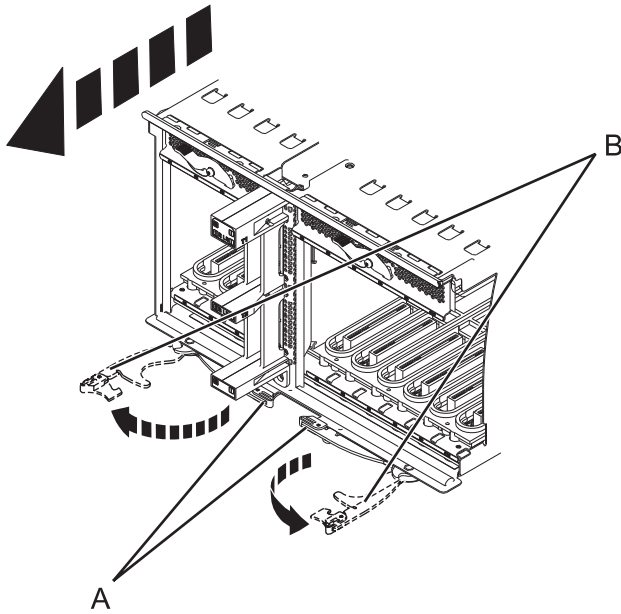
Figure 163. Removing the I/O planar

13. Slide the planar out of the system.
14. Remove the SAS conduit card and midplane from the enclosure by doing the following steps:
    a. Pull the spring plungers **(A)** up and turn them one quarter to the left.
    b. Turn the captive screws **(B)** and **(C)** counterclockwise until they are completely loosened.
    c. Pull the SAS conduit and midplane component out of the enclosure.
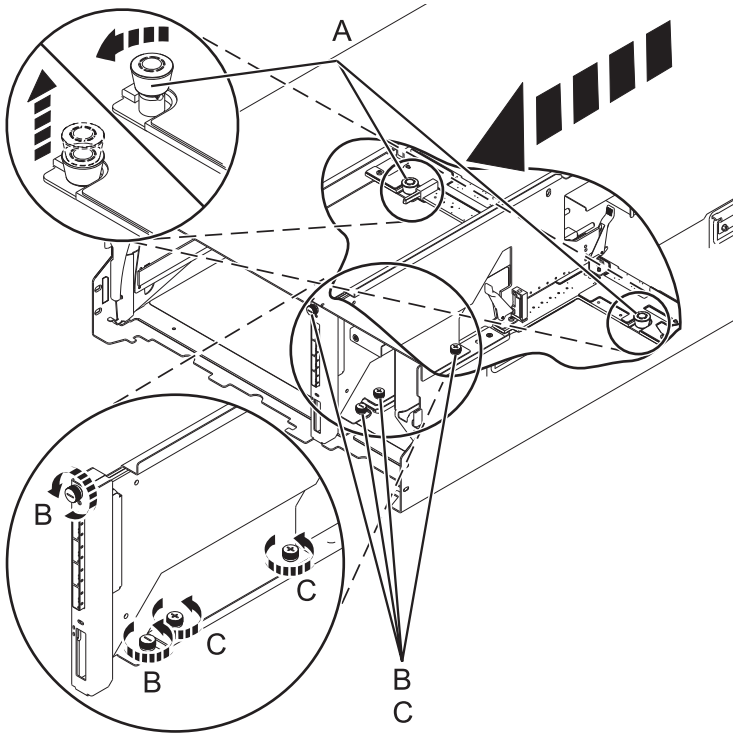
Figure 164. Removing the SAS conduit card and midplane

15. Push the handles **(A)** on the conduit card down to disengage the card from the midplane, and remove the card.
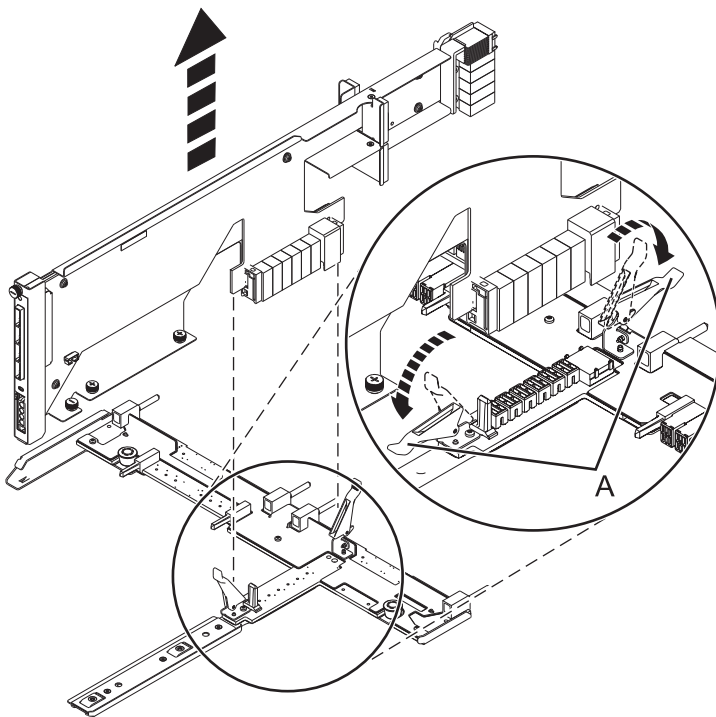
Figure 165. Removing the SAS conduit card from the midplane

Continue with replacing the SAS expander card or return to the procedure that sent you here.

Replacing a SAS expander card in a 5802 expansion unit with power off

Learn how to replace a SAS expander card in a 5802 expansion unit with power off.

Review the requirements in "Before you begin" on page 189.

If your system is managed by the Hardware Management Console (HMC) use the HMC to replace the card. For instructions see, "Removing a part by using the Hardware Management Console" on page 247

1. Before installing or reinstalling a SAS expander card, inspect the signal connector pins to ensure that the pins are not bent or damaged.

   Attention: Bent pins damage the backplane receptacle. Be careful not to touch or damage the signal connector pins.

2. Slide the card completely into the slot and push the lever **(A)** down to secure the card as shown in the following figure.
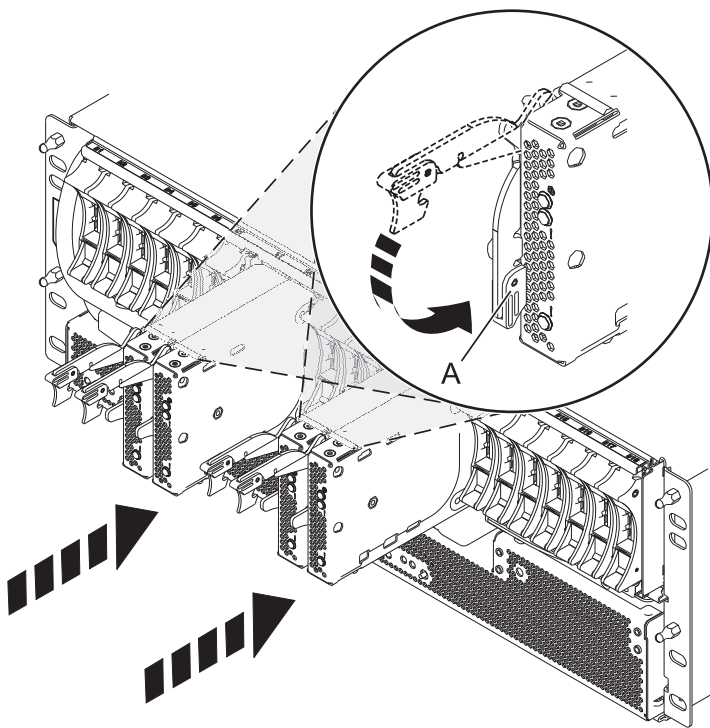
Figure 166. Installing the SAS expander card

3. Start the system. For instructions see, "Starting the system or logical partition" on page 199.
4. Verify the presence of the newly installed card. For instructions see, "Verifying the installed part" on page 249.

Continue with any other service actions you need to perform.

Removing a SAS expander card from a 5802 expansion unit with power off

Learn how to remove a SAS expander card from a 5802 (rack-mounted) expansion unit if you need to replace a failing part with power off.

If your system is managed by the Hardware Management Console (HMC) use the HMC to remove the SAS expander card. For instructions see, "Removing a part by using the Hardware Management Console" on page 247.

1. Perform the prerequisite tasks as described in "Before you begin" on page 189.
2. Identify the card you are going to remove. For instructions see, "Identifying a failing part" on page 193.
3. Lift the handle **(A)** and pull the card out of the system, as shown in the following figure.
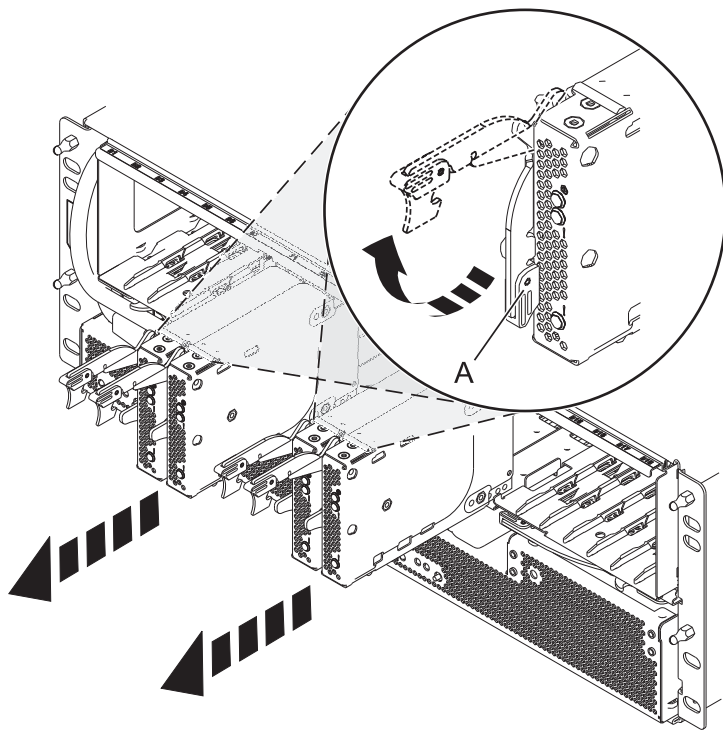
Figure 167. Removing the SAS expander card.

Continue with replacing the SAS expander card or return to the procedure that sent you here.

Common procedures for installable features

This section contains all the common procedures that are related to installing, removing, and replacing features.

Before you begin

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

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 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:
- **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.**
- **Connect all power cords to a properly wired and grounded electrical outlet. Ensure that the outlet supplies proper voltage and phase rotation according to the system rating plate.**
- **Connect any equipment that will be attached to this product to properly wired outlets.**
- **When possible, use one hand only to connect or disconnect signal cables.**
- **Never turn on any equipment when there is evidence of fire, water, or structural damage.**
- **Disconnect the attached power cords, telecommunications systems, networks, and modems before you open the device covers, unless instructed otherwise in the installation and configuration procedures.**
- **Connect and disconnect cables as described in the following procedures when installing, moving, or opening covers on this product or attached devices.**

  To Disconnect:
  1. **Turn off everything (unless instructed otherwise).**
  2. **Remove the power cords from the outlets.**
  3. **Remove the signal cables from the connectors.**
  4. **Remove all cables from the devices**

  To Connect:
  1. **Turn off everything (unless instructed otherwise).**
  2. **Attach all cables to the devices.**
  3. **Attach the signal cables to the connectors.**
  4. **Attach the power cords to the outlets.**
  5. **Turn on the devices.**

  (D005)

DANGER

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

- Heavy equipment–personal injury or equipment damage might result if mishandled.
- Always lower the leveling pads on the rack cabinet.
- Always install stabilizer brackets on the rack cabinet.
- To avoid hazardous conditions due to uneven mechanical loading, always install the heaviest devices in the bottom of the rack cabinet. Always install servers and optional devices starting from the bottom of the rack cabinet.
- Rack-mounted devices are not to be used as shelves or work spaces. Do not place objects on top of rack-mounted devices.

- Each rack cabinet might have more than one power cord. Be sure to disconnect all power cords in the rack cabinet when directed to disconnect power during servicing.
- Connect all devices installed in a rack cabinet to power devices installed in the same rack cabinet. Do not plug a power cord from a device installed in one rack cabinet into a power device installed in a different rack cabinet.
- An electrical outlet that is not correctly wired could place hazardous voltage on the metal parts of the system or the devices that attach to the system. It is the responsibility of the customer to ensure that the outlet is correctly wired and grounded to prevent an electrical shock.

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

(R001)

Before you begin a replacement or installation procedure, perform these tasks:

1. If you are installing a new feature, ensure that you have the software required to support the new feature.

   To do this, go to the following Web site: IBM Prerequisite

2. If you are performing an installation or replacement procedure 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, open or close a latch, and so on. Terra-cotta might also indicate that the part can be removed and replaced with the system or logical partition power 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:

   - 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 Web site 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. If you are installing new hardware in a logical partition, you need to understand and plan for the implications of partitioning your system. For information, see Logical Partitioning.

Identifying a failing part

Use these instructions to learn how to locate and identify a failing part on your system or expansion unit using the appropriate method for your system.

For IBM Power Systems servers that contain the POWER7 processor, the light-emitting diodes (LEDs) can be used to identify or verify a part that you are servicing. The fault (amber) LED indicates an error and corresponds to the location code in the system reference code (SRC). The LED is activated and deactivated automatically.

If you need to use the identify function, use the following procedures.

Control panel LEDs

Use this information as a guide to the control panel LEDs and buttons.

The control panel has LEDs that indicate various system status.
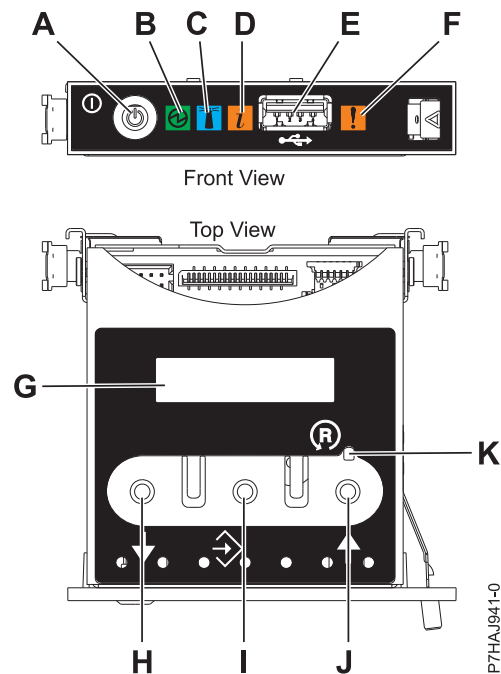
Figure 168. Control panel

- **A**: Power-on button
- **B**: Power LED
  - A constant light indicates full system power to the unit.
  - A blinking light indicates standby power to the unit.

  Note: There is approximately a 30-second transition period from the time the power-on button is pressed to when the power LED goes from blinking to solid. During the transition period, the LED might blink faster.
- **C**: Enclosure identify light

- – A constant light indicates the identify state, which is used to identify a part.
  - – No light indicates that the system is operating normally.
- **D**: System information light
  - – No light indicates that the system is operating normally.
  - – Light on indicates that the system requires attention.
- **E**: USB port
- **F**: Enclosure fault roll-up light
  - – A constant light indicates a fault in the system unit.
  - – No light indicates that the system is operating normally.
- **G**: Function/Data display
- **H**: Decrement button
- **I**: Enter button
- **J**: Increment button
- **K**: Pinhole reset button

Related concepts

Identifying a failing part
Use these instructions to learn how to locate and identify a failing part on your system or expansion unit using the appropriate method for your system.

Identifying a failing part in an AIX system or logical partition

Use these instructions to learn how to locate a failing part, and then activate the indicator light for that part on a system or logical partition running the AIX operating system.

Locating a failing part in an AIX system or logical partition

You might need to use AIX tools, before activating the indicator light, to locate a part that is failing.

1. Log in as root user or `celogin-`.
2. At the command line, type `diag` and press Enter.
3. From the Function Selection menu, select **Task Selection** and press Enter.
4. Select **Display Previous Diagnostic Results** and press Enter.
5. From the Display Previous Diagnostic Results display, select **Display Diagnostic Log Summary**. The Display Diagnostic Log display shows a chronological list of events.
6. Look in the **T** column for the most recent **S** entry. Select this row in the table and press Enter.
7. Select **Commit**. The details of this log entry are shown.
8. Record the location information and the SRN value shown near the end of the entry.
9. Exit to the command line.

Use the location information for the failing part to activate the indicator light that identifies the failing part. "Activating the indicator light for the failing part."

Activating the indicator light for the failing part

Use these instructions to help physically identify the location of a part you are servicing.

1. Log in as root user.
2. At the command line, type `diag` and press Enter.
3. From the Function Selection menu, select **Task Selection** and press Enter.
4. From the Task Selection menu, select **Identify and Attention Indicators** and press Enter.
5. From the list of lights, select the location code for the failing part and press Enter.

6. Select **Commit**. This turns on the system attention and indicator light for the failing part.

7. Exit to the command line.

Deactivating the failing-part indicator light

Use this procedure to turn off any indicator light that you turned on as a part of a service action.

To deactivate the indicator light, follow these steps:

1. Log in as root user.

2. At the command line, type `diag` and press Enter.

3. From the Function Selection menu, select **Task Selection** and press Enter.

4. From the Task Selection menu, select **Identify and Attention Indicators** and press Enter.

5. From the list of lights, select the location code for the failing part and press Enter. When a light is activated for a failing part, an I character precedes the location code.

6. Select **Commit**. This turns off the system attention and indicator light for the failing part.

7. Exit to the command line.

Identifying a failing part in an IBM i system or logical partition

You can activate or deactivate the indicator light by using IBM i to assist in locating a failing part.

Activating the failing-part indicator light

You can search the service action log for an entry that matches the time, reference code, or resource of a problem, and then activate the indicator light for a failing part.

1. Sign on to an IBM i session, **with at least service level authority**.

2. On the command line of the session, type `strsst` and press Enter.

   Note: If you cannot get to the System Service Tools display, use function 21 from the control panel. Alternatively, if the system is managed by a Hardware Management Console (HMC), use the Service Focal Point™ utilities to get to the Dedicated Service Tools (DST) display.

3. Type your service tools user ID and service tools password on the System Service Tools (SST) Sign On display. Press Enter.

   Remember: The service tools password is case-sensitive.

4. Select **Start a service tool** from the System Service Tools (SST) display and press Enter.

5. Select **Hardware service manager** from the Start a Service Tool display and press Enter.

6. Select **Work with service action log** from the Hardware Service Manager display and press Enter.

7. On the Select Timeframe display, change the **From: Date and Time** field to a date and time prior to when the problem occurred.

8. Search for an entry that matches one or more conditions of the problem:

   - System Reference code
   - Resource
   - Date and time
   - Failing item list

9. Select option **2** (Display failing item information) to display the service action log entry.

10. Select option **2** (Display details) to display location information for the failing part to be replaced. The information displayed in the date and time fields is the date and time for the first occurrence of the specific System reference code for the resource displayed during the time range selected.

11. If location information is available, select option **6** (Indicator on) to turn on the failing part's indicator light.

Tip: If the failing part does not contain a physical indicator light, a higher-level indicator light is activated. For example, the indicator light for the backplane or unit that contains the failing part might be lit. In this case, use the location information to locate the actual failing part.

12. Look for the enclosure indicator light to locate the enclosure that contains the failing part.

Deactivating the failing-part indicator light

Use this procedure to turn off any indicator light that you turned on as a part of a service action.

To deactivate the indicator light, follow these steps:

1. Sign on to an IBM i session, **with at least service level authority**.
2. On the command line of the session, type `strsst` and press Enter.

   Note: If you cannot get to the System Service Tools display, use function 21 from the control panel. Alternatively, if the system is managed by a Hardware Management Console (HMC), use the Service Focal Point utilities to get to the Dedicated Service Tools (DST) display.

3. Type your service tools user ID and service tools password on the System Service Tools (SST) Sign On display. Press Enter.

   Remember: The service tools password is case-sensitive.

4. Select **Start a service tool** from the System Service Tools (SST) display and press Enter.
5. Select **Hardware service manager** from the Start a Service Tool display and press Enter.
6. Select **Work with service action log** from the Hardware Service Manager display and press Enter.
7. On the Select Timeframe display, change the **From: Date and Time** field to a date and time prior to when the problem occurred.
8. Search for an entry that matches one or more conditions of the problem:
   - System Reference code
   - Resource
   - Date and time
   - Failing item list
9. Select option **2** (Display failing item information) to display the service action log entry.
10. Select option **2** (Display details) to display location information for the failing part to be replaced. The information displayed in the date and time fields is the date and time for the first occurrence of the specific System reference code for the resource displayed during the time range selected.
11. Select option **7** (Indicator off) to turn off the indicator light.
12. Select the **Acknowledge all errors** function at the bottom of the Service Action Log display, if all problems have been resolved.
13. Close the log entry by selecting option **8** (Close new entry) on the Service Action Log Report display.

Identifying a failing part in a Linux system or logical partition

If the service aids have been installed on a system or logical partition, you can activate or deactivate the indicator lights to locate a part or compete a service action.

Locating a failing part in a Linux system or logical partition

If the service aids have been installed on a system or logical partition, you need to activate the indicator lights to locate a part.

To activate the indicator light, follow these steps:

1. Log in as root user.
2. At the command line, type `/usr/sbin/usysident -s identify -l`*<location code>* and press Enter.

3. Look for the system attention light to identify the enclosure that contains the failing part.

Related information

➡ Service and productivity tools for Linux on POWER systems
IBM provides hardware diagnostic aids and productivity tools, as well as installation aids for Linux operating systems on IBM Power systems.

Finding the location code of a failing part in a Linux system or logical partition

To retrieve the location code of the failing part, if you do not know the location code, use the procedure in this topic.

To locate the failing part in a system or logical partition follow these steps:

1. Log in as root user.
2. At the command line, type `grep diagela /var/log/platform` and press Enter.
3. Look for the most recent entry that contains a system reference code (SRC).
4. Record the location information.

   Note: IBM provides hardware diagnostic aids and productivity tools, as well as installation aids for Linux operating systems on IBM Power systems. See Service and productivity tools for Linux on POWER® systems

Activating the indicator light for the failing part

If you know the location code of the failing part, activate the indicator light to help you locate which part to replace.

To activate the indicator light, follow these steps:

1. Log in as root user.
2. At the command line, type `/usr/sbin/usysident -s identify -l`*<location code>* and press Enter.
3. Look for the system attention light to identify the enclosure that contains the failing part.

Note: IBM provides hardware diagnostic aids and productivity tools, as well as installation aids for Linux operating systems on IBM Power systems. See Service and productivity tools for Linux on POWER systems

Deactivating the failing-part indicator light

After you complete a removal and replacement procedure, you must deactivate the failing-part indicator light.

To deactivate the indicator light, follow these steps:

1. Log in as root user.
2. At the command line, type `/usr/sbin/usysident -s normal -l`*<location code>* and press Enter.

Note: IBM provides hardware diagnostic aids and productivity tools, as well as installation aids for Linux operating systems on IBM Power systems. See Service and productivity tools for Linux on POWER systems

Locating a failing part in a Virtual I/O Server system or logical partition

You can use Virtual I/O Server (VIOS) tools, before activating the indicator light, to locate a part that is failing.

1. Log in as root user or `celogin-`.
2. At the command line, type `diagmenu` and press Enter.
3. From the **Function Selection** menu, select **Task Selection** and press Enter.
4. Select **Display Previous Diagnostic Results** and press Enter.
5. From the **Display Previous Diagnostic Results** display, select **Display Diagnostic Log Summary**. A **Display Diagnostic Log** display appears. This display contains a chronological list of events.
6. Look in the **T** column for the most recent **S** entry. Select this row in the table and press Enter.
7. Choose **Commit**. The details of this log entry are shown.
8. Record the location information and the SRN value shown near the end of the entry.
9. Exit to the command line.

Use the location information for the failing part to activate the indicator light that identifies the failing part. For instructions, see "Identifying a part by using the Virtual I/O Server."

Identifying a part by using the Virtual I/O Server

Use these instructions to turn on the indicator light to help you physically locate a part by using the Virtual I/O Server (VIOS).

1. Log in as root user.
2. At the command line, type `diagmenu` and press Enter.
3. From the Function Selection menu, select **Task Selection**. Press Enter.
4. From the Task Selection menu, select **Identify and Attention Indicators**. Press Enter.
5. From the list of lights, select the location code for the failing part and press Enter.
6. Select **Commit**. This turns on the system attention and indicator light for the failing part.
7. Exit to the command line.

Starting the system or logical partition

Learn how to start a system or logical partition after performing a service action or system upgrade.

Starting a system that is not managed by a Hardware Management Console

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

To start a system that is not managed by a Hardware Management Console (HMC), follow these steps:

1. Open the front rack door, if necessary.
2. Before you press the power button on the control panel, ensure that power is connected to the system unit as follows:
   - All system power cables are connected to a power source.
   - The power-on light, as shown in the following figure, is slowly blinking.
   - The top of the display, as shown in the following figure, shows 01 V=F.
3. Press the power button **(A)**, as shown in the following figure, on the control panel.
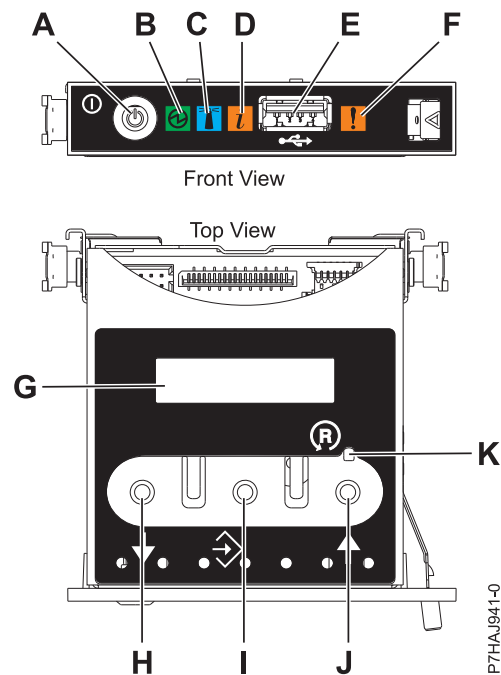
Figure 169. Control panel

- **A**: Power-on button
- **B**: Power LED
  - A constant light indicates full system power to the unit.
  - A blinking light indicates standby power to the unit.

Note: There is approximately a 30-second transition period from the time the power-on button is pressed to when the power LED goes from blinking to solid. During the transition period, the LED might blink faster.

- **C**: Enclosure identify light
  - A constant light indicates the identify state, which is used to identify a part.
  - No light indicates that the system is operating normally.
- **D**: Attention light
  - No light indicates that the system is operating normally.
  - A blinking light indicates that the system requires attention.
- **E**: USB port
- **F**: Enclosure fault roll-up light
  - A constant light indicates a fault in the system.
  - No light indicates that the system is operating normally.
- **G**: Function/Data display
- **H**: Decrement button
- **I**: Enter button
- **J**: Increment button
- **K**: Pinhole reset button

4. Observe the following after pressing the power button:
   - The power-on light begins to blink faster.
   - The system cooling fans are activated after approximately 30 seconds and begin to accelerate to operating speed.
   - Progress indicators, also referred to as checkpoints, appear on the control panel display while the system is being started. The power-on light on the control panel stops blinking and remains on, indicating that system power is on.

Tip: If pressing the power button does not start the system, do the following steps to start the system using the Advanced System Management Interface (ASMI):

1. Access the ASMI. For instructions, see Accessing the ASMI.
2. Start the system using the ASMI. For instructions, see Powering the system on and off.

Starting a system or logical partition by using the Hardware Management Console

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

For instructions on working with the HMC, see Managing the Hardware Management Console. For instructions on starting a logical partition, see Logical partitioning. For instructions on starting the system, see Powering on the managed system.

Progress indicators, also referred to as checkpoints, appear on the control panel display while the system is being started. When the power-on light on the control panel stops blinking and remains on, the system power is on.

Stopping a system or logical partition

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

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

To stop the system or logical partition, select the appropriate procedure.

Related tasks

Shutting down logical partitions using the Integrated Virtualization Manager
Use this procedure to shut down a logical partition or the entire managed system that is managed using the Integrated Virtualization Manager.

Stopping a system that is not managed by a Hardware Management Console

You might need to stop the system to perform another task. Use these instructions to stop the system using the power button or Advanced System Management Interface.

Before you stop the system, follow these steps:

1. If an Integrated xSeries® Adapter (IXA) is present on the system, shut it down using IBM i options.
2. Ensure that all jobs are completed and end all applications.
3. Ensure that the operating system is stopped.

   Attention: Failure to do so can result in the loss of data.
4. If a Virtual I/O Server (VIOS) logical partition is running, ensure that all clients are shut down or that the clients have access to their devices using an alternate method.

The following procedure describes how to stop a system that is not managed by a Hardware Management Console (HMC).

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

   The command stops the operating system. The system power turns off, the power-on light begins to slowly flash, and the system goes into a standby state.
3. Record the IPL type and the IPL mode from the control panel display to help you return the system to this state when the installation or replacement procedure is completed.
4. Set the power switches of any devices connected to the system to off.
5. Unplug any power cables that are attached to the unit from electrical outlets. Ensure that you unplug power cables from peripheral devices, such as printers and expansion units.

   Important: The system is equipped with a second power supply. Before continuing with this procedure, ensure that all power sources to the system have been disconnected.

(L003)
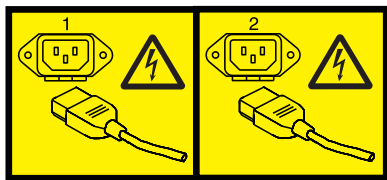
or

Stopping a system by using the Hardware Management Console

You can use the Hardware Management Console (HMC) user interface to stop the system or a logical partition. Use the following steps to accomplish this task.

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

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

To power off a managed system, you must be a member of one of the following roles:
- Super administrator
- Service representative
- Operator
- Product engineer

1. In the Navigation area, expand the **Systems Management** folder.
2. Click the **Servers** icon.
3. In the Contents area, select the managed system.

4. Select **Tasks**, then **Operations**, and then **Power Off**
5. Select the appropriate power-off mode and click **OK**.

Related information

Shutting down and restarting logical partitions

Removing and replacing the expansion unit cover or door

You might need to remove, replace, or install covers or doors on an expansion unit as a part of accessing components or performing a service action.

Removing the front cover on the 7314-G30 or 5796

You might need to remove the front cover to perform service to the system.

To remove the front cover, follow these steps:

1. Remove the two thumbscrews **(B)** located on the left and right of the cover.
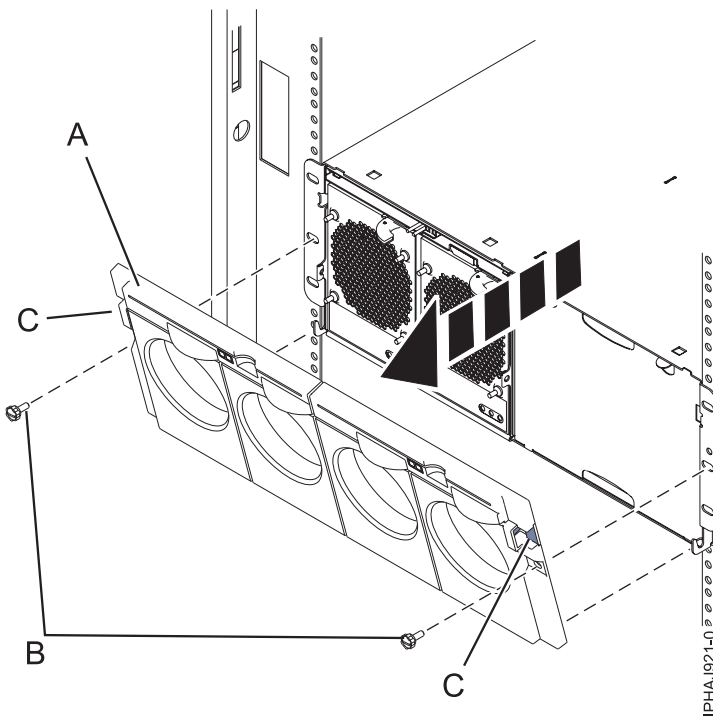
Figure 170. Remove the front cover for model 7314-G30 or 5796

2. Press in on the two latches **(C)** located left and right of the cover to release the cover.
3. Lift out the cover **(A)** and away from the chassis.

   Tip: If an airflow block is present on an unpopulated side of the chassis do not remove it unless you are populating that side of the chassis.

Installing the front cover on the 7314-G30 or 5796

Use this procedure to install the front cover after installing the system or performing a service action.

If you only have one side of the chassis populated, ensure that the airflow block is present on the unpopulated side.

1. Insert the posts on the bottom of the cover **(A)** into the hooks on the chassis of the enclosure.

2. Press in on the two latches **(C)** on the right and left of the front cover.
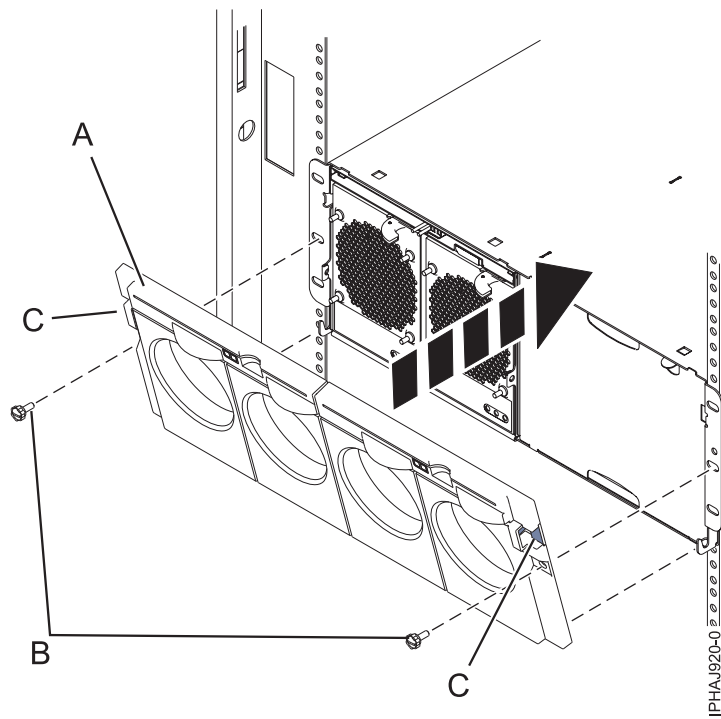
Figure 171. Front cover on a model 7314-G30 or 5796

3. Press the cover onto the chassis and release the latches. The cover securely snaps into place.
4. Replace the two thumbscrews **(B)** into the slots on the left and right of the front cover.

System covers

Use these procedures to remove and replace the covers on IBM Power Systems servers that contain the POWER7 processor.

Removing and replacing covers for the 8202-E4B or 8205-E6B

Use these instructions to remove, replace, or install covers to access components or perform service.

Removing the front cover on a rack-mounted 8202-E4B or 8205-E6B system

Use this procedure to remove the cover to access components or perform service.

To remove the front cover, follow these steps:

1. Remove the two screws that secure the system to the rack.
2. Pull the cover away from the system. The cover has an indentation where you can hold onto it more easily.

Figure 172. Removing the front cover

Removing the front cover on a stand-alone 8202-E4B or 8205-E6B system

Use this procedure to remove the cover to access components or perform service.

To remove the front cover, follow these steps:

1. Open the front door **(A)** by swinging it towards the left as shown in the following figure.

2. Press latch **(B)** and pull the cover away from the system. The cover has an indentation where you can hold onto it more easily.
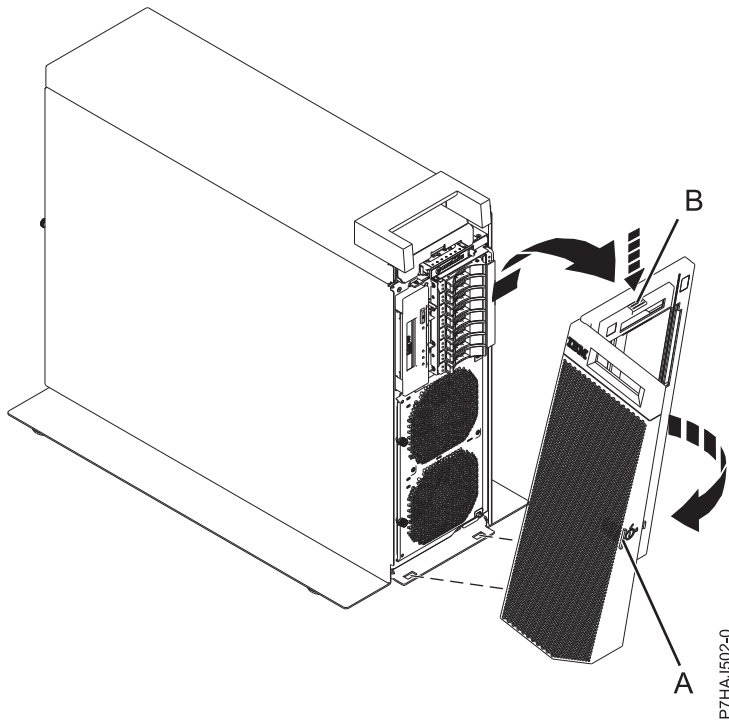
Figure 173. Removing the front cover

Installing the front cover on a rack-mounted 8202-E4B or 8205-E6B system

Use this procedure to install the cover to access components or perform service.

To install the front cover, follow these steps:
1. Push the cover onto the system.
2. Gently push the cover in until the four cover clips are seated in their respective mounting posts as shown in the following figure. The cover snaps into place and has an indentation where you can hold onto it more easily.
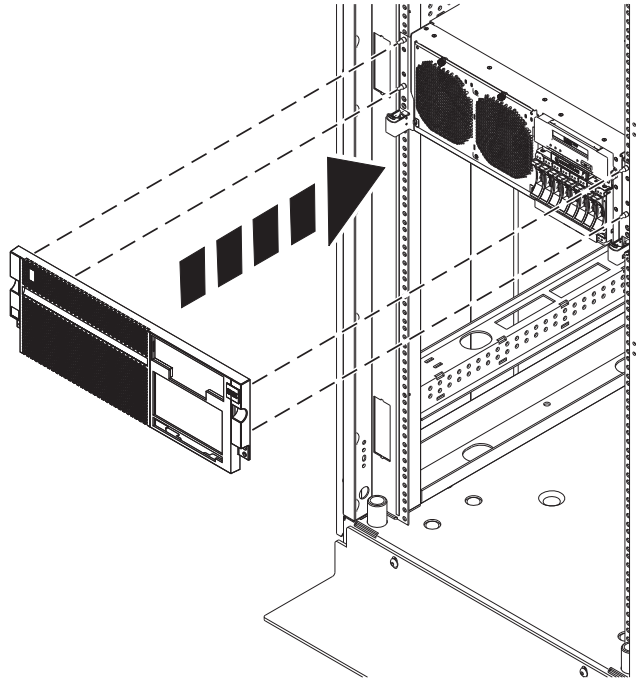
Figure 174. Removing the front cover

Installing the front cover and front door on a stand-alone 8202-E4B or 8205-E6B system

Use this procedure to install the cover to access components or perform service.

To install the front cover and front door, complete the following steps.

1. Align the cover **(A)** until the two cover tabs are seated into the slots on the base plate **(B)**, as shown in the following figure.
2. Rotate the cover up and towards the system until the release latch is seated into its respective slot. The cover has an indentation where you can hold onto it more easily.
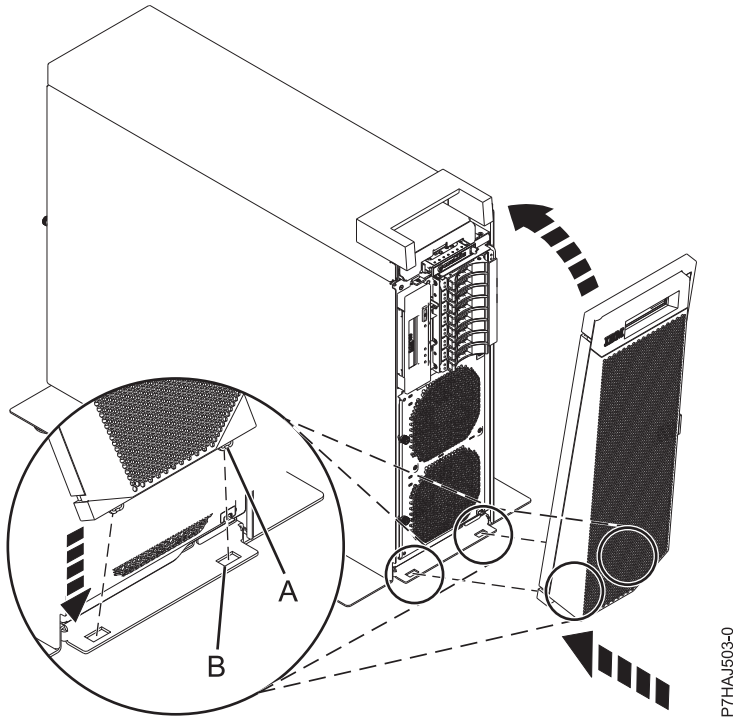
Figure 175. Installing the front cover

3. Hold the front door at an approximate 120 degree angle to the system as show in the following figure. Engage the latches.
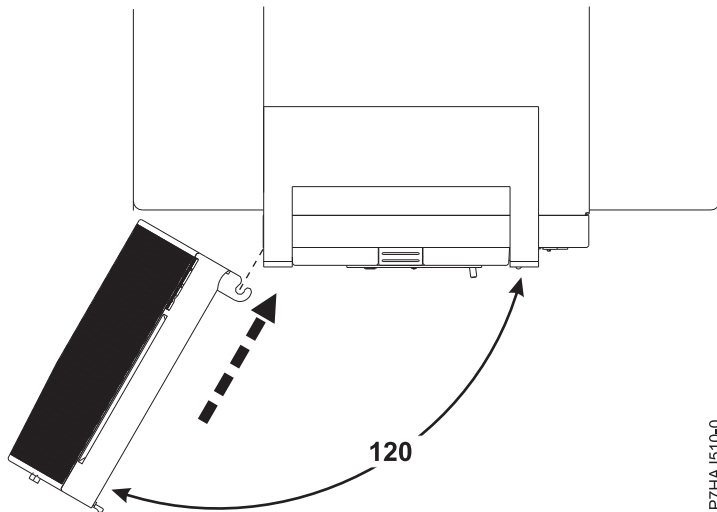
Figure 176. Installing the front door

Removing the service access cover on a rack-mounted 8202-E4B or 8205-E6B system

Use this procedure to remove the service access cover.

1. Loosen the two thumbscrews **(A)** located at the back of the cover.

2. Slide the cover toward the back of the system unit. When the front of the service access cover has cleared the upper frame ledge, lift the cover up and off the system unit.
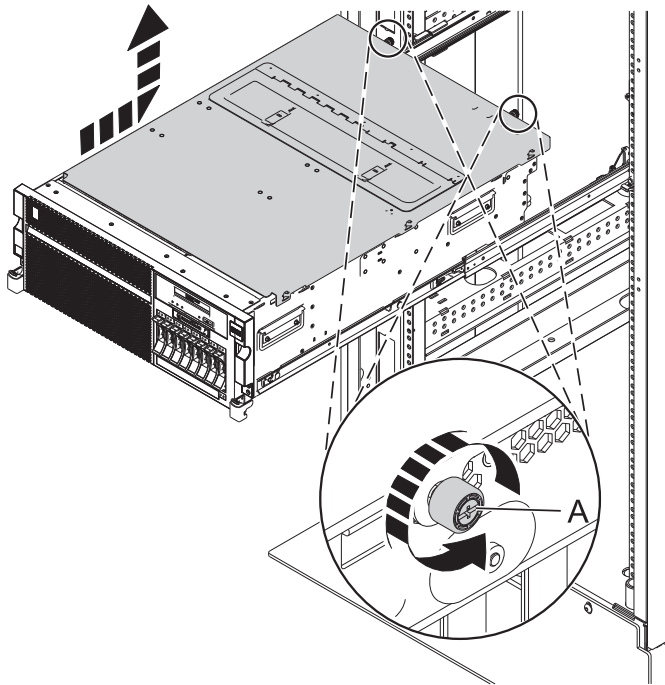
Figure 177. Removing the service access cover

> **Attention:** For proper cooling and air flow, re-install the cover before turning on the system. Operating the system without the cover for more than 30 minutes could damage the system components.

Removing the service access cover on a stand-alone 8202-E4B or 8205-E6B system

Use this procedure to remove the service access cover.

1. Loosen the thumbscrew **(A)** located at the back of the outside cover.
2. Slide the cover **(B)** toward the back of the system unit. When the front of the service access cover has cleared the upper frame ledge, lift the cover up and off the system unit.
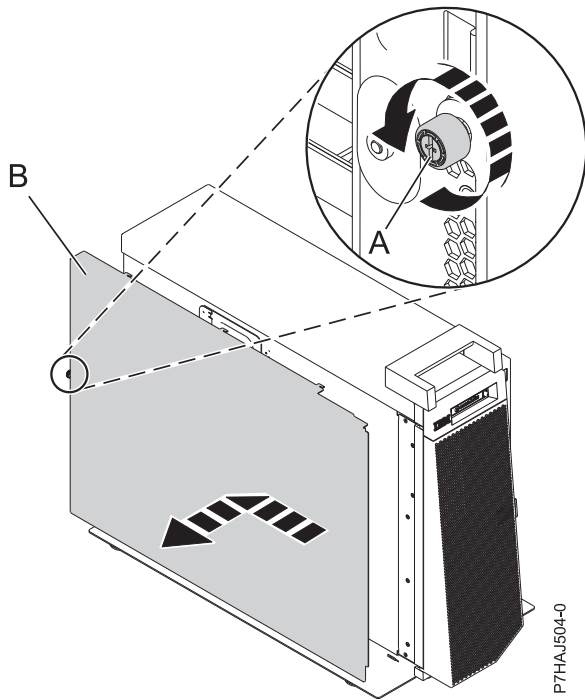
Figure 178. Installing the outside service access cover

3. Loosen the two thumbscrews **(A)** located at the back of the inside cover.
4. Slide the cover **(B)** toward the back of the system unit. When the front of the service access cover has cleared the upper frame ledge, lift the cover up and off the system unit.
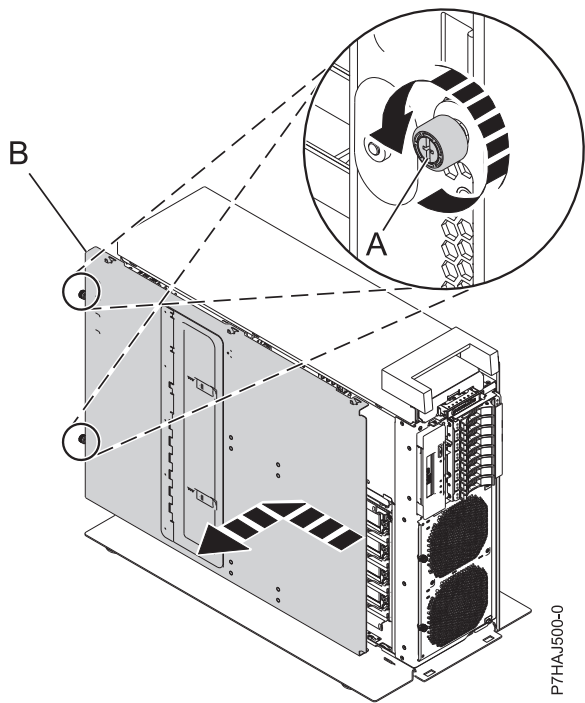
Figure 179. Removing the inside service access cover

Installing the service access cover on a rack-mounted 8202-E4B or 8205-E6B system

Use this procedure to install the service access cover.

1. Place the service access cover on top of the system, about 25 mm (1 in.) from the upper chassis ledge.
2. Hold the service access cover against the system unit and slide it toward the front of the system. The tabs of the service access cover slide beneath the upper chassis ledge.
3. Align the two thumbscrews **(A)** located on the back of the service access cover with the two holes on the back of the system chassis.
4. Tighten the thumbscrews to secure the service access cover.
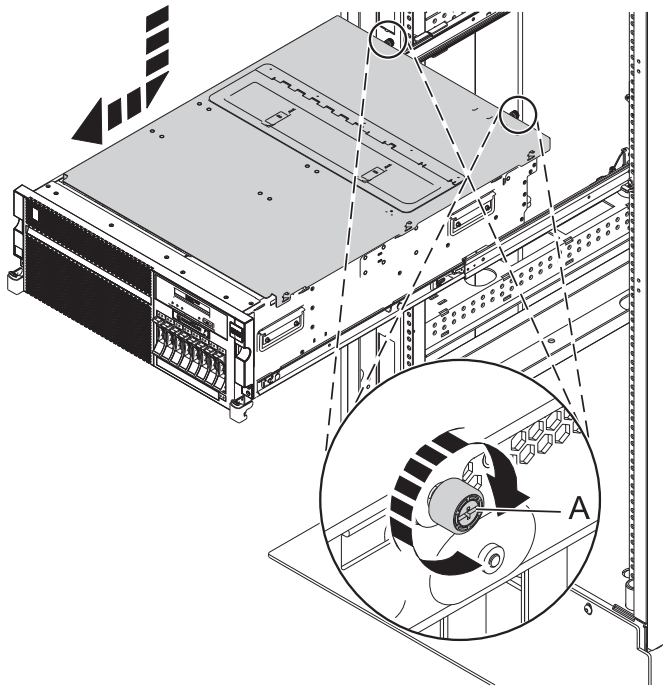
Figure 180. Installing the service access cover

Installing the service access cover on a stand-alone 8202-E4B or 8205-E6B system

Use this procedure to install the service access cover.

1. Place the inside service access cover **(A)** on top of the system, about 25 mm (1 in.) from the upper chassis ledge.
2. Hold the service access cover against the system unit and slide it toward the front of the system. The tabs of the service access cover slide beneath the upper chassis ledge.
3. Align the two thumbscrews **(B)** located on the back of the service access cover with the two holes on the back of the system chassis.
4. Tighten the thumbscrews to secure the service access cover.
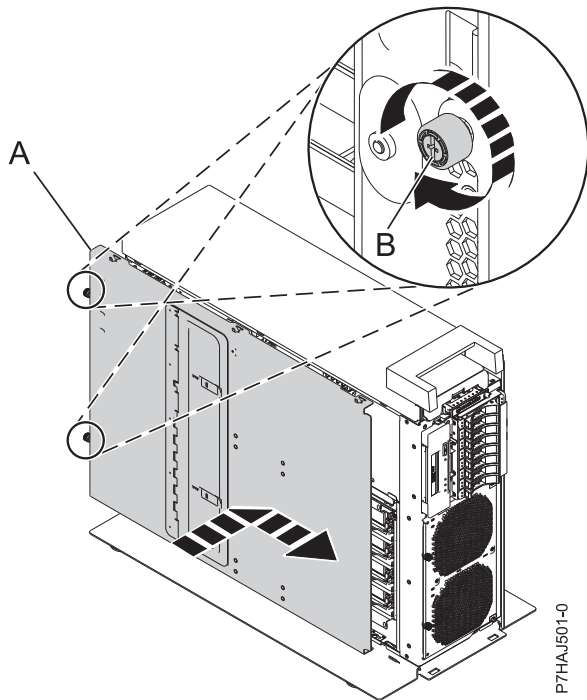
Figure 181. Installing the inside service access cover

5. Place the outside service access cover **(A)** on top of the system.
6. Hold the service access cover against the system unit and slide it toward the front of the system. The tabs of the service access cover slide beneath the upper chassis ledge.
7. Align the thumbscrew **(B)** located on the back of the service access cover with the hole on the back of the system chassis.
8. Tighten the thumbscrew to secure the service access cover.
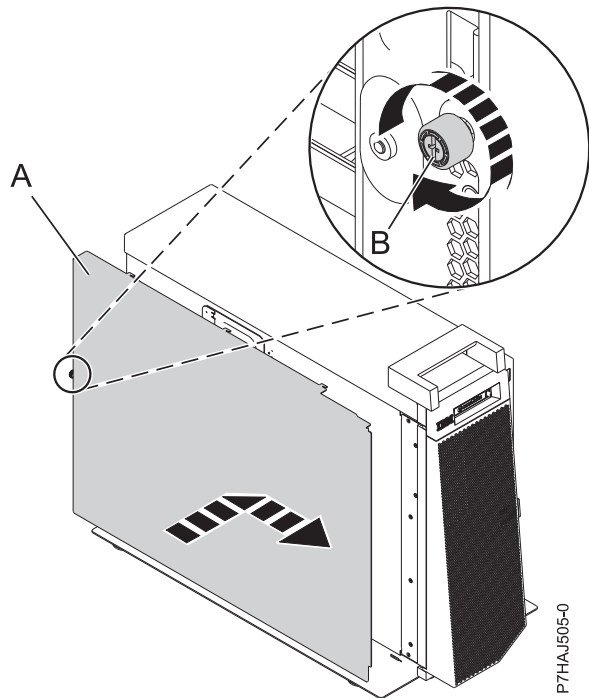
Figure 182. Installing the outside service access cover

Removing and replacing covers for the 8231-E2B

Use these instructions to remove, replace, or install covers to access components or perform service.

Removing the service access cover for the 8231-E2B

Use this procedure to remove the service access cover.

1. Loosen the thumbscrew **(A)** located at the back of the cover.
2. Slide the cover **(B)** toward the back of the system unit. When the front of the service access cover has cleared the upper frame ledge, lift the cover up and off the system unit.
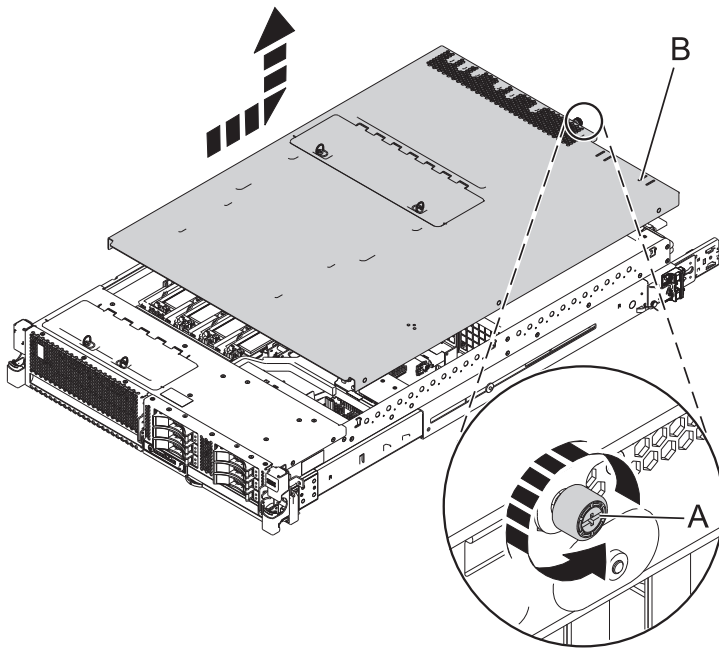
Figure 183. Removing the service access cover

> **Attention:** For proper cooling and air flow, re-install the cover before turning on the system. Operating the system without the cover for more than 30 minutes could damage the system components.

Installing the service access cover for the 8231-E2B

Use this procedure to install the service access cover.

1. Place the service access cover **(A)** on top of the system, about 25 mm (1 in.) from the upper chassis ledge.
2. Hold the service access cover against the system unit and slide it toward the front of the system. The tabs of the service access cover slide beneath the upper chassis ledge.
3. Align the thumbscrew **(B)** located on the back of the service access cover with the two holes on the back of the system chassis.
4. Tighten the thumbscrews to secure the service access cover.
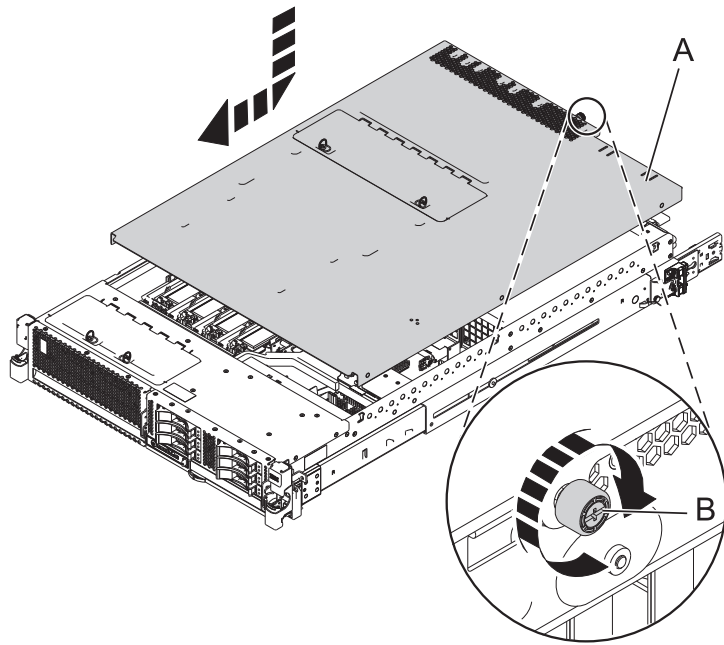
Figure 184. Installing the service access cover

Removing and replacing covers on the 8233-E8B or 8236-E8C system

Use these instructions to remove, replace, or install covers to access components or perform service.

Removing the front cover from an 8233-E8B or 8236-E8C system

Use this procedure to remove the cover to access components or perform service.

To remove the front cover, follow these steps:

1. Remove the two screws **(A)** that secure the system to the rack **(B)** as shown in the following figure.
2. Pull the cover away from the system. The cover has an indentation where you can hold onto it more easily.
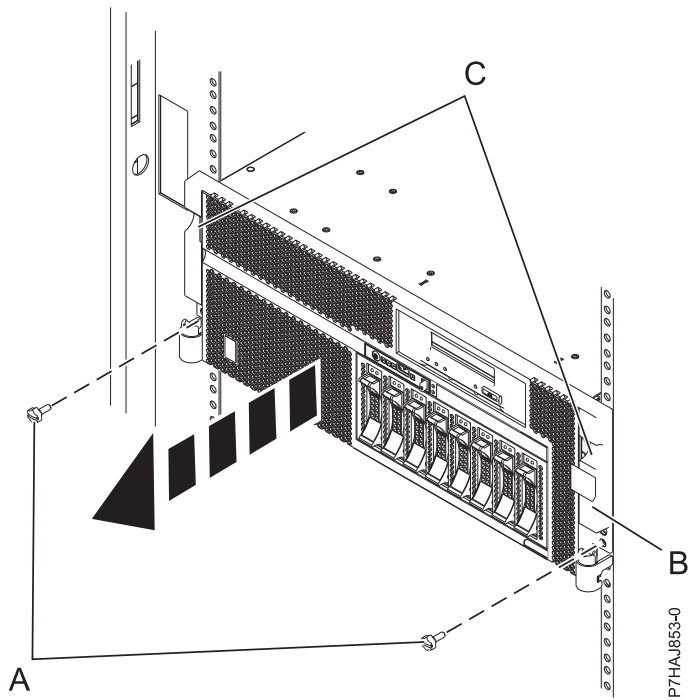
Figure 185. Removing the front cover
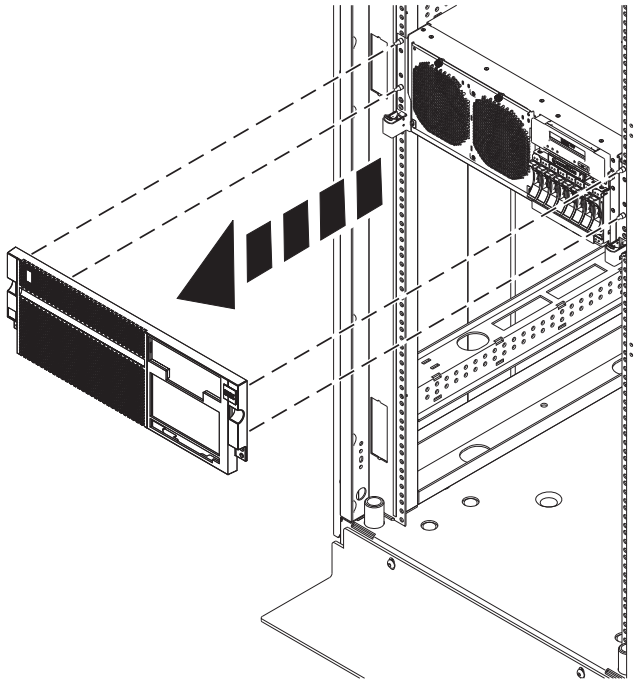
Installing the front cover on an 8233-E8B or 8236-E8C system

Use this procedure to install the cover after accessing components or performing service.

To install the front cover, follow these steps:

1. Align the cover with the system.
2. Gently push the cover in until the four cover clips are seated in their respective mounting posts **(B)** on the system.
3. Replace the two screws **(C)** that secure the system to the rack **(A)**.
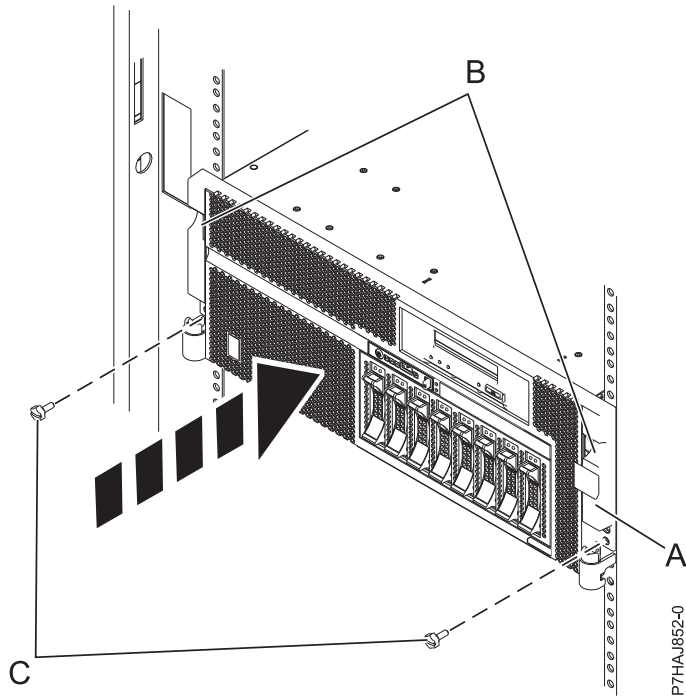
Figure 186. Installing the front cover

Removing the service access cover from an 8233-E8B or 8236-E8C system

Use this procedure to remove the service access cover to perform service or to gain access to internal components.

To remove the service access cover, follow these steps:

1. Place the system into the service position. For instructions, see "Placing a 8233-E8B or 8236-E8C in the service position" on page 236.
2. Loosen the two thumbscrews **(A)** located at the back of the cover.
3. Slide the cover **(B)** toward the back of the system unit. When the front of the service access cover clears the upper frame ledge, lift the cover up and off the system unit.

Attention: For proper cooling and airflow, install the cover before starting the system. Operating the system without the cover for more than 30 minutes could damage the system components.
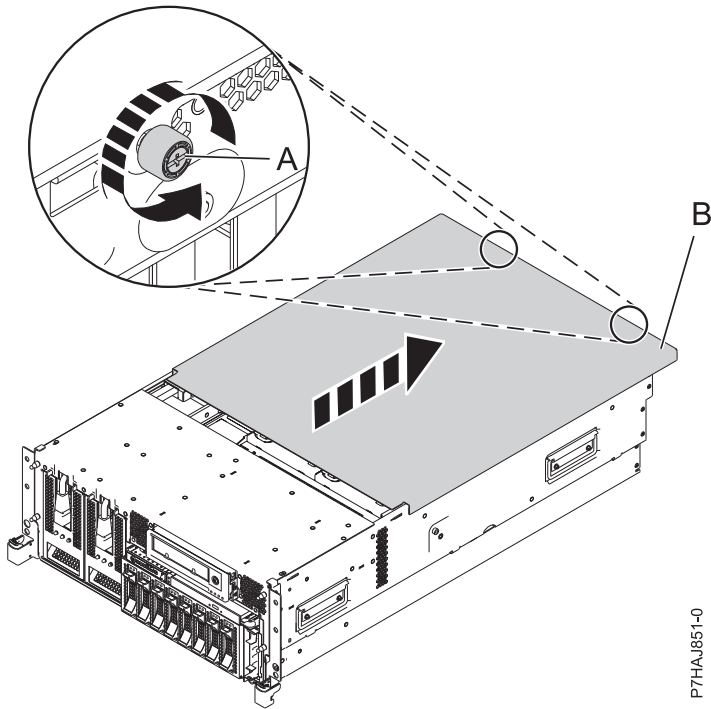
Figure 187. Removing the service access cover

Installing the service access cover on an 8233-E8B or 8236-E8C system

Use this procedure to install the service access cover after performing service or accessing internal components.

To install the service access cover, follow these steps:

1. Place the service access cover **(A)** on the top of the system unit, approximately 25 mm (1 in.) from the front of the system unit.
2. Hold the service access cover against the system unit, and slide it toward the front of the system.

   The tabs on the service access cover slide beneath the upper chassis ledge, and the two screws align with the screw holes at the back of the system unit.

   Important: Ensure that the fan LED cables do not get caught on the front edge of the service access cover as you move it forward.
3. Tighten the screws **(B)** located at the back of the cover.
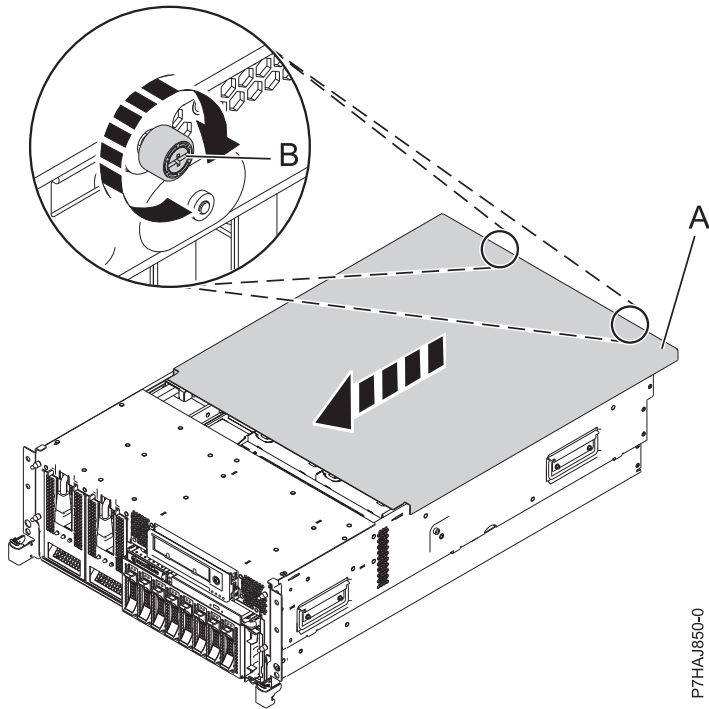
Figure 188. Installing the service access cover

Removing and replacing covers for the 9117-MMB or 9179-MHB

Use these instructions to remove, replace, or install covers to access components or perform service.

Removing the front cover from the 9117-MMB or 9179-MHB

Use this procedure to remove the cover to access components or perform service.

To remove the front cover follow these steps:
1. If necessary, open the front rack door.
2. Pull out the latches **(A)** located on both sides of the cover as shown in the following figure.
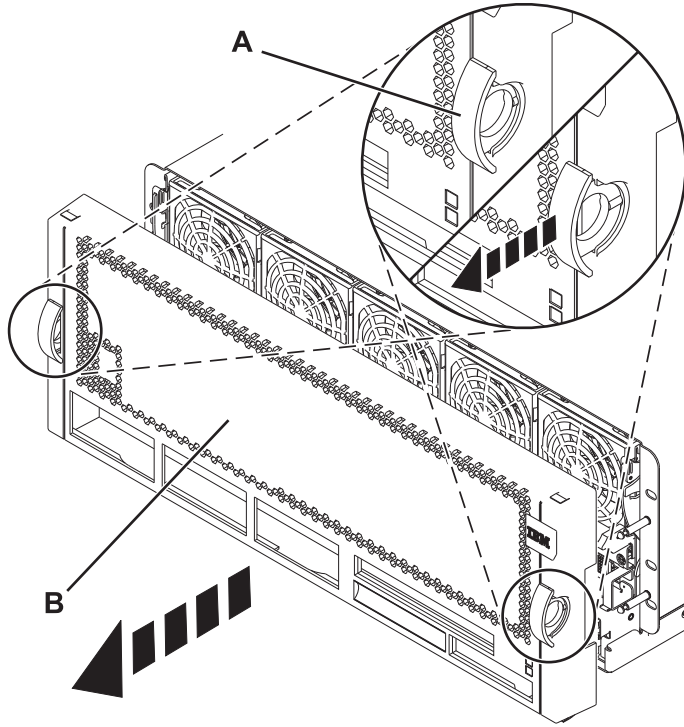
Figure 189. Removing the front cover

3. Pull off the cover **(B)** to remove it from the system unit.

Installing the front cover on the 9117-MMB or 9179-MHB

Use this procedure to install the cover after accessing components or performing service.

To install the front cover, follow these steps:

1. Position the cover **(A)** on the front of the system unit so that the four pins on the system match the four holes on the back of the cover.
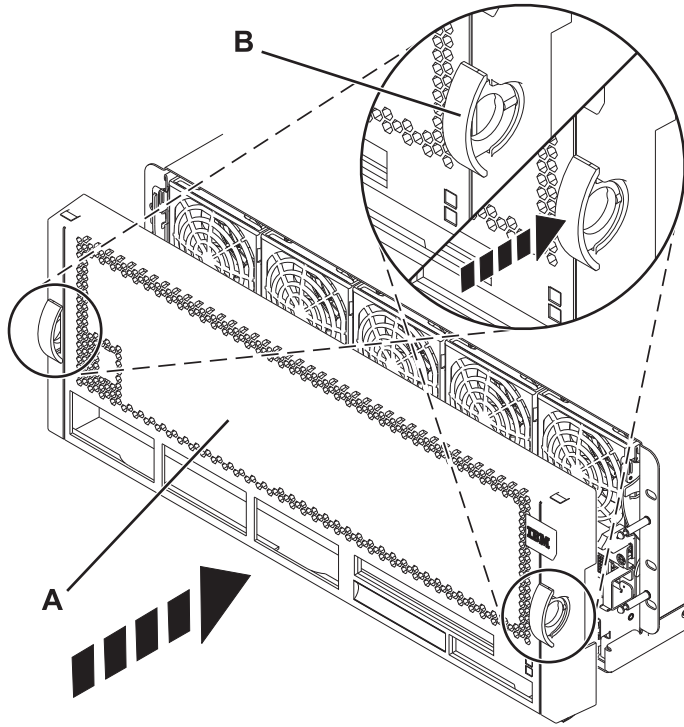
Figure 190. Installing the front cover

2. Press the tabs **(B)** to snap the cover into position.
3. Close the front rack door.

Placing the rack-mounted 8233-E8B or 8236-E8C system into the service position or operating position

Use these procedures to place a system into the service position or operating position to perform service or to gain access to internal components.

Placing a rack-mounted 8231-E2B system into the service position

Use this procedure to place the rack-mounted system into the service position.

Notes:

* When placing the system into the service position, it is essential that all stability plates are firmly in position to prevent the rack from toppling. Ensure that only one system unit is in the service position at a time.
* Ensure that the cables at the back of the system unit do not catch or bind as you pull the unit forward in the rack.
* When the system unit rails are fully extended, the rail safety latches lock into place. This action prevents the system from being pulled out too far.

1. Open the front rack door.
2. Identify the system unit you are servicing in the rack.
3. While holding the system unit release latches down on both the left and right sides, pull the system unit out from the rack until the rails are fully extended and locked.

Figure 191. Placing the system in the service position

Placing the rack-mounted 8231-E2B system into the operating position

Use this procedure to place the rack-mounted system into the operating position.

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

1. Unlock the rail safety latches by sliding them toward the front of the system.
2. Push the system unit back into the rack until both system-unit release latches have locked into position.
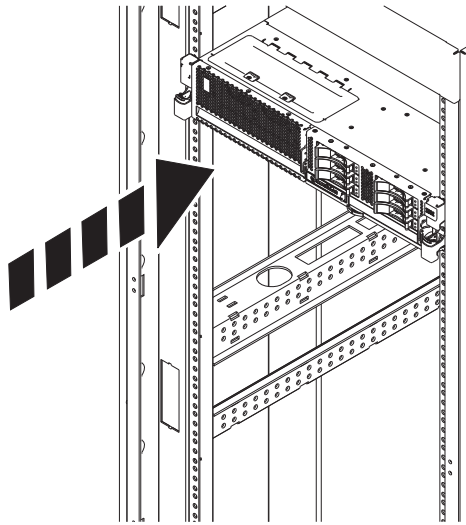
Figure 192. Placing the system into the operating position

3. Close the front rack door of the unit you are servicing.

Placing a rack-mounted 8202-E4B or 8205-E6B system into the service position

Use this procedure to place the rack-mounted system into the service position.

Notes:

- When placing the system into the service position, it is essential that all stability plates are firmly in position to prevent the rack from toppling. Ensure that only one system unit is in the service position at a time.
- Ensure that the cables at the back of the system unit do not catch or bind as you pull the unit forward in the rack.
- When the system unit rails are fully extended, the rail safety latches lock into place. This action prevents the system from being pulled out too far.

1. Open the front rack door.
2. Identify the system unit you are servicing in the rack.
3. Remove the two screws **(A)** (if present) that secure the system unit **(B)** to the rack.

Figure 193. Placing the system in the service position

4. While holding the system unit release latches **(A)** down on both the left and right sides, pull the system unit **(B)** out from the rack until the rails are fully extended and locked.

Placing the rack-mounted 8202-E4B or 8205-E6B system into the operating position

Use this procedure to place the rack-mounted system into the operating position.

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

1. Unlock the rail safety latches **(A)** by sliding them upward from the system. The rail safety latches are located near the middle of the system.

Figure 194. Placing the system into the operating position

2. Push the system unit **(B)** back into the rack until both system-unit release latches have locked into position.
3. Replace and tighten the two screws **(A)** that secure the system unit **(B)** to the rack.
4. Close the front rack door of the unit you are servicing.
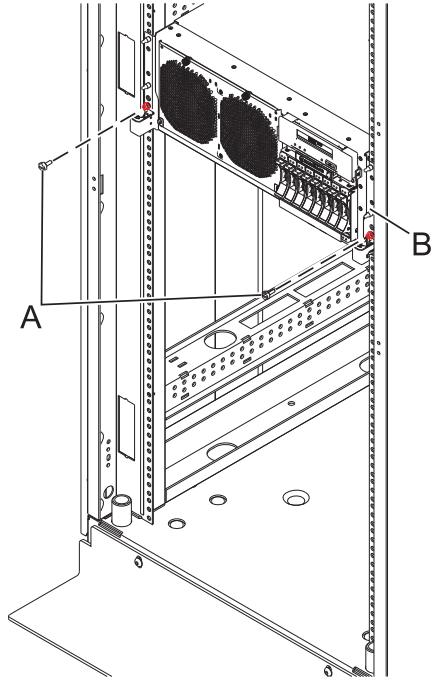
Figure 195. Placing the system into the operating position

Service and operating positions

Use these procedures to place IBM Power Systems servers into the service or operating position.

Placing the 8202-E4B or 8205-E6B system into the service or operating position

Use these procedures to place a system into the service position or operating position to perform service or to gain access to internal components.

Placing a rack-mounted 8202-E4B or 8205-E6B system into the service position

Use this procedure to place the rack-mounted system into the service position.

Notes:

- When placing the system into the service position, it is essential that all stability plates are firmly in position to prevent the rack from toppling. Ensure that only one system unit is in the service position at a time.
- Ensure that the cables at the back of the system unit do not catch or bind as you pull the unit forward in the rack.
- When the system unit rails are fully extended, the rail safety latches lock into place. This action prevents the system from being pulled out too far.

1. Open the front rack door.
2. Identify the system unit you are servicing in the rack.
3. Remove the two screws **(A)** (if present) that secure the system unit **(B)** to the rack.

Figure 196. Placing the system in the service position

4. While holding the system unit release latches **(A)** down on both the left and right sides, pull the system unit **(B)** out from the rack until the rails are fully extended and locked.

Placing the rack-mounted 8202-E4B or 8205-E6B system into the operating position

Use this procedure to place the rack-mounted system into the operating position.

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

1. Unlock the rail safety latches **(A)** by sliding them upward from the system. The rail safety latches are located near the middle of the system.

Figure 197. Placing the system into the operating position

2. Push the system unit **(B)** back into the rack until both system-unit release latches have locked into position.
3. Replace and tighten the two screws **(A)** that secure the system unit **(B)** to the rack.
4. Close the front rack door of the unit you are servicing.
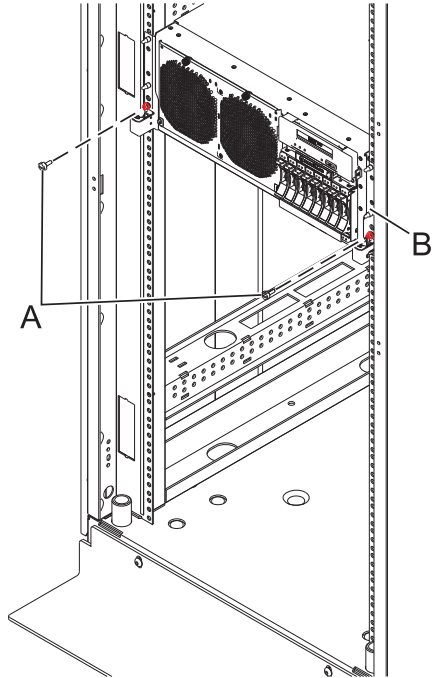
Figure 198. Placing the system into the operating position

Placing the rack-mounted 8233-E8B or 8236-E8C system into the service position or operating position

Use these procedures to place a system into the service position or operating position to perform service or to gain access to internal components.

Placing a rack-mounted 8231-E2B system into the service position

Use this procedure to place the rack-mounted system into the service position.

Notes:
- When placing the system into the service position, it is essential that all stability plates are firmly in position to prevent the rack from toppling. Ensure that only one system unit is in the service position at a time.
- Ensure that the cables at the back of the system unit do not catch or bind as you pull the unit forward in the rack.
- When the system unit rails are fully extended, the rail safety latches lock into place. This action prevents the system from being pulled out too far.
1. Open the front rack door.
2. Identify the system unit you are servicing in the rack.
3. While holding the system unit release latches down on both the left and right sides, pull the system unit out from the rack until the rails are fully extended and locked.

Figure 199. Placing the system in the service position

Placing the rack-mounted 8231-E2B system into the operating position

Use this procedure to place the rack-mounted system into the operating position.

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

1. Unlock the rail safety latches by sliding them toward the front of the system.
2. Push the system unit back into the rack until both system-unit release latches have locked into position.
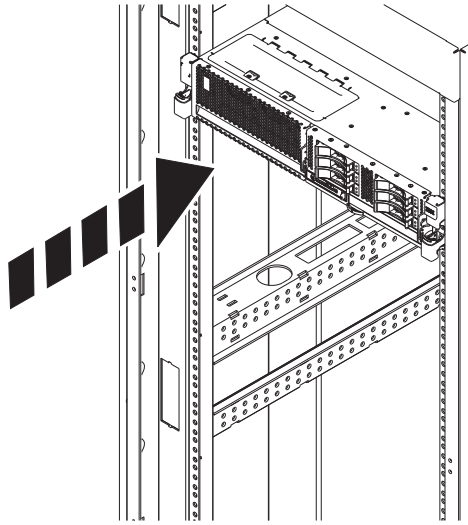
Figure 200. Placing the system into the operating position

3. Close the front rack door of the unit you are servicing.

Placing the rack-mounted 8233-E8B or 8236-E8C system into the service position or operating position

Use these procedures to place a system into the service position or operating position to perform service or to gain access to internal components.

Placing a 8233-E8B or 8236-E8C in the service position

Use this procedure to perform service or gain access to internal components by placing the rack-mounted system or expansion unit in the service position.

Note: Some of the figures in these procedures might not look exactly like the system or expansion unit that you have. However, the steps to perform the task are the same.

DANGER

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

Electrical voltage and current from power, telephone, and communication cables are hazardous. To avoid a shock hazard:

- Connect power to this unit only with the 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.
- Connect all power cords to a properly wired and grounded electrical outlet. Ensure that the outlet supplies proper voltage and phase rotation according to the system rating plate.
- Connect any equipment that will be attached to this product to properly wired outlets.
- When possible, use one hand only to connect or disconnect signal cables.
- Never turn on any equipment when there is evidence of fire, water, or structural damage.
- Disconnect the attached power cords, telecommunications systems, networks, and modems before you open the device covers, unless instructed otherwise in the installation and configuration procedures.
- Connect and disconnect cables as described in the following procedures when installing, moving, or opening covers on this product or attached devices.

  To Disconnect:
  1. Turn off everything (unless instructed otherwise).
  2. Remove the power cords from the outlets.
  3. Remove the signal cables from the connectors.
  4. Remove all cables from the devices

  To Connect:
  1. Turn off everything (unless instructed otherwise).
  2. Attach all cables to the devices.
  3. Attach the signal cables to the connectors.
  4. Attach the power cords to the outlets.
  5. Turn on the devices.

  (D005)

DANGER

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

- Heavy equipment–personal injury or equipment damage might result if mishandled.
- Always lower the leveling pads on the rack cabinet.
- Always install stabilizer brackets on the rack cabinet.
- To avoid hazardous conditions due to uneven mechanical loading, always install the heaviest devices in the bottom of the rack cabinet. Always install servers and optional devices starting from the bottom of the rack cabinet.
- Rack-mounted devices are not to be used as shelves or work spaces. Do not place objects on top of rack-mounted devices.

- Each rack cabinet might have more than one power cord. Be sure to disconnect all power cords in the rack cabinet when directed to disconnect power during servicing.
- Connect all devices installed in a rack cabinet to power devices installed in the same rack cabinet. Do not plug a power cord from a device installed in one rack cabinet into a power device installed in a different rack cabinet.
- An electrical outlet that is not correctly wired could place hazardous voltage on the metal parts of the system or the devices that attach to the system. It is the responsibility of the customer to ensure that the outlet is correctly wired and grounded to prevent an electrical shock.

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

(R001)

To place the rack-mounted system or expansion unit into the service position, follow these steps:
1. If necessary, open the front rack door.
2. Remove the two screws **(A)** that secure the system unit to the rack as shown in the following figure.
3. Release the rack latches **(B)** on both the left and right sides as shown in the following figure.
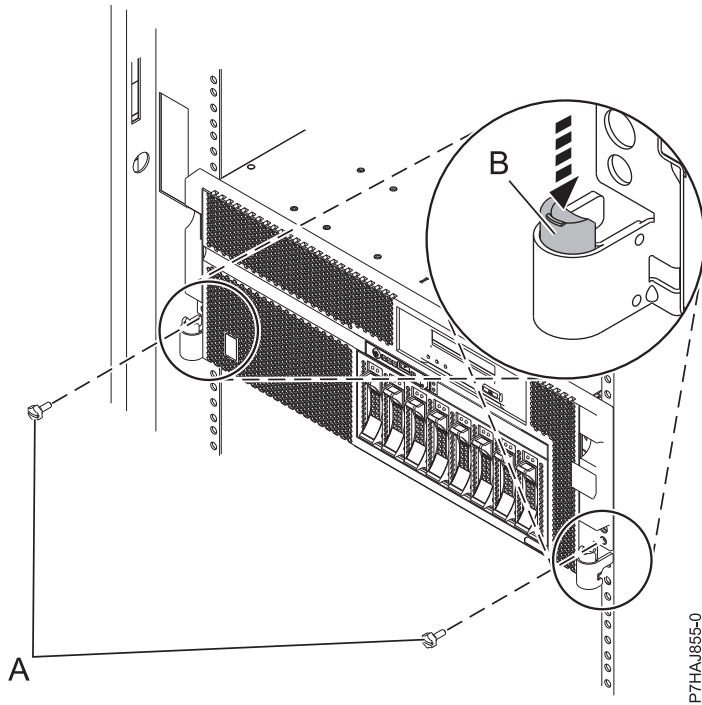
Figure 201. Releasing the rack latches

4. If required, unplug the cables from the back of the system or expansion unit before you pull the unit out from the rack. Ensure that the cables at the rear of the system or expansion unit do not catch or bind as you pull the unit out from the rack.
5. Slowly pull the system or expansion unit out from the rack until the rails are fully extended and locked. Ensure that the rails are fully extended. When the rails are fully extended, the rail safety latches lock into place. This action prevents the system or expansion unit from being pulled out too far.

Placing the 8233-E8B or 8236-E8C in the operating position

Use this procedure to place the system or expansion unit in the operating position to make the unit available for use.

To place the system into the operating position follow these steps:

Tip: Some of the figures in these procedures might not look exactly like the system or expansion unit that you have. However, the steps to perform the task are the same.

1. Simultaneously release the blue rail safety latches **(B)**, located near the front of each rail, and push the system or expansion unit into the rack as shown in the following figure.

   Note: Ensure that the cables at the rear of the system or expansion unit do not catch or bind as you push the unit back into the rack.
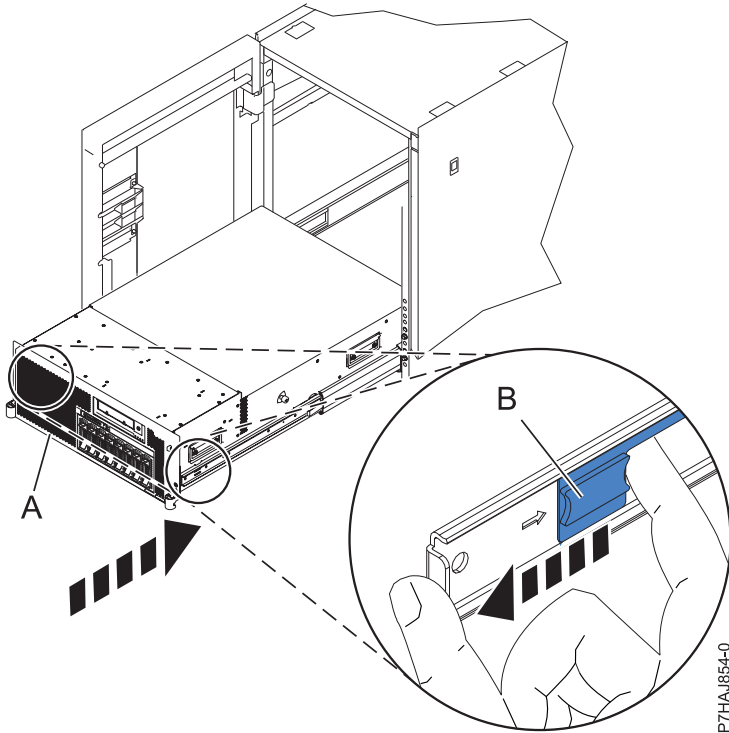
Figure 202. Releasing the rail safety latches

2. Replace and tighten the two thumbscrews **(C)** that secure the system or expansion unit **(A)** to the rack as shown in the following figure.
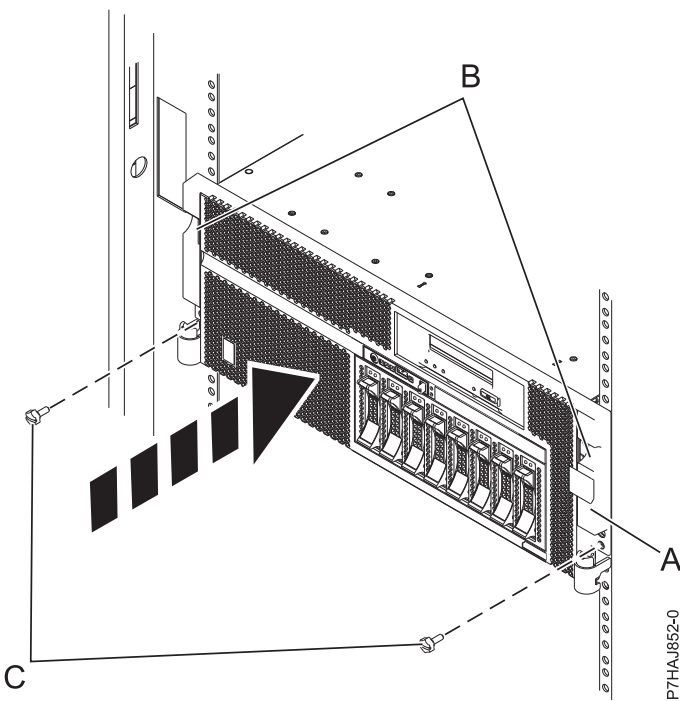
Figure 203. Replacing the thumbscrews

3. Close the front rack door.

Power cords

Use these procedures to disconnect and connect the power cords on IBM Power Systems servers that contain the POWER7 processor.

Disconnecting the power cords from the 8202-E4B or 8205-E6B system

Use these procedures to disconnect the power cords from the 8202-E4B or 8205-E6B system.

1. For a rack-mounted system, open the back rack door on the unit you are servicing and identify the system unit you are servicing in the rack.

2. For both a rack-mounted system and a stand-alone system, disconnect all power cords from the unit you are servicing. This system might be equipped with two power supplies. Before continuing with any remove and replace procedures that require the power off, ensure that both power sources to the system have been completely disconnected.
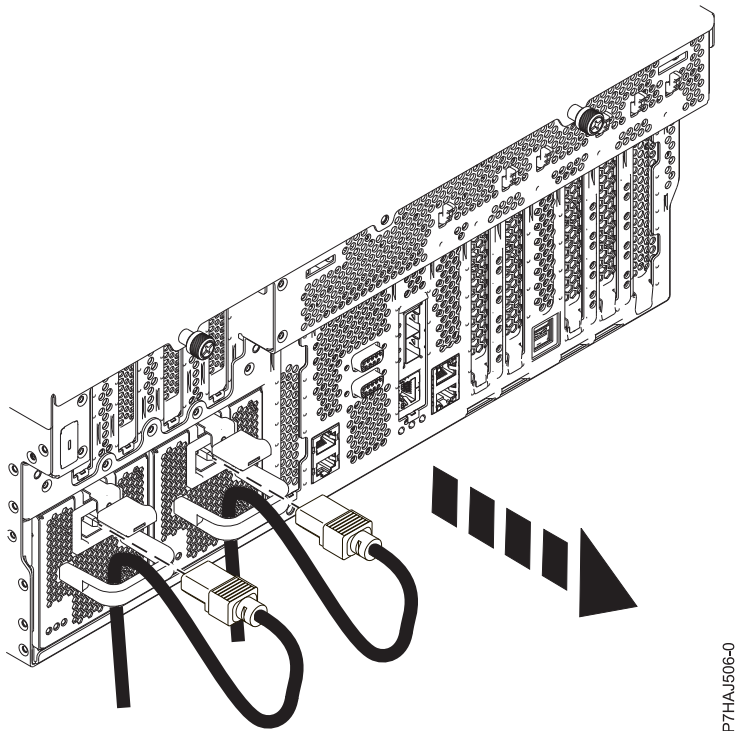
Figure 204. Removing the power cords for a rack-mounted system
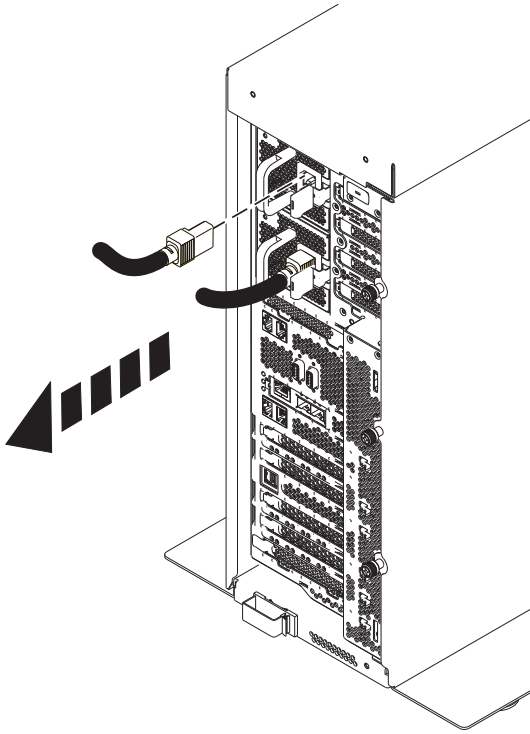
Figure 205. Removing the power cords for a stand-alone system

Connecting the power cords to the 8202-E4B or 8205-E6B system

Use this procedure to connect the power cords.

1. Identify the system unit you are servicing in the rack.
2. Connect all power cords to the unit you are servicing. Ensure that the cords are threaded through the handles.
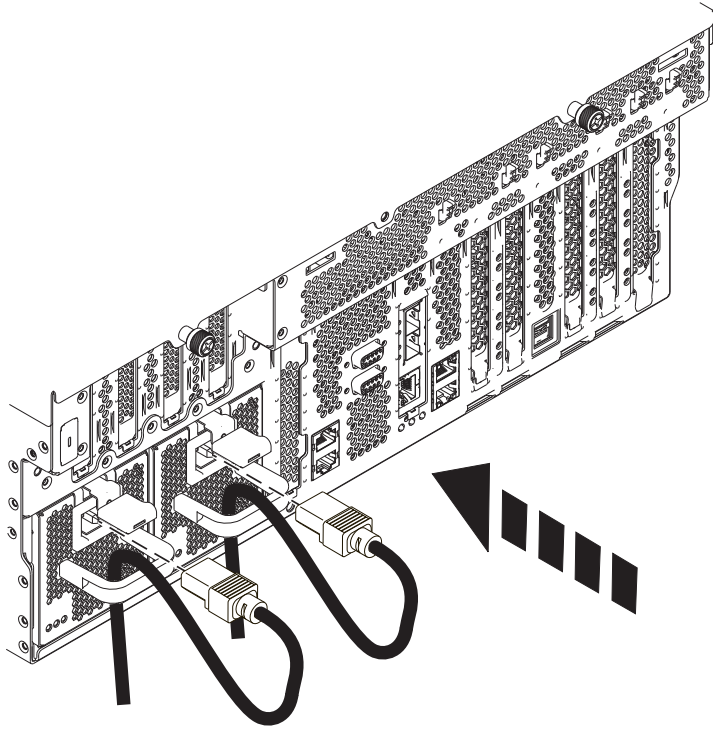
Figure 206. Connecting the power cords

3. Close the back rack door.

Disconnecting the power cords from the 8231-E2B

Use these procedures to disconnect the power cords from the8231-E2B system.

1. Open the back rack door on the unit you are servicing.
2. Identify the system unit you are servicing in the rack.
3. Disconnect all power cords from the unit you are servicing. This system might be equipped with two power supplies. Before continuing with any remove and replace procedures that require the power off, ensure that both power sources to the system have been completely disconnected.
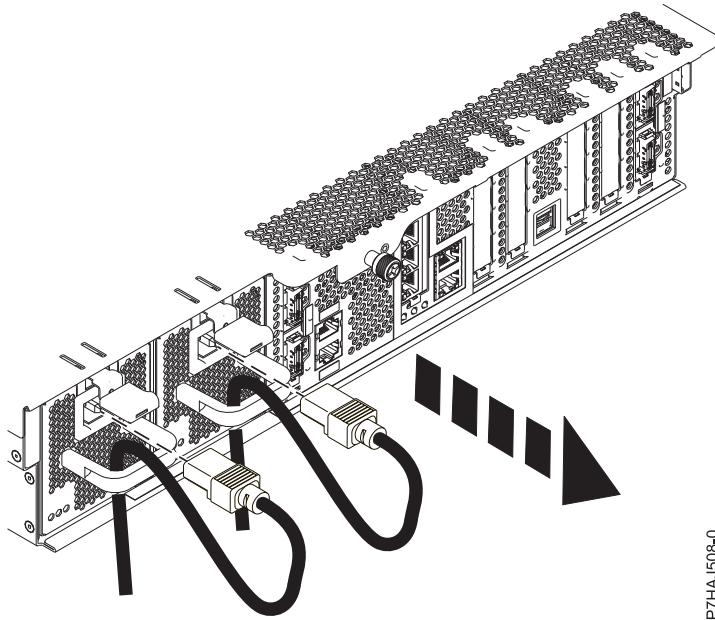
Figure 207. Removing the power cords

Connecting the power cords to the 8231-E2B

Use these procedures to connect the power cords to the8231-E2B system.

1. Open the back rack door on the unit you are servicing.
2. Identify the system unit you are servicing in the rack.
3. Disconnect all power cords from the unit you are servicing. Ensure that the cords are threaded through the handles.
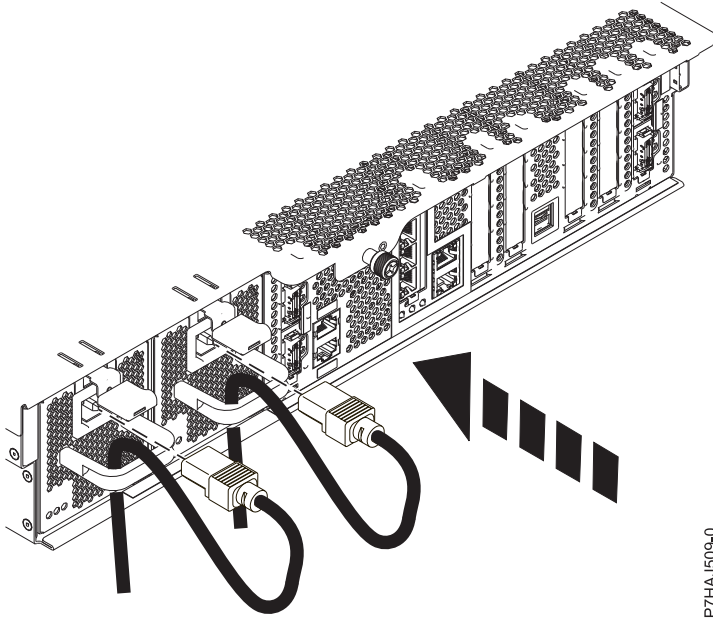
P7HAJ509-0

Figure 208. Connecting the power cords

Installing a feature by using the Hardware Management Console

You can use the Hardware Management Console to perform many service actions, including the installation of a new feature or part.

To use the Hardware Management Console user interface to install a feature or part into a system or expansion unit that is managed by an HMC, follow these steps:

1. In the navigation area, expand **Systems Management** → **Servers**.
2. Select the managed system you will install the part in.
3. In the Tasks area expand **Serviceability** → **Hardware**.
4. Select **Add FRU** (field replaceable unit).
5. In the Add/Install/Remove Hardware window select the system or enclosure into which you are installing the feature.
6. Select the type of feature you are installing from the menu and click **Next**
7. Select the location code for where you will install the feature, and click **Add**.
8. After the FRU is placed in the **pending actions** category click **Launch Procedure** and follow the instructions to install the feature.

   Note: The HMC might open external instructions for installing the feature. If so, follow those instructions to install the feature.

Removing a part by using the Hardware Management Console

You can use the Hardware Management Console (HMC) to perform many service actions, including the removal of a field replaceable unit (FRU) or part.

To use the Hardware Management Console user interface to remove a part in a system or expansion unit that is managed by an HMC, follow these steps:

1. In the navigation area, expand **Systems Management** → **Servers**.
2. Select the managed system from which you are removing a part.
3. In the Tasks area, expand **Serviceability** → **Hardware**.
4. Select **Remove FRU**.
5. In the Add/Install/Remove Hardware - Remove FRU, Select FRU Type window, select the system or enclosure from which you are removing the part.
6. Select the type of part you are removing from the menu and click **Next**.
7. Select the location of the part you are removing and click **Add**.
8. After the part is listed in the **Pending Actions** display click **Launch Procedure** and follow the instructions to remove the part.

   Note: The HMC might open the information center instructions for removing the part. If so, follow those instructions to remove the part.

Exchanging a part by using the Hardware Management Console

You can use the Hardware Management Console (HMC) to perform many service actions, including exchanging a field replaceable unit (FRU) or part.

If you are exchanging a part to repair a serviceable event follow those instructions. If you are exchanging a part as a part of any other procedure using HMC Version 7 or later use these steps:

1. In the navigation area, expand **Systems Management** → **Servers**.
2. Select the managed system in which you are exchanging a part.
3. In the Tasks area expand **Serviceability** → **Hardware**.
4. Select **Exchange FRU**.
5. In the Replace Hardware - Replace FRU, Select FRU Type window select the system or enclosure in which you will exchange a part from the list.
6. Select the type of part you will exchange from the menu and click **Next**.
7. Select the location code of the part you will exchange from the menu and click **Add**.
8. After the FRU is placed in the **pending actions** category click **Launch Procedure** and follow the instructions to exchange the feature.

   Note: The HMC might open external instructions for replacing the part. If so, follow those instructions to replace the part.

Verifying the installed part

You can verify a newly installed or replaced part on your system, logical partition, or expansion unit using the operating system, stand-alone diagnostics, or the Hardware Management Console (HMC).

Verifying an installed feature or replaced part in an AIX system or logical partition

If you installed feature or replaced a part, you might want to use the tools in AIX to verify that the feature or part is recognized by the system or logical partition.

To verify the operation of a newly installed feature or replacement part, select the appropriate procedure:
- Verify the installed feature using AIX
- Verifying the replaced part using AIX

Verify the installed feature by using AIX:
1. Log in as root user.
2. At the command line, type `diag` and press Enter.
3. Select **Advanced Diagnostics Routines** and press Enter.
4. From the **Diagnostic Mode Selection** menu, select **System Verification** and press Enter.
5. When the **Advanced Diagnostic Selection** menu appears, do one of the following:
   - To test a single resource, select the resource that you just installed from the list of resources and press Enter.
   - To test all the resources available to the operating system, select **All Resources** and press Enter.
6. Select **Commit**, and wait until the diagnostic programs run to completion, responding to any prompts that appear.
7. Did the diagnostics run to completion and display the message `No trouble was found`?
   - **No:** If a service request number (SRN) or other reference code is displayed, suspect a loose adapter or cable connection. Review the installation procedures to ensure that the new feature is installed correctly. If you cannot correct the problem, collect all SRNs or any other reference code information that you see. If the system is running in logical partitioning (LPAR) mode, note the logical partition in which you installed the feature. Contact your service provider for assistance.
   - **Yes:** The new device is installed correctly. Exit the diagnostic programs and return the system to normal operations.

Verify the replacement part by using AIX:

To verify the operation of a newly installed feature or replacement part, follow these steps:
1. Did you use either the AIX operating system or the online diagnostics service aid concurrent (hot-swap) service to replace the part?

   No: Go to step 2.

   Yes: Go to step 5 on page 250.
2. Is the system powered off?

   No: Go to step 4 on page 250.

   Yes: If the system supports slow boot, set the system to perform a slow boot. For information, see Performing a slow boot.

3. Start the system and wait until the AIX operating system login prompt is displayed or until apparent system activity on the operator panel or display has stopped.

   Did the AIX login prompt display?

   - **No:** If a service request number (SRN) or other reference code is displayed, suspect a loose adapter or cable connection. Review the procedures for the part that you replaced to ensure that the new part is installed correctly. If you cannot correct the problem, collect all SRNs or any other reference code information that you see. If the system does not start or you have no login prompt, see: Problems with loading and starting the operating system.

     If the system is partitioned, note the logical partition in which you replaced the part. Contact your service provider for assistance.

   - **Yes:** Go to step 4.

4. At the command prompt, type `diag –a` and press Enter to check for missing resources. If you see a command prompt, go to step 5.

   If the **Diagnostic selection** menu is shown with **M** appearing next to any resource, follow these steps:

   a. Select the resource and press Enter.

   b. Select **Commit**.

   c. Follow any instructions that are shown.

   d. If the *Do you want to review the previously displayed error?* message is shown, select **Yes** and press Enter.

   e. If an SRN is shown, suspect a loose card or connection. If no obvious problem is shown, record the SRN and contact your service provider for assistance..

   f. If no SRN is shown, go to step 5.

5. Test the part by doing the following steps:

   a. At the command line, type `diag` and press Enter.

   b. From the **Function Selection** menu, select **Advanced Diagnostics Routines** and press Enter.

   c. From the **Diagnostic Mode Selection** menu, select **System Verification** and press Enter.

   d. Select **All Resources**, or select the diagnostics for the individual part to test only the part you replaced and any devices that are attached to the part you replaced and press Enter.

      Did the **Resource Repair Action** menu appear?

      No: Go to step 6.

      Yes: Go to step 7.

6. Did the *Testing Complete, No trouble was found* message appear?

   - **No:** There is still a problem. Contact your service provider. **This ends the procedure.**

   - **Yes:** Select **Log Repair Action**, if not previously logged, from the **Task Selection** menu to update the AIX error log. If the repair action was reseating a cable or adapter, select the resource associated with that repair action. If the resource associated with your action is not displayed on the resource list, select **sysplanar0** and press Enter.

     Tip: This action changes the indicator light for the part from the fault state to the normal state. Go to step 9 on page 251.

7. Select the resource for the replaced part from the **Resource Repair Action** menu. When a test is run on a resource in system verification mode, and that resource has an entry in the AIX error log, if the test on the resource was successful, the **Resource Repair Action** menu appears. Complete the following steps to update the AIX error log to indicate that a system-detectable part has been replaced.

   Note: On systems with an indicator light for the failing part, this action changes the indicator light to the normal state.

a. Select the resource that has been replaced from the **Resource Repair Action** menu. If the repair action was reseating a cable or adapter, select the resource associated with that repair action. If the resource associated with your action does not appear on the resource list, select **sysplanar0** and press Enter.

b. Select **Commit** after you make your selections. Did another **Resource Repair Action** display appear?

   No: If the **No Trouble Found** display appears, go to step 9

   Yes: Go to step 8.

8. Select the parent or child of the resource for the replaced part from the **Resource Repair Action** menu if necessary. When a test is run on a resource in system verification mode, and that resource has an entry in the AIX error log, if the test on the resource was successful, the **Resource Repair Action** menu appears. Complete the following steps to update the AIX error log to indicate that a system-detectable part has been replaced.

   Note: This action changes the indicator light for the part from the fault state to the normal state.

   a. From the **Resource Repair Action** menu, select the parent or child of the resource that has been replaced. If the repair action was to reseat a cable or adapter, select the resource associated with that repair action. If the resource associated with your action does not appear on the resource list, select **sysplanar0** and press Enter.

   b. Select **Commit** after you make your selections.

   c. If the **No Trouble Found** display appears, go to step 9.

9. If you changed the service processor or network settings, as instructed in previous procedures, restore the settings to the values they had prior to servicing the system.

10. Did you do any hot-plug procedures before doing this procedure?

    No: Go to step 11.

    Yes: Go to step 12.

11. Start the operating system, with the system or logical partition in normal mode. Were you able to start the operating system?

    No: Contact your service provider. **This ends the procedure.**

    Yes: Go to step 12.

12. Are the indicator lights still on?

    - **No. This ends the procedure.**
    - **Yes.** Turn off the lights. See the following for instructions: Changing service indicators.

Verifying the installed part in an IBM i system or logical partition

If you have installed a new feature or part, verify that the system recognizes the feature or part by using the IBM i system service tools.

To verify the installed part, follow these steps:

1. Deactivate the failing item indicator light. For instructions, see "Deactivating the failing-part indicator light" on page 196.

2. Sign on **with at least service level authority**.

3. On the command line of the IBM i session, type `strsst` and press Enter.

   Note: If you cannot get to the System Service Tools display, use function 21 from the control panel. Alternatively, if the system is managed by Hardware Management Console (HMC), use the Service Focal Point Utilities to get to the Dedicated Service Tools (DST) display.

4. Type your service tools user ID and service tools password on the System Service Tools (SST) Sign On display and press Enter.

Note: The service tools password is case-sensitive.

5. Select **Start a service tool** from the System Service Tools (SST) display and press Enter.

6. Select **Hardware service manager** from the Start a Service Tool display and press Enter.

7. Select **Logical hardware resources (buses, IOPs, controllers)** from the Hardware Service Manager display and press Enter. This option allows you to display and work with logical resources. Logical hardware resources are the functional resources of the system used by the operating system.

With the Logical Hardware Resources display, you can show logical hardware resource status or information, and associated packaging hardware resources. Use the online Help information to better understand specific functions, fields, or symbols.

Deactivating the failing-part indicator light

Use this procedure to turn off any indicator light that you turned on as a part of a service action.

To deactivate the indicator light, follow these steps:

1. Sign on to an IBM i session, **with at least service level authority**.

2. On the command line of the session, type `strsst` and press Enter.

   Note: If you cannot get to the System Service Tools display, use function 21 from the control panel. Alternatively, if the system is managed by a Hardware Management Console (HMC), use the Service Focal Point utilities to get to the Dedicated Service Tools (DST) display.

3. Type your service tools user ID and service tools password on the System Service Tools (SST) Sign On display. Press Enter.

   Remember: The service tools password is case-sensitive.

4. Select **Start a service tool** from the System Service Tools (SST) display and press Enter.

5. Select **Hardware service manager** from the Start a Service Tool display and press Enter.

6. Select **Work with service action log** from the Hardware Service Manager display and press Enter.

7. On the Select Timeframe display, change the **From: Date and Time** field to a date and time prior to when the problem occurred.

8. Search for an entry that matches one or more conditions of the problem:
   - System Reference code
   - Resource
   - Date and time
   - Failing item list

9. Select option **2** (Display failing item information) to display the service action log entry.

10. Select option **2** (Display details) to display location information for the failing part to be replaced. The information displayed in the date and time fields is the date and time for the first occurrence of the specific System reference code for the resource displayed during the time range selected.

11. Select option **7** (Indicator off) to turn off the indicator light.

12. Select the **Acknowledge all errors** function at the bottom of the Service Action Log display, if all problems have been resolved.

13. Close the log entry by selecting option **8** (Close new entry) on the Service Action Log Report display.

Verifying the installed part in a Linux system or logical partition

If you have installed a new part, learn how to verify that the system recognizes the part.

To verify the newly installed or replaced part, continue with "Verifying an installed part by using stand-alone diagnostics" on page 253.

Verifying an installed part by using stand-alone diagnostics

If you have installed or replaced a part, verify that the system recognizes the new part. You can use stand-alone diagnostics to verify an installed part in a Linux system, expansion unit, or logical partition.

- If this server is directly attached to another server or attached to a network, ensure communications with the other servers have stopped.
- The stand-alone diagnostics require use of all of the logical partition resources. No other activity can be running on the logical partition.
- The stand-alone diagnostics require access to the system console.

You access these diagnostics from a CD-ROM or from the Network Installation Management (NIM) server. This procedure describes how to use the diagnostics from a CD-ROM. For information on running diagnostics from the Network Installation Management (NIM) server, see Running stand-alone diagnostics from a Network Installation Management server.

To use stand-alone diagnostics, follow these steps:

1. Stop all jobs and applications and then stop the operating system on the system or logical partition.
2. Remove all tapes, diskettes, and CD-ROM.
3. Turn off the system unit power. The next step boots the server or logical partition from the stand-alone diagnostics CD-ROM. If the optical drive is not available as the boot device on the server or logical partition on which you are working, follow these steps:
   a. Access the ASMI. See Accessing the ASMI for information on using the ASMI.
   b. On the ASMI main menu, click on **Power/Restart Control**.
   c. Click Power On/Off System.
   d. Select the **Service mode boot from default boot list** option in the AIX or Linux logical partition mode boot drop-down menu.
   e. Click **Save settings and power on**. As soon as the optical drive has power, insert the standalone diagnostic CD-ROM.
   f. Go to step 5.
4. Turn on the system unit power and immediately insert the diagnostics CD-ROM into the optical drive.
5. After the **keyboard** POST indicator displays on the system console and before the last POST indicator (**speaker**) displays, press the numeric 5 key on the system console to indicate that a service mode boot should be initiated using the default-service mode boot list.
6. Enter any requested password.
7. At the **Diagnostic Operating Instructions** display, press Enter.

   Tip: If a service request number (SRN) or other reference code is displayed, suspect a loose adapter or cable connection.

   Note: If you received an SRN or any other reference code when you attempted to start the system, contact your service provider for assistance..
8. If the terminal type is requested, select the **Initialize Terminal** option on the Function Selection menu to initialize the operating system.
9. From the Function Selection menu, select **Advanced Diagnostics Routines** and press Enter.
10. From the Diagnostic Mode Selection menu, select **System Verification** and press Enter.
11. When the Advanced Diagnostic Selection menu appears, select **All Resources**, or test only the part you replaced, and any devices that are attached to the part you replaced, by selecting the diagnostics for the individual part and press Enter.
12. Did the `Testing Complete, No trouble was found` message appear?

- **No:** There is still a problem. Contact your service provider.
- **Yes:** Go to step 13.

13. If you changed the service processor or network settings, as instructed in previous procedures, restore the settings to the value they had prior to servicing the system.

14. If the indicator lights are still on, follow these steps:

   a. Select **Identify and Attention Indicators** from the Task Selection menu to turn off the system attention and indicator lights and press Enter.

   b. Select **Set System Attention Indicator to NORMAL** and press Enter.

   c. Select **Set All Identify Indicators to NORMAL** and press Enter.

   d. Choose **Commit**.

      Note: This changes the system attention and identify indicators from the *Fault* state to the *Normal* state.

   e. Exit to the command line.

Verifying the installed part by using Hardware Management Console

If you have installed or replaced a part, use the Hardware Management Console (HMC) to update your HMC records after you have completed a service action on your server. If you have reference codes, symptoms, or location codes that you used during the service action, locate the records for use during this procedure.

To verify the installed part, complete these steps:

1. At the HMC, examine the service action event log for any open service action events. See "Viewing serviceable events" on page 256 for details.

2. Are there any service action events that are open?

   No: If the system attention LED is still on, use the HMC to turn off the LED. See "Activating and deactivating LEDs" on page 255. **This ends the procedure.**

   Yes: Continue with the next step.

3. Record the list of open service action events.

4. Examine the details of the open service action event. Is the error code associated with this service action event the same as you gathered earlier.

   - **No**: Select one of the following options:
     – Review the other serviceable events, find one that does match, and continue with the next step.
     – If the log does not match what you had gathered earlier, contact your service provider.
   - **Yes**: Continue with the next step.

5. Select and highlight the service action event from the Error Associated With This Serviceable Event window.

6. Click **Close Event**.

7. Add comments for the serviceable event. Include any unique additional information. Click **OK**.

8. Did you replace, add, or modify a field replaceable unit (FRU) of the open service action event?

   - **No**: Select the **No FRU Replaced for this Serviceable Event** option, and click **OK** to close the service action event.
   - **Yes**: Perform the following steps:
     a. From the FRU list, select a FRU that you need to update.
     b. Double-click the FRU and update the FRU information.
     c. Click **OK** to close the service action event.

9. If you continue to have problems, contact your service provider.

Activating and deactivating LEDs

Use this procedure to activate or deactivate LEDs using Service Focal Point for the HMC.

Choose from the following:
- "Deactivating a system attention LED or partition LED"
- "Activating or deactivating identify LED"

Deactivating a system attention LED or partition LED

You can deactivate a system attention LED or a logical partition LED. For example, you might determine that a problem is not a high priority and decide to repair the problem at a later time. However, you want to be alerted if another problem occurs, so you must deactivate the system attention LED so that it can be activated again if another problem occurs.

1. In the navigation area, open **Systems Management**.
2. Open **Servers** and select the appropriate system.
3. In the content area, check the box for the appropriate Partition.
4. Select **Tasks**, then **Operations**, and then **Manage Attention LED**.
5. Select the appropriate Partition.
6. Select **Deactivate System Attention LED** from the **Action** menu. A confirmation window is displayed that provides the following information:
   - A verification that the system attention LED was deactivated.
   - An indication that there still might be open problems within the system.
   - An indication that you cannot activate the system attention LED.
7. Select one of the logical partitions in the lower table, and select **Deactivate partition LED** from the **Partition Operations** menu. A confirmation window is displayed that provides the following information:
   - A verification that the logical partition LED was deactivated.
   - An indication that there still might be open problems within the logical partition.
   - An indication that you cannot activate the logical partition LED.

Activating or deactivating identify LED

The system provides several LEDs that help identify various components, such as enclosures or field replaceable units (FRUs), in the system. For this reason, they are called *identify LEDs*.

You can activate or deactivate the following types of identify LEDs:
- **Identify LED for an enclosure** If you want to add an adapter to a specific drawer (enclosure), you need to know the machine type, model, and serial number (MTMS) of the drawer. To determine whether you have the correct MTMS for the drawer that needs the new adapter, you can activate the LED for a drawer and verify that the MTMS corresponds to the drawer that requires the new adapter.
- **Identify LED for a FRU associated with a specified enclosure** If you want to hook up a cable to a specific I/O adapter, you can activate the LED for the adapter which is a field replaceable unit (FRU), and then physically check to see where you should hook up the cable. This is especially useful when you have several adapters with open ports.

To activate or deactivate an identify LED for an enclosure or FRU, follow these steps:
1. In the navigation area, open **Systems Management**.
2. Select **Servers**.
3. In the content area, check the box for the appropriate System.
4. Select **Tasks**, then **Operations**, then **LED Status**, and then **Identify LED**.

5. To activate or deactivate an identify LED for an enclosure, select an enclosure from the table, and click either **Activate LED** or **Deactivate LED**. The associated LED is either turned on or off.

6. To activate or deactivate an identify LED for a FRU, select an enclosure from the table, select **Selected** → **List FRUs**.

7. Select one or more FRUs from the table, and click either **Activate LED** or **Deactivate LED**. The associated LED is either turned on or off.

Viewing serviceable events

Use this procedure to view a serviceable event, including details, comments, and service history.

To view serviceable events and other information about the events, you must be a member of one of the following roles:

- Super administrator
- Service representative
- Operator
- Product engineer
- Viewer

To view serviceable events, follow these steps:

1. In the navigation area, select **Service Management**.

2. Select **Manage Serviceable Events**.

3. Select the criteria for the serviceable events that you want to view, and click **OK**. The Serviceable Event Overview window opens. The list shows all serviceable events that match your selection criteria. You can use the menu options to perform actions on the serviceable events.

4. Select a line in the Serviceable Event Overview window, and select **Selected** → **View Details** The Serviceable Event Details window opens, showing detailed information about the serviceable event. The upper table shows information, such as problem number and reference code. The lower table shows the field replaceable units (FRUs) associated with this event.

5. Select the error for which you want to view comments and history, and follow these steps:

   a. Select **Actions** → **View Comments**.

   b. When you are finished viewing the comments, click **Close**.

   c. Select **Actions** → **View Service History**. The Service History window opens, showing service history associated with the selected error.

   d. When you are finished viewing the service history, click **Close**.

6. When you are finished, click **Cancel** twice to close the Serviceable Event Details window and the Serviceable Event Overview window.

Verifying an installed feature or replaced part on a system or logical partition by using Virtual I/O Server tools

If you installed feature or replaced a part, you might want to use the tools in Virtual I/O Server (VIOS) to verify that the feature or part is recognized by the system or logical partition.

To verify the operation of a newly installed feature or replacement part, select the appropriate procedure:

- Verify the installed feature using VIOS
- Verifying the replaced part using VIOS

Verify the installed feature by using VIOS:

1. Log in as root user.

2. At the command line, type `diagmenu` and press Enter.

3. Select **Advanced Diagnostics Routines** and press Enter.
4. From the **Diagnostic Mode Selection** menu, select **System Verification** and press Enter.
5. When the **Advanced Diagnostic Selection** menu appears, do one of the following:
   - To test a single resource, select the resource that you just installed from the list of resources and press Enter.
   - To test all the resources available to the operating system, select **All Resources** and press Enter.
6. Select **Commit**, and wait until the diagnostic programs run to completion, responding to any prompts that appear.
7. Did the diagnostics run to completion and display the message No trouble was found?
   - **No:** If a service request number (SRN) or other reference code is displayed, suspect a loose adapter or cable connection. Review the installation procedures to ensure that the new feature is installed correctly. If you cannot correct the problem, collect all SRNs or any other reference code information that you see. If the system is running in LPAR mode, note the logical partition in which you installed the feature. Contact your service provider for assistance.
   - **Yes:** The new device is installed correctly. Exit the diagnostic programs and return the system to normal operations.

Verify the replacement part by using VIOS:

To verify the operation of a newly installed feature or replacement part, follow these steps:
1. Did you replace the part by using either VIOS or the online diagnostics service aid's concurrent (hot-swap) service operation?

   No: Go to step 2.

   Yes: Go to step 5 on page 258.
2. Is the system powered off?

   No: Go to step 4.

   Yes: If the system supports slow boot, set the system to perform a slow boot. For information, see Performing a slow boot.
3. Start the system and wait until the VIOS operating system login prompt displays or until apparent system activity on the operator panel or display has stopped.

   Did the VIOS login prompt display?
   - **No:** If an SRN or other reference code is displayed, suspect a loose adapter or cable connection. Review the procedures for the part that you replaced to ensure that the new part is installed correctly. If you cannot correct the problem, collect all SRNs or any other reference code information that you see. If the system does not start or you have no login prompt, see: Problems with loading and starting the operating system.

     If the system is partitioned, note the logical partition in which you replaced the part. Contact your service provider for assistance.
   - **Yes:** Go to step 4
4. At the command prompt, type diag –a and press Enter to check for missing resources. If you see a command prompt, go to step 5 on page 258.

   If the **Diagnostic selection** menu is shown with **M** appearing next to any resource, follow these steps:
   a. Select the resource and press Enter.
   b. Select **Commit**.
   c. Follow any instructions that are shown.
   d. If a *Do you want to review the previously displayed error?* message is shown, select **Yes** and press Enter.

e. If an SRN is shown, suspect a loose card or connection. If no obvious problem is shown, record the SRN and contact your service provider for assistance..

f. If no SRN is shown, go to 5.

5. Test the part by doing the following:

   a. At the command line, type diagmenu and press Enter.

   b. From the **Function Selection** menu, select **Advanced Diagnostics Routines** and press Enter.

   c. From the **Diagnostic Mode Selection** menu, select **System Verification** and press Enter.

   d. Select **All Resources**, or select the diagnostics for the individual part to test only the part you replaced, and any devices that are attached to the part you replaced and press Enter.

   Did the **Resource Repair Action** menu appear?

   No: Go to step 6.

   Yes: Go to step 7.

6. Did the *Testing Complete, No trouble was found* message appear?

   • **No:** There is still a problem. Contact your service provider. **This ends the procedure.**

   • **Yes:** Select **Log Repair Action**, if not previously logged, from the **Task Selection** menu to update the AIX error log. If the repair action was reseating a cable or adapter, select the resource associated with that repair action. If the resource associated with your action is not displayed on the Resource List, select **sysplanar0** and press Enter.

   Tip: This action changes the indicator light for the part from the fault state to the normal state. Go to step 9 on page 259

7. Select the resource for the replaced part from the **Resource Repair Action** menu. When a test is run on a resource in system verification mode, and that resource has an entry in the AIX error log, if the test on the resource was successful, the **Resource Repair Action** menu appears. Complete the following steps to update the AIX error log to indicate that a system-detectable part has been replaced.

   Note: On systems with a indicator light for the failing part, this changes the indicator light to the normal state.

   a. Select the resource that has been replaced from the **Resource Repair Action** menu. If the repair action was reseating a cable or adapter, select the resource associated with that repair action. If the resource associated with your action does not appear on the Resource List, select **sysplanar0**. Press Enter.

   b. Select **Commit** after you make your selections. Did another **Resource Repair Action** display appear?

   No: If the **No Trouble Found** display appears, go to step 9 on page 259

   Yes: Go to step 8.

8. Select the parent or child of the resource for the replaced part from the **Resource Repair Action** menu if necessary. When a test is run on a resource in system verification mode, and that resource has an entry in the AIX error log, if the test on the resource was successful, the **Resource Repair Action** menu appears. Complete the following steps to update the AIX error log to indicate that a system-detectable part has been replaced.

   Note: This changes the indicator light for the part from the fault state to the normal state.

   a. From the **Resource Repair Action** menu, select the parent or child of the resource that has been replaced. If the repair action was to reseat a cable or adapter, select the resource associated with that repair action. If the resource associated with your action does not appear on the Resource List, select **sysplanar0**. Press Enter.

   b. Select **Commit** after you make your selections.

   c. If the **No Trouble Found** display appears, go to step 9 on page 259.

9. If you changed the service processor or network settings, as instructed in previous procedures, restore the settings to the values they had prior to servicing the system.

10. Did you do any hot-plug procedures before doing this procedure?

    No: Go to step 11.

    Yes: Go to step 12.

11. Start the operating system, with the system or logical partition in normal mode. Were you able to start the operating system?

    No: Contact your service provider. **This ends the procedure.**

    Yes: Go to step 12.

12. Are the indicator lights still on?

    *   **No. This ends the procedure.**
    *   **Yes.** Turn off the lights. See one of the following for instructions: Changing service indicators

Verifying a repair

Use these procedures to verify hardware operation after making repairs to the system.

Choose from the following options:
- To verify the repair of a system that is currently powered off, go to step 1.
- To verify the repair of a system that is currently powered on with no operating system loaded, go to step 3.
- To verify the repair of a system that is currently powered on and that has an operating system loaded, go to step 5.

1. Power on the server and all attached I/O enclosures.

Did all the enclosures power on?
Yes: Go to step 3.↓ Go to step 3.
No: Continue with the next step.

2. Choose from the following options:

- If the original problem was that an enclosure would not power on and you have another FRU to replace, locate and replace the next field-replaceable unit (FRU).
- If the next FRU in the FRU list is an isolation procedure, perform the isolation procedure.
- If the original problem was that an enclosure would not power on and you have an isolation procedure to complete, perform the isolation procedure.
- If the original problem was that an enclosure would not power on and there are no more FRUs or isolation procedures in the FRU list, contact your next level of support.
- If you have a new problem, perform problem analysis and repair the new problem.

3. Load the operating system.

Did the operating system load successfully?
Yes: Go to step 5.
No: Continue with the next step.

4. Choose from the following options:

- If the original problem was a failing disk drive that contained the operating system software, go to step 5.
- If the original problem was that the operating system would not load and you have another FRU to replace, go to your FRU locations section to locate the next FRU.
- If the next FRU in the FRU list is an isolation procedure, perform the isolation procedure.
- If the original problem was that the operating system would not load and you have an isolation procedure to complete, perform the isolation procedure.
- If the original problem was that the operating system would not load and there are no more FRUs or isolation procedures in the FRU list, contact your next level of support.
- If you have a new problem, perform problem analysis and repair the new problem.

5. Choose from the following options:
   - "Verifying the repair in AIX" on page 262
   - "Verifying the repair in Linux" on page 267
   - "Verifying a repair using an IBM i system or logical partition" on page 265

Verifying the repair in AIX

You can use this procedure to verify that a repair is complete using the AIX operating system.

Use this maintenance analysis procedure (MAP) to check out the server after a repair is completed.

1. Did you replace a disk drive in the root volume group?

No Go to step 3.

Yes Continue with the next step.

2. Run stand-alone diagnostics either from a CD or from a Network Installation Management (NIM) server.

Did you encounter any problems?

No Reinstall the operating system and continue with step 5.

Yes If the original problem still exists, replace the field-replaceable unit (FRU) or perform the isolation procedure that is next in the FRU list. If you have reached the end of the FRU list, contact your next level of support.

If a new problem has occurred, go to Beginning problem analysis.

3. Did you replace a FRU with the power turned on and concurrently with system operations?

No Go to step 5.

Yes Continue with the next step.

4. Did you use an AIX diagnostics service aid hot-swap operation to change the FRU?

Yes Go to step 6.

No Go to step 7 on page 263.

Note: The AIX diagnostic service aid was used if a resource was removed using the **Hot Plug** task.

5.

Note: If any FRUs have been removed that should be reinstalled, reinstall them now.

Perform the following steps:

1. If the system is not powered on, power it on now.
2. Perform a slow boot.
3. Wait until the AIX operating system login prompt displays or until system activity on the operator panel or display apparently has stopped.
4. Did you encounter any problems?

No Continue at step 6.

Yes If the original problem still exists, replace the FRU or perform the isolation procedure that is next in the FRU list. If you have reached the end of the FRU list, contact your next level of support.

If a new problem has occurred, go to Beginning problem analysis.

6. If the Resource Repair Action menu is already displayed, go to step 9 on page 263; otherwise, perform the following steps:

1. Log into the operating system either with root authority (if needed, ask the customer to enter the password) or use the CE login.

2. Enter the `diag -a` command and check for missing resources. Follow any instructions that display. If an SRN displays, suspect a loose card or connection. If no instructions display, no resources were detected as missing. Continue with the next step.

7. Perform the following steps:

1. Enter `diag` at the command prompt.
2. Press Enter.
3. Select the **Diagnostics Routines** option.
4. When the Diagnostic Mode Selection menu displays, select **System verification**.
5. When the Diagnostic Selection menu displays, select the **All Resources** option or test the FRUs you exchanged, and any devices that are attached to the FRU(s) you exchanged, by selecting the diagnostics for the individual FRU.

Did the Resource Repair Action menu (801015) display?

No   Continue with the next step.

Yes   Go to step 9.

8. Did the Testing Complete, no trouble was found menu (801010) display?

Yes   Use the **Log Repair Action** option, if not previously logged, in the TASK SELECTION menu to update the AIX error log. If the repair action was reseating a cable or adapter, select the resource associated with that repair action.

If the resource associated with your action is not displayed on the resource list, select **sysplanar0**.
Note: If the system attention indicator is on, this action will set it back to the normal state.

Go to step 11 on page 264.

No   If the original problem still exists, replace the FRU or perform the isolation procedure that is next in the FRU list. If you have reached the end of the FRU list, contact your next level of support.

If a new problem has occurred, go to Beginning problem analysis.

9. When a test is run on a resource in system verification mode, that resource has an entry in the AIX error log. If the test on that resource was successful, the Resource Repair Action menu displays.

After replacing a FRU, you must select the resource for that FRU from the Resource Repair Action menu. This updates the AIX error log to indicate that a system-detectable FRU has been replaced.

Note: If the system attention indicator is on, this action will set it back to the normal state.

Perform the following steps:

1. Select the resource that has been replaced from the Resource Repair Action menu. If the repair action was reseating a cable or adapter, select the resource associated with that repair action. If the resource associated with your action is not displayed on the resource list, select **sysplanar0**.

2. Press **Commit** after you make your selections.

Did another Resource Repair Action (801015) display?

No   If the No Trouble Found menu displays, go to step 11.

Yes   Continue with the next step.

10. The parent or child of the resource you just replaced might also require that you run the Resource Repair Action service aid on it.

    When a test is run on a resource in system verification mode, that resource has an entry in the AIX error log. If the test on the resource was successful, the Resource Repair Action menu displays.

    After replacing that FRU, you must select the resource for that FRU from the Resource Repair Action menu. This updates the AIX error log to indicate that a system-detectable FRU has been replaced.

    Note: If the system attention indicator is on, this action will set it back to the normal state.

    Perform the following steps:

    1. From the RESOURCE REPAIR ACTION menu, select the parent or child of the resource that has been replaced. If the repair action was reseating a cable or adapter, select the resource associated with that repair action. If the resource associated with your action is not displayed on the resource list, select **sysplanar0**.

    2. Press COMMIT after you make your selections.

    3. If the No Trouble Found menu displays, continue with the next step.

11. If you changed the service processor or network settings, as instructed in previous MAPs, restore the settings to the value they had prior to servicing the system. If you ran stand-alone diagnostics from CD-ROM, remove the stand-alone diagnostics CD-ROM from the system.

    Did you perform service on a RAID subsystem involving changing of the PCI RAID adapter cache card or changing the configuration?

    Note: This information does not apply to the PCI-X RAID adapter or cache.

No   Go to the close of call procedure.

Yes   Continue with the next step.

12. Use the **Recover Options** selection to resolve the RAID configuration. To do this, perform the following steps:

1. On the PCI SCSI Disk Array Manager display, select **Recovery options**.
2. If a previous configuration exists on the replacement adapter, this must be cleared. Select **Clear PCI SCSI Adapter Configuration** and press F3.
3. On the Recovery Options screen, select **Resolve PCI SCSI RAID Adapter Configuration**.
4. On the Resolve PCI SCSI RAID Adapter Configuration screen, select **Accept Configuration on Drives**.
5. On the PCI SCSI RAID Adapter selections menu, select the adapter that you changed.
6. On the next screen, press Enter.
7. When you see the Are You Sure selection menu, press Enter to continue.
8. If you see a `Failed` status message, verify that you selected the correct adapter, and then repeat this procedure. When the recovery is complete, exit the operating system.
9. Go to the close of call procedure.

Verifying a repair using an IBM i system or logical partition

Use this procedure to verify a repair using the IBM i operating system.

1. Was the system powered off during the repair?

    Yes: Continue with the next step.

    No: Continue with step 3.

2. Perform the following tasks:

    a. Verify that the power cable is plugged into the power outlet.

    b. Verify that power is available at the customer's power outlet.

3. Was the partition powered off during the repair?

    Yes: Continue with the next step.

    No: Continue with step 6.

4. Select the IPL type and mode for the system or logical partition that the customer uses (see IPL type mode and speed options in the Service functions).

5. Start an IPL by powering on the system or partition (see Powering on and powering off). Did the system complete the IPL?

    Yes: Continue with the next step.

    No: This might be a new problem. Go to the Start of call procedure. **This ends the procedure.**

6. Did the system or partition remain running throughout the repair, and was the I/O processor, I/O adapter, or storage device replaced?

    Yes: Continue with step 10.

    No: Continue with the next step.

7. Use the service action log or serviceable event view (if the system is managed by an HMC) to look for any reference codes that are related to this IPL (see Using the Service Action Log). Are there any reference codes that are related to this IPL?

    Yes: Continue with the next step.

    No: If the problem was related to removable media or communications, perform the verification procedures in the Service functions to verify that the problem is corrected. Then return the system to the customer and have the customer verify the system date and time. **This ends the procedure.**

8. Is the new reference code the same as the original reference code?

   Yes: Continue with the next step.

   No: A new symptom might have occurred. Go to the Start of call procedure. **This ends the procedure.**

9. Are there any other failing items that remain to be replaced?

   Yes: Replace the next failing item listed for this reference code. **This ends the procedure.**

   No: Contact your next level of support for assistance. **This ends the procedure.**

10. Was concurrent maintenance performed on an optical storage unit?

    Yes: The product activity log and service action log, in most cases, contain a reference code for the optical storage unit when concurrent maintenance is performed. You can ignore this reference code. Perform the following:

    - Perform the verification procedures in the Service functions topic to verify that the problem is corrected.

    - Return the system to the customer and have the customer verify the system date and time. **This ends the procedure.**

    No: Continue with the next step.

11. Use the service action log to look for any new reference codes (see Using the Service Action Log). Are there any new reference codes?

    Yes: Continue with the next step.

    No: Go to step 14.

12. Is the new reference code the same as the original reference code?

    Yes: Continue with the next step.

    No: A new symptom might have occurred. Go to the Start of call procedure to determine the cause of the problem. **This ends the procedure.**

13. Are there any other failing items that need to be replaced?

    Yes: Replace the next failing item listed for the reference code. **This ends the procedure.**.

    No: Contact your next level of support for assistance. **This ends the procedure.**

14. Are you working with a tape device?

    Yes: Perform the verification procedures in the Service functions to verify that the problem is corrected. After the verification test is complete, the tape device description will be set to the failed state because a resource change was detected. Perform the following tasks:

    - Vary the tape device description off and then on.

    - Return the system to the customer and have the customer verify the system date and time. Then go to Verifying the repair from the HMC. **This ends the procedure.**

    No: Continue with the next step.

15. Are you working with an IOP or an IOA?

    Yes: Use the display hardware configuration service function to check for any missing or failed hardware:

    - On the command line, enter the STRSST (Start System Service Tools command). If you cannot get to SST, select DST. Do not IPL the system or partition to get to DST.

    - On the Start Service Tools Sign On display, enter the user ID with the service authority and password.

    - Select **Start a service tool** → **Hardware service manager** → **Logical hardware resources** → **System bus resources**.

    - Select the function key for **Include nonreporting resources**.

    - If the IOP and IOA that you just replaced is a failed or non-reporting resource, the problem has not been fixed. Continue to the next failing item in the failing item list. **This ends the procedure.**

No: Perform the verification procedures in the Service functions topics to verify that the problem is corrected. Resources that usually vary on automatically during an IPL, or that were previously varied on manually, might need to be varied on again after the verification procedures are complete. Return the system to the customer and have the customer verify the system date and time. **This ends the procedure.**

Verifying the repair in Linux

You can use this procedure to verify that a repair is complete using the Linux operating system.

1. Run stand-alone diagnostics from either a CD or from a Network Installation Management (NIM) server. See Running the stand-alone diagnostics from CD-ROM.

Did you encounter any problems?

No   Reboot the operating system and continue with the close of call procedure.

Yes   If the original problem still exists, replace the field-replaceable unit (FRU) or perform the isolation procedure that is next in the FRU list. If you have reached the end of the FRU list, contact your next level of support.

       If a new problem has occurred, go to Beginning problem analysis and repair the new problem.

Verifying the repair from the HMC

Perform these procedures to close problem numbers, clear hardware messages, and prepare the server to return to the customer using the hardware management console (HMC).

Follow this checklist before performing the procedures:

- You return the server to the state that the customer normally uses such as IPL type, IPL mode, and the way the system is configured or partitioned.

  Attention: Before returning the system to the customer, remove the system from service mode. If the system is left in service mode, it automatically places a call for service every two hours.

- While you were performing the problem analysis on the original serviceable event, other serviceable-event numbers might have been opened. Close all serviceable events that were opened as a result of your service activity.

- Server verification has been performed and there are no problems that require additional service actions.

- If the repair was done using the HMC online repair procedures, ensure that the original serviceable event is now closed.

1. Is an HMC used to manage the server that you are servicing?

- **Yes:** Continue with the next step.
- **No:** Return to the "Verifying a repair" on page 261. **This ends the procedure.**

2. Are you closing a service event that was a repair on the HMC personal computer?

- **Yes:** Continue with the next step.
- **No:** Go to step 4 on page 268.

3. Power on the HMC. Did the power-on process complete without errors?

- **Yes:** Ensure that the HMC can be used to perform server management tasks, and return the HMC to normal operations. Go to "Closing a service call" on page 269. **This ends the procedure.**
- **No**: Go to the *HMC isolation procedures*. **This ends the procedure.**

4. Log into the HMC as the service representative. If invalid user or invalid password displays, get the correct login information from the system administer.

   1. If logged on the System Manager, select Exit from the Console, located on the System Manager window.
   2. Login to the System Manager with the following: User identification service Password service mode

5. View Serviceable Event Details.

   1. In the navigation area, select the Service Applications icon.
   2. In the navigation area, select the Service Focal Point icon.
   3. In the Contents area, select Manage Serviceable Events.
   4. Designate the set of Serviceable Events you want to view. When you are finished, click OK. The **Service Event** Overview window opens.

   Note: Only the events that match all of the criteria you specify are shown.

6. Close open or delayed events.

   1. Select the problem to close, on the Service Event Overview window.
   2. Select the menu Selected, located on the menu bar.
   3. Click Close Event.
   4. Enter your comments in the Serviceable Event Comments window, and click Close Event.
   5. Close all events associated with the problem on which you were working.

7. Did the Service Event Overview window contain the event or events on which you were working?

- **Yes:** Return the HMC to normal operations. Go to "Closing a service call" on page 269. **This ends the procedure.**
- **No:** Go to *Detecting problems*. **This ends the procedure.**

Closing a service call

Perform these procedures to close problem numbers, clear hardware messages, and prepare the server to return to the customer.

Follow this checklist before performing the procedures:

- Return the server to the state that the customer normally uses such as IPL type, IPL mode, and the way the system is configured or partitioned.

  Attention: Before returning the system to the customer, remove the system from service mode. If the system is left in service mode, it automatically places a call for service every two hours.

- While you were performing the problem analysis on the original serviceable event, other serviceable events might have been opened. Close all serviceable events that were opened as a result of your service activity.

- Ensure that server verification has been performed and no problems require additional service actions.

- If the repair was done using the Hardware Management Console (HMC) online repair procedures, ensure that the original serviceable event is now closed.

 1. Record the system reference code (SRC) or symptom and the location code of the field-replaceable unit (FRU) you replaced, for future reference. Is the server managed by an HMC?

- **Yes:** Continue with the next step.
- **No:** Do one of the following steps:
  - If the server is managed by Integrated Virtualization Manager (IVM), go to "Closing a service call using Integrated Virtualization Manager" on page 277.
  - If the server is not partitioned and is running the AIX or Linux operating system, go to "Closing a service call using AIX or Linux" on page 273.

 2. On the HMC, open **Manage Serviceable Events** and examine the service action event log for any open service action events.

 3. Are there any service action events that are open?

- **Yes:** Continue with the next step.
- **No:** If the system attention LED is still on, turn off the LED as described in "Activating and deactivating LEDs" on page 283. Return the system to the customer. **This completes the repair.**

 4. Record the list of open service action events.

 5. From the list of serviceable events recorded in step 4, perform the following step 6 through step 32 on page 272 for each open service action event.

 6. Determine the error class of the serviceable event. Record for future use.

 7. Examine the details of the open service action event.

Is the error code that is associated with this service action event the same as recorded in Step 1 on page 269?

- **Yes:** Go to step 11.
- **No:** Continue with the next step.

8. Examine the FRU list of the service action event. Are any FRUs listed for the service action event?

- **Yes:** Continue with the next step.
- **No:** Go to step 11.

9. Is the FRU list identical (same FRUs, same number of FRUs, and same order of FRUs) to the FRU list of the error code recorded in step 1 on page 269?

- **Yes:** Go to step 11.
- **No:** Continue with the next step.

10. The FRU list is different. Is the FRU you replaced and recorded in step 1 on page 269 in the list of FRUs for this service action event?

- **Yes:** Continue with the next step.
- **No:** Go to step 32 on page 272.
  Note: There are service action events that will remain open when you leave this MAP. Further service actions might be required to complete the repair.

11. Examine the details of this service action event, and record the partitions involved in this service action event for use in a later step.

12. Is the error code associated with this service action event of the form A11-xxx or A01-xxx?

- **Yes:** Continue with the next step.
- **No:** Go to step 17 on page 271.

13. Have you begun a list of A*xx* partitions from prior service action events that you processed in this maintenance analysis procedure (MAP)?

- **Yes:** Go to step 15.
- **No:** Continue with the next step.

14. Begin a new list of A*xx* partitions by copying the list of partitions obtained in step 11. Go to step 16.

15. Add the partition list obtained in step 11 to the existing list of A*xx* partitions obtained from processing previous service action events in this MAP.

16. Remove all entries in the list of all partitions you recorded in step 11. If you are referred to the list of partitions obtained in step 11 in future steps, the list is empty. Go to step 17 on page 271.

17. Select and highlight the service action event from the Error Associated With This Serviceable Event window.

18. Click **Close Event**.

19. Add comments for the serviceable event. Include any unique additional information. Click **OK**. The following steps will add or update FRU information.

20. Did you replace, add, or modify a FRU of the open service action event?

- **Yes:** Continue with the next step.
- **No:** Go to step 22.

21. From the FRU list, select a FRU that you need to update. Double-click the FRU, and update the FRU information. Go to step 23.

22. Select the **No FRU Replaced for this Serviceable Event** option.

23. Click **OK** to close the service action event.

24. Is the list of all partitions you recorded in step 11 on page 270 empty?

- **Yes:** Go to step 32 on page 272.
- **No:** Continue with the next step.

25. Does the list of all partitions you recorded in step 11 on page 270 contain more than one entry?

- **Yes:** Continue with the next step.
- **No:** Go to step 32 on page 272.

26. Is the error class recorded in step 25 AIX?

- **Yes:** Continue with the next step.
- **No:** Go to step 32 on page 272.

27. Perform the following steps for each entry in the list of all partitions you recorded in step 11 on page 270, except the partition you were using to debug the original problem.

28. From the HMC virtual terminal window of a partition in the list of all partitions, type `diag` at the AIX command prompt.

29. When the diagnostic operating instructions are displayed, do the following steps:

1. Press Enter.

2. Select the **Task Selection** option.

3. Select the **Log Repair** option.

4. Select the resource associated with the repair action. If the repair action was reseating a cable or adapter, select the resource associated with that repair action. If the resource associated with your repair action is not displayed on the Resource List, select **sysplanar0**.

5. Click **Commit** after you have made your selection.

Note: If the terminal type is not defined, you are prompted to define it before you can proceed.

30. Exit from diagnostics in this partition and return to the AIX prompt.

31. Have all the partitions in the list of all the partitions you recorded in step 11 on page 270 been processed?

- **Yes:** Continue with the next step.
- **No:** Go to step 24 on page 271 to process the next partition in the list you recorded in step 11 on page 270.

32. Have all the serviceable events recorded in step 4 on page 269 been processed?

- **Yes:** Continue with the next step.
- **No:** Go to step 5 on page 269 and process the next service action event in the list of serviceable events recorded in step 4 on page 269.

33. While processing all service action events, were you directed to step 14 on page 270?

- **Yes:** Continue with the next step.
- **No:** If the system attention LED is still on, turn off the LED as described in "Activating and deactivating LEDs" on page 283. Return the system to the customer. **This completes the repair.**
  Note: If during the processing of the list of open service action events, some service action events remained open, further service actions might be required to complete the repair.

34. Perform the following steps for each entry in the list of A*xx* partitions you began recording in step 14 on page 270, except the partition you were using to debug the original problem.

35. From the HMC virtual terminal window of a partition in the list of A*xx* partitions, type `diag` at the AIX command prompt.

36. When the diagnostic operating instructions are displayed, do the following steps:

1. Press Enter.
2. Select the **Task Selection** option.
   Note: If the terminal type is not defined, you are prompted to define it before you can proceed.
3. Select the **Log Repair** option.
4. Select the resource associated with the repair action. If the repair action was reseating a cable or adapter, select the resource associated with that repair action. If the resource associated with your repair action is not displayed on the Resource List, select **sysplanar0**.
5. Click **Commit** after you have made your selection.

37. Exit from diagnostics in this partition and return to the AIX prompt.

38. Have all the partitions in the list of A*xx* partitions you began recording in step 14 on page 270 been processed?

- **Yes:** Continue with the next step.
- **No:** Go to step 34 on page 272 to process the next partition in the list you recorded in step 14 on page 270.

39. If the system attention LED is still on, turn off the LED as described in "Activating and deactivating LEDs" on page 283. This completes the repair. Return the system to the customer.

   Note: If during the processing of the list of open service action events, some service action events remained open, further service actions might be required to complete the repair.

Closing a service call using AIX or Linux

If the server is not connected to an Hardware Management Console (HMC) and not using Integrated Virtualization Manager (IVM), perform these procedures to close problem numbers, clear hardware messages, and prepare the server to return to the customer.

Follow this checklist before performing the procedures:
- Return the server to the state that the customer normally uses, such as IPL type, IPL mode, and the way the system is configured or partitioned.
  Attention: Before returning the system to the customer, remove the system from service mode. If the system is left in service mode, it automatically places a call for service every two hours.
- While you were performing the problem analysis on the original serviceable event, other serviceable-event numbers might have been opened. Close all serviceable events that were opened as a result of your service activity.
- Ensure that server verification has been performed and that no problems require additional service actions.
- If the repair was done using the IVM online repair procedures, ensure that the original serviceable event is now closed.

   1. Did you use an AIX diagnostics service aid hot-swap operation to change the FRU?

- **Yes:** Go to step 4 on page 274
- **No:** Continue with the next step.

2. Do you have any field-replaceable units (FRUs) (for example cards, adapters, cables, or devices) that were removed during problem analysis that you want to put back into the system?

   Note: If the system planar or battery has been replaced and you are loading diagnostics from a server over a network, it might be necessary for the customer to set the network boot information for this system before diagnostics can be loaded. The system time and date information should also be set when the repair is completed.

   • **Yes:** Reinstall all of the FRUs that were removed during problem analysis. Go to step 3
   • **No:** Continue with the next step.

3. Is the system or logical partition that you are performing a repair action on running the AIX operating system?

   • **Yes:** Continue with the next step.
   • **No:** Go to step 5.

4. Does the system or logical partition you are performing a repair action on have AIX installed?

   Note: Answer no to this question if you have just replaced a hard disk in the root volume group.

   • **Yes:** Go to step 7.
   • **No:** Continue with the next step.

5. Run stand-alone diagnostics in problem determination mode from either a CD-ROM or from a Network Installation Management (NIM) server.

   Note: For instructions on running stand-alone diagnostics from a CD and not using an HMC, go to Running the stand-alone diagnostics from CD on a server without an HMC attached.

   For instructions on running stand-alone diagnostics from a NIM server, go to Running the stand-alone diagnostics from a Network Installation Management server.
   Did you encounter any problems?

   • **Yes:** Go to problem analysis.
   • **No:** Continue with the next step.

6. The system hardware is functioning correctly.

If the system attention LED is still on, turn off the LED as described in "Activating and deactivating LEDs" on page 283.

This completes the repair.
Note: If, during the processing of the list of open service action events, some service action events remained open, further service actions might be required to complete the repair.

Return the server to the state that the customer normally uses, such as IPL type, IPL mode, and the way the system is configured or partitioned. This might require you to reboot the operating system.

Attention: Before returning the system to the customer, remove the system from service mode. If the system is left in service mode, it automatically places a call for service every two hours.

7. Complete the following steps:

1. If the system supports slow boot (see Performing a slow boot), do a slow boot on the system. If the system does not support slow boot, do a normal boot.

2. Power on the system.

3. Wait until the AIX operating system login prompt displays or until system activity on the operator panel or display apparently has stopped.

Did the AIX Login Prompt display?

- **Yes:** Continue with the next step.
- **No:** Go to problem analysis.

8. If the Resource Repair Action menu is already displayed, go to 12 on page 276; otherwise, do the following steps:

1. Log into the operating system, either with root authority (if needed, ask the customer to enter the password) or use the CE login.

2. Enter the `diag -a` command and check for missing resources. Follow any instructions that display. If an system request number (SRN) displays, suspect a loose card or connection. If no instructions display, no resources were detected as missing. Continue with 9.

9. Complete the following steps:

1. Enter `diag` at the command prompt.
2. Press Enter.
3. Select the **Diagnostics Routines** option.
4. When the Diagnostic Mode Selection menu displays, select **Problem determination**.
5. When the Advanced Diagnostic Selection menu displays, select the **All Resources** option, or test the FRUs you exchanged, and any devices that are attached to the FRUs you exchanged, by selecting the diagnostics for the individual FRU.

Did the Resource Repair Action menu (801015) display?

- **Yes:** Go to step 13 on page 276.
- **No:** Continue with the next step.

10. Did the TESTING COMPLETE, no trouble was found menu (801010) display?

- **Yes:** Continue with the next step.
- **No:** There is still a problem. Go to problem analysis.

11. Use the **Log Repair Action** option, if not previously logged, in the TASK SELECTION menu to update the AIX error log. If the repair action was reseating a cable or adapter, select the resource associated with that repair action.

If the resource associated with your action is not displayed on the
resource list, select **sysplanar0**.
Note: If the system attention indicator is on, this will set it back to
the normal state. Go to step 14.

12. When a test is run on a resource in system verification mode, and that resource has an entry in the
    AIX error log, if the test on the resource was successful, the Resource Repair Action menu displays.

After replacing a FRU, you must select the resource for that FRU from the Resource Repair Action menu. This
updates the AIX error log to indicate that a system-detectable FRU has been replaced.
Note: If the system attention indicator is on, this action will set it back to the normal state.

Do the following steps:

1. Select the resource that has been replaced from the Resource Repair Action menu. If the repair action was
   reseating a cable or adapter, select the resource associated with that repair action. If the resource associated with
   your action is not displayed on the resource list, select **sysplanar0**.

2. Press **Commit** after you make your selections.

Did another Resource Repair Action (801015) display?

- **Yes:** Continue with the next step.
- **No:** If the No Trouble Found menu displays, go to step 14.

13. The parent or child of the resource you just replaced might also require that you run the Resource
    Repair Action service aid on it.

When a test is run on a resource in system verification mode, and
that resource has an entry in the AIX error log, if the test on the
resource was successful, the Resource Repair Action menu displays.

After replacing that FRU, you must select the resource for that FRU
from the Resource Repair Action menu. This updates the AIX error
log to indicate that a system-detectable FRU has been replaced.
Note: If the system attention indicator is on, this action will set it
back to the normal state.

Do the following steps:

1. From the Resource Repair Action menu, select the parent or child
   of the resource that has been replaced. If the repair action was
   reseating a cable or adapter, select the resource associated with
   that repair action. If the resource associated with your action is
   not displayed on the resource list, select **sysplanar0**.

2. Press COMMIT after you make your selections.

Did the No Trouble Found menu display?

- **Yes:** Continue with the next step.
- **No:** Go to problem analysis.

14. If you changed the service processor or network settings, as instructed in previous MAPs, restore the
    settings to the value they had prior to servicing the system. If you ran stand-alone diagnostics from
    CD-ROM, remove the stand-alone diagnostics CD-ROM from the system.

Did you perform service on a RAID subsystem involving changing of the PCI RAID adapter cache card or changing the configuration?
Note: This does not refer to the PCI-X RAID adapter or cache.

- **Yes:** Continue with the next step.
- **No:** Go to step 16.

15. Use the **Recover Options** selection to resolve the RAID configuration. To do this, do the following steps:

1. On the PCI SCSI Disk Array Manager dialog, select **Recovery options**.
2. If a previous configuration exists on the replacement adapter, this must be cleared. Select **Clear PCI SCSI Adapter Configuration** and press F3.
3. On the Recovery Options dialog, select **Resolve PCI SCSI RAID Adapter Configuration**.
4. On the Resolve PCI SCSI RAID Adapter Configuration dialog, select **Accept Configuration on Drives**.
5. On the PCI SCSI RAID Adapter selections menu, select the adapter that you changed.
6. On the next dialog, press Enter.
7. When you see the Are You Sure selection menu, press Enter to continue.
8. You should see an OK status message when the recover is complete. If you get a Failed status message, verify that you selected the correct adapter, and then repeat this procedure. When recover is complete, exit the operating system.
9. Go to 16.

16. The system hardware is functioning correctly. Return the server to the state that the customer normally uses, such as IPL type, IPL mode, and the way the system is configured or partitioned.

Attention: Before returning the system to the customer, remove the system from service mode. If the system is left in service mode, it automatically places a call for service every two hours.

Closing a service call using Integrated Virtualization Manager

Perform these procedures to close problem numbers, clear hardware messages, and prepare the server to return to the customer.

Follow this checklist before performing the procedures:
- Return the server to the state that the customer normally uses, such as IPL type, IPL mode, and the way the system is configured or partitioned.

  Attention: Before returning the system to the customer, remove the system from service mode. If the system is left in service mode, it automatically places a call for service every two hours.
- While you were performing the problem analysis on the original serviceable event, other serviceable-event numbers might have been opened. Close all serviceable events that were opened as a result of your service activity.
- Ensure that server verification has been performed and there are no problems that require additional service actions.
- If the repair was done using the Integrated Virtualization Manager (IVM) online repair procedures, ensure that the original serviceable event is now closed.

1. Record the system reference code (SRC) or symptom and the location code of the field-replaceable unit (FRU) you replaced, for future reference.

2. On the IVM, open **Manage Serviceable Events** and look at existing serviceable events.

3. Are there any service action events that are open?

- **Yes:** Continue with the next step.
- **No:** If the system attention LED is still on, turn off the LED as described in "Activating and deactivating LEDs" on page 283. Return the system to the customer. **This completes the repair.**

4. Record the list of open service action events.

5. From the list of serviceable events recorded in step 4, perform step 6 through step 30 on page 280 for each open service action event.

6. Determine the error class of the serviceable event. Record for future use.

7. Examine the details of the open service action event.

Is the error code associated with this service action event the same as recorded in step 1 on page 277?

- **Yes:** Go to step 11.
- **No:** Continue with the next step.

8. Examine the FRU list of the service action event. Are any FRUs listed for the service action event?

- **Yes:** Continue with the next step.
- **No:** Go to step 11.

9. Is the FRU list identical (same FRUs, same number of FRUs, and same order of FRUs) to the FRU list of the error code recorded in step 1 on page 277?

- **Yes:** Go to step 11.
- **No:** Continue with the next step.

10. Is the FRU you replaced and recorded in step 1 on page 277 in the list of FRUs for this service action event?

- **Yes:** Continue with the next step.
- **No:** Go to step 30 on page 280.
  Note: There are service action events that will remain open when you leave this MAP. Further service actions might be required to complete the repair.

11. Examine the details of this service action event, and record the partitions involved in this service action event for use in a later step.

12. Is the error code associated with this service action event of the form A11-xxx or A01-xxx?

- **Yes:** Continue with the next step.
- **No:** Go to step 17.

13. Have you begun a list of A*xx* partitions from prior service action events that you processed in this maintenance analysis procedure (MAP)?

- **Yes:** Go to step 15.
- **No:** Continue with the next step.

14. Begin a new list of A*xx* partitions by copying the list of partitions obtained in step 11 on page 278. Go to step 16.

15. Add the partition list obtained in step 11 on page 278 to the existing list of A*xx* partitions obtained from processing previous service action events in this MAP.

16. Remove all entries in the list of all partitions you recorded in step 11 on page 278. If you are referred to the list of partitions obtained in step 11 on page 278 in future steps, the list is empty. Go to step 17.

17. Select and highlight the service action event from the Manage Serviceable Events window.

18. Click **Close Event**.

19. Add comments for the serviceable event. Include any unique additional information. Click **OK**.

20. Add or update FRU information:

Did you replace, add, or modify a FRU of the open service action event?

- **Yes:** Continue with the next step.
- **No:** Go to step 22.

21. Click **OK** to close the service action event.

22. Is the list of all partitions you recorded in step 11 on page 278 empty?

- **Yes:** Go to step 30 on page 280.
- **No:** Continue with the next step.

23. Does the list of all partitions you recorded in step 11 on page 278 contain more than one entry?

- **Yes:** Continue with the next step.
- **No:** Go to step 30.

24. Is the error class recorded in step 23?

- **Yes:** Continue with the next step.
- **No:** Go to step 30.

25. Perform the following steps for each entry in the list of all partitions you recorded in step 11 on page 278, except the partition you were using to debug the original problem.

26. From the IVM virtual terminal window of a partition in the list of all partitions, type `diag` at the AIX command prompt.

27. When the diagnostic operating instructions are displayed, do the following steps:

1. Press Enter.
2. Select the **Task Selection** option.
3. Select the **Log Repair** option.
4. Select the resource associated with the repair action. If the repair action was reseating a cable or adapter, select the resource associated with that repair action. If the resource associated with your repair action is not displayed on the Resource List, select **sysplanar0**.
5. Click **Commit** after you have made your selection.

Note: If the terminal type is not defined, you are prompted to define it before you can proceed.

28. Exit from diagnostics in this partition and return to the AIX prompt.

29. Have all the partitions in the list of all partitions you recorded in step 11 on page 278 been processed?

- **Yes:** Continue with the next step.
- **No:** Go to step 25 to process the next partition in the list you recorded in step 11 on page 278.

30. Have all the serviceable events recorded in step 4 on page 278 been processed?

- **Yes:** Continue with the next step.
- **No:** Go to step 5 on page 278 and process the next service action event in the list of serviceable events recorded in step 4 on page 278.

31. While processing all service action events, were you directed to step 14 on page 279?

- **Yes:** Continue with the next step.
- **No:** If the system attention LED is still on, turn off the LED as described in "Activating and deactivating LEDs" on page 283. Return the system to the customer. **This completes the repair.**
  Note: If during the processing of the list of open service action events, some service action events remained open, further service actions might be required to complete the repair.

32. Perform the following steps for each entry in the list of A*xx* partitions you began recording in step 14 on page 279, except the partition you were using to debug the original problem.

33. From the IVM virtual terminal window of a partition in the list of A*xx* partitions, type `diag` at the AIX command prompt.

34. When the diagnostic operating instructions are displayed, do the following steps:

1. Press Enter.
2. Select the **Task Selection** option.
   Note: If the terminal type is not defined, you are prompted to define it before you can proceed.
3. Select the **Log Repair** option.
4. Select the resource associated with the repair action. If the repair action was reseating a cable or adapter, select the resource associated with that repair action. If the resource associated with your repair action is not displayed on the Resource List, select **sysplanar0**.
5. Click **Commit** after you have made your selection.

35. Exit from diagnostics in this partition and return to the AIX prompt.

36. Have all the partitions in the list of A*xx* partitions you began recording in step 14 on page 279 been processed?

- **Yes:** Continue with the next step.
- **No:** Go to step 32 to process the next partition in the list you recorded in step 14 on page 279.

37. If the system attention LED is still on, turn off the LED as described in "Activating and deactivating LEDs" on page 283. This completes the repair. Return the system to the customer.

Note: If, during the processing of the list of open service action events, some service action events remained open, further service actions might be required to complete the repair.

Activating and deactivating LEDs

You can use these procedures to activate or deactivate light-emitting diodes (LEDs) using the Hardware Management Console (HMC) or the Advanced System Management Interface (ASMI).

For IBM Power Systems servers that contain the POWER7 processor, the LEDs can be used to identify or verify a part that you are servicing. The error and identify function (amber) LED indicates an error and corresponds to the location code in the system reference code (SRC). The LED is activated and deactivated automatically.

Additionally, the following procedures can also be used to activate and deactivate LEDs.

Deactivating a system attention LED or partition LED using the HMC

You can deactivate a system attention LED or a logical partition LED if you decide that a problem is not a high priority and you decide to repair the problem at a later time.

If you want to be alerted if another problem occurs, you must deactivate the system attention LED so that it can be activated again if another problem occurs.

To deactivate a system attention LED using the HMC, complete the following steps:
1. In the navigation area, open **Systems management**.
2. Select the server you are working on by checking the box next to its name.
3. Open **Operations**.
4. Open **LED Status**.
5. Select **View System Attention**. The system attention LED window opens. The selected system and its LED state are displayed in the upper part of the window. The logical partition and its LED state are displayed in the lower part of the window. From the system attention LED window, you can deactivate both the system attention LED and the logical partition LED.
6. Select **Deactivate System Attention LED** from the Action menu. A confirmation window is displayed that provides the following information:
   - A verification that the system attention LED was deactivated.
   - An indication that there still might be open problems within the system.
   - An indication that you cannot activate the system attention LED.
7. Select one of the logical partitions in the lower table, and select **Deactivate partition LED** from the Partition Operations menu. A confirmation window is displayed that provides the following information:
   - A verification that the logical partition LED was deactivated.
   - An indication that there still might be open problems within the logical partition.
   - An indication that you cannot activate the logical partition LED.

Activating or deactivating an identify LED using the HMC

You can activate or deactivate an identify LED for components attached to the system.

The system provides several LEDs that help identify various components, such as enclosures or field-replaceable units (FRUs), in the system. For this reason, they are called *identify LEDs*.

You can activate or deactivate the following types of identify LEDs:

- **Identify LED for an enclosure** If you want to add an adapter to a specific drawer (enclosure), you need to know the machine type, model, and serial number (MTMS) of the drawer. To determine whether you have the correct MTMS for the drawer that needs the new adapter, you can activate the LED for a drawer and verify that the MTMS corresponds to the drawer that requires the new adapter.
- **Identify LED for a FRU associated with a specified enclosure** If you want to hook up a cable to a specific I/O adapter, you can activate the LED for the adapter, which is a field replaceable unit (FRU), and then physically check to see where you should hook up the cable. This is especially useful when you have several adapters with open ports.

To activate or deactivate an identify LED for an enclosure or FRU, follow these steps:

1. In the navigation area, open **Systems management**.
2. Select the server you are working on.
3. Click **Operations** → **LED Status** → **Identify LED**. The Identify LED, Select Enclosure window opens.
4. To activate or deactivate an identify LED for an enclosure, select an enclosure from the table, and click either **Activate LED** or **Deactivate LED**. The associated LED is either turned on or off.
5. To activate or deactivate an identify LED for a FRU, select an enclosure from the table, and then select **Selected** → **List FRUs**.
6. Select one or more FRUs from the table, and click either **Activate LED** or **Deactivate LED**. The associated LED is either turned on or off.

Deactivating a system attention LED or logical partition LED using the Advanced System Management Interface

You can deactivate a system attention LED or a logical partition LED using the Advanced System Management Interface (ASMI).

The system attention indicator provides a visual signal that the system as a whole requires attention or service. Each system has a single system attention indicator. When an event occurs that either needs your intervention or that of service and support, the system attention indicator lights continuously. The system attention indicator is turned on when an entry is made in the service processor error log. The error entry is transmitted to the system error log and the operating system error log.

To perform this operation, your authority level must be one of the following levels:

- Administrator
- Authorized service provider

To turn off the system attention indicator, do the following steps:

1. On the ASMI Welcome pane, specify your user ID and password, and click **Log In**.
2. In the navigation area, expand **System Configuration** → **Service Indicators** → **System Attention Indicator**.
3. In the right pane, click **Turn off system attention indicator**. If the attempt is unsuccessful, an error message is displayed.

Activating or deactivating an identify LED using the Advanced System Management Interface

You can activate or deactivate an identify LED using the Advanced System Management Interface (ASMI).

You can specify the location code of any indicator to view or modify its current state. If you provide the wrong location code, the advanced system manager attempts to go to the next higher level of the location code.

The next level is the base-level location code for that field replaceable unit (FRU). For example, a user types the location code for the FRU located on the second I/O slot of the third enclosure in the system. If the location code for the second I/O slot is incorrect (the FRU does not exist at this location), an attempt to set the indicator for the third enclosure is initiated. This process continues until a FRU is located or no other level is available.

To perform this operation, your authority level must be one of the following levels:
* Administrator
* Authorized service provider

To change the current state of an indicator, do the following steps:
1. On the ASMI Welcome pane, specify your user ID and password, and click **Log In**.
2. In the navigation area, expand **System Configuration** → **Service Indicators** → **Indicators by Location code**.
3. In the right pane, enter the location code of the FRU and click **Continue**.
4. Select the preferred state from the list.
5. Click **Save settings**.

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Federal Communications Commission (FCC) statement

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

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

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

Industry Canada Compliance Statement

This Class A digital apparatus complies with Canadian ICES-003.

Avis de conformité à la réglementation d'Industrie Canada

Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.

European Community Compliance Statement

This product is in conformity with the protection requirements of EU Council Directive 2004/108/EC on the approximation of the laws of the Member States relating to electromagnetic compatibility. IBM cannot accept responsibility for any failure to satisfy the protection requirements resulting from a non-recommended modification of the product, including the fitting of non-IBM option cards.

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Tele: +49 7032 15-2937
e-mail: tjahn@de.ibm.com

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

VCCI Statement - Japan

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

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

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

Japanese Electronics and Information Technology Industries Association (JEITA) Confirmed Harmonics Guideline (products less than or equal to 20 A per phase)

高調波ガイドライン適合品

Japanese Electronics and Information Technology Industries Association (JEITA) Confirmed Harmonics Guideline with Modifications (products greater than 20 A per phase)

高調波ガイドライン準用品

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

声　　明

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

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

Electromagnetic Interference (EMI) Statement - Taiwan

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

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

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

IBM Taiwan Contact Information:

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

Electromagnetic Interference (EMI) Statement - Korea

이 기기는 업무용으로 전자파적합등록을 한 기기이오니 판매자
또는 사용자는 이점을 주의하시기 바라며, 만약 잘못 판매 또는
구입하였을 때에는 가정용으로 교환하시기 바랍니다.

Please note that this equipment has obtained EMC registration for commercial use. In the event that it has been mistakenly sold or purchased, please exchange it for equipment certified for home use.

Germany Compliance Statement

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

Dieses Produkt entspricht den Schutzanforderungen der EU-Richtlinie 2004/108/EG zur Angleichung der Rechtsvorschriften über die elektromagnetische Verträglichkeit in den EU-Mitgliedsstaaten und hält die Grenzwerte der EN 55022 Klasse A ein.

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

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

Deutschland: Einhaltung des Gesetzes über die elektromagnetische Verträglichkeit von Geräten

Dieses Produkt entspricht dem "Gesetz über die elektromagnetische Verträglichkeit von Geräten (EMVG)". Dies ist die Umsetzung der EU-Richtlinie 2004/108/EG in der Bundesrepublik Deutschland.

Zulassungsbescheinigung laut dem Deutschen Gesetz über die elektromagnetische Verträglichkeit von Geräten (EMVG) (bzw. der EMC EG Richtlinie 2004/108/EG) für Geräte der Klasse A

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

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

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

Der verantwortliche Ansprechpartner des Herstellers in der EU ist:
IBM Deutschland GmbH
Technical Regulations, Abteilung M456
IBM-Allee 1, 71139 Ehningen, Germany
Tel: +49 7032 15-2937
e-mail: tjahn@de.ibm.com

Generelle Informationen:

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

Electromagnetic Interference (EMI) Statement - Russia

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

Class B Notices

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

Federal Communications Commission (FCC) statement

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

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

If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

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

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

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

Industry Canada Compliance Statement

This Class B digital apparatus complies with Canadian ICES-003.

Avis de conformité à la réglementation d'Industrie Canada

Cet appareil numérique de la classe B est conforme à la norme NMB-003 du Canada.

European Community Compliance Statement

This product is in conformity with the protection requirements of EU Council Directive 2004/108/EC on the approximation of the laws of the Member States relating to electromagnetic compatibility. IBM cannot accept responsibility for any failure to satisfy the protection requirements resulting from a non-recommended modification of the product, including the fitting of non-IBM option cards.

This product has been tested and found to comply with the limits for Class B Information Technology Equipment according to European Standard EN 55022. The limits for Class B equipment were derived for typical residential environments to provide reasonable protection against interference with licensed communication equipment.

European Community contact:
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VCCI Statement - Japan

　この装置は，クラスB情報技術装置です。この装置は，家庭環境で使用することを目的としていますが，この装置がラジオやテレビジョン受信機に近接して使用されると，受信障害を引き起こすことがあります。
　取扱説明書に従って正しい取り扱いをして下さい。　　　　VCCI－B

Japanese Electronics and Information Technology Industries Association (JEITA) Confirmed Harmonics Guideline (products less than or equal to 20 A per phase)

高調波ガイドライン適合品

Japanese Electronics and Information Technology Industries Association (JEITA) Confirmed Harmonics Guideline with Modifications (products greater than 20 A per phase)

高調波ガイドライン準用品

IBM Taiwan Contact Information

台灣IBM 產品服務聯絡方式：
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Electromagnetic Interference (EMI) Statement - Korea

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주거지역에서는 물론 모든 지역에서 사용할 수 있습니다.

Germany Compliance Statement

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

Dieses Produkt entspricht den Schutzanforderungen der EU-Richtlinie 2004/108/EG zur Angleichung der Rechtsvorschriften über die elektromagnetische Verträglichkeit in den EU-Mitgliedsstaaten und hält die Grenzwerte der EN 55022 Klasse B ein.

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Deutschland: Einhaltung des Gesetzes über die elektromagnetische Verträglichkeit von Geräten

Dieses Produkt entspricht dem "Gesetz über die elektromagnetische Verträglichkeit von Geräten (EMVG)". Dies ist die Umsetzung der EU-Richtlinie 2004/108/EG in der Bundesrepublik Deutschland.

Zulassungsbescheinigung laut dem Deutschen Gesetz über die elektromagnetische Verträglichkeit von Geräten (EMVG) (bzw. der EMC EG Richtlinie 2004/108/EG) 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:
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Generelle Informationen:

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

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