ESCALA Power7

E5-700 Disk drives

ESCALA Power7

E5-700 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

Mai 2011

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Contents

Replacing a SAS conduit card in a 5802 expansion unit with the power turned off . . 157

Removing a SAS conduit card from a 5802 expansion unit with the power turned off   165

Replacing a SAS expander card in a 5802 expansion unit with power off 173

Removing a SAS expander card from a 5802 expansion unit with power off 175

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

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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)

</div>

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)
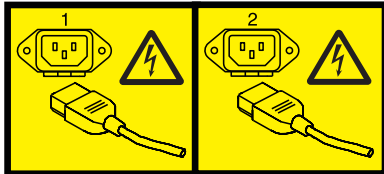
or

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

You might need to install, or remove and replace a disk drive.

Related information

➥ Backplanes

What's new in Disk drives

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

May 2011

The following updates were made to the content:
- Added information for installing a disk drive in the 5887, see Installing a disk drive or solid-state drive with the AIX® system or logical partition power turned on, Installing a disk drive or solid-state drive with the Linux system or logical partition power turned on, Installing a disk drive or solid-state drive with the Virtual I/O Server system or logical partition power turned on, Installing a disk drive or solid-state drive with the IBM i system or logical partition power turned on, and Installing a disk drive or solid-state drive with the system or logical partition power turned off.
- Added information for Disk drive locations and concurrent maintenance lights for the 5887 disk drive enclosure unit.
- Added information for Removing the internal disk drive from an 8202-E4B or 8205-E6B system.
- Added information for Removing the internal disk drive from an 8231-E2B system.
- Added information for Replacing the internal disk drive in an 8202-E4B or 8205-E6B system.
- Added information for Replacing the internal disk drive in an 8231-E2B system.

September 2010

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

March 2010

The following updates were made to the content:
- Added information for Disk drive locations and concurrent maintenance lights for models 9117-MMB or 9179-MHB.
- Added a procedure for Internal disk drive sharing in a 9117-MMB or 9179-MHB system.

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 or expansion unit.

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

5887	• (5805) - PCIe 380MB Cache Dual - x4 3Gb SAS RAID Adapter
	• (5901) - PCIe Dual - x4 SAS Adapter
	• (5908) - PCI-X DDR 1.5 GB Cache SAS RAID Adapter (BSC)
		• A maximum of 24 drives are supported in this expansion unit.
		• The EXP24S can be configured as one set of 24 bays (Mode 1), two sets of 12 bays (Mode 2), or four sets of 6 bays (Mode 4).
		• The EXP24S SAS ports are attached to SAS controller(s) which can be a SAS PCI-X adapter, PCIe adapter, or a pair of adapters. The EXP24S can also be attached to an imbedded SAS controller in a server with an imbedded SAS port.
		• Mixing of the Solid-state drives and hard disk drives:
		  – Cannot be mixed in a logical group when configured as in Mode 1
		  – Can be mixed when configured as in Mode 2: one set can be SSDs and the other set can be HDDs
		  – Cannot be mixed when configured as in Mode 4 because the SSDs are not supported by the adapter that is required to configure the 5887 for Mode 4

5886	• (5904) - PCI-X DDR 1.5GB Cache SAS RAID Adapter • (5906 and 5908) - PCI-X DDR 1.5 GB Cache SAS RAID Adapter (BSC) • (5903) - PCIe 380 MB Cache Dual - x4 3 Gb SAS RAID Adapter	• Solid-state drives and hard disk drives can be mixed in this drive enclosure. • A maximum of 24 drives are supported in this expansion unit. • Can be attached to the SAS Controller PCI or PCI-X adapters. Also, attached to the imbedded SAS controller in a server with an imbedded SAS port.
8231-E2B	• (2053) - 3 Gb/s SAS RAID Controller with 4X SSD Sockets • (5278) - SAS Controller	• SSD and HDD can never be mixed in the same RAID array or mirroring group. • Cannot split DASD. • Can be connected to the 5886 from the external SAS port.
8202-E4B and 8205-E6B	• (5631) - Split DASD Enablement adapter	• SSD and HDD can never be mixed in the same RAID array or mirroring group. • Can be connected to the 5886 from the external SAS port. • 5631 can be used to split DASD

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

5887	• (5805) - PCIe 380MB Cache Dual - x4 3Gb SAS RAID Adapter
	• (5901) - PCIe Dual - x4 SAS Adapter
	• (5908) - PCI-X DDR 1.5 GB Cache SAS RAID Adapter (BSC)
		• A maximum of 24 drives are supported in this expansion unit.
		• The EXP24S can be configured as one set of 24 bays (Mode 1), two sets of 12 bays (Mode 2), or four sets of 6 bays (Mode 4).
		• The EXP24S SAS ports are attached to SAS controller(s) which can be a SAS PCI-X adapter, PCIe adapter, or a pair of adapters. The EXP24S can also be attached to an imbedded SAS controller in a server with an imbedded SAS port.
		• Mixing of the Solid-state drives and hard disk drives:
		  – Cannot be mixed in a logical group when configured as in Mode 1
		  – Can be mixed when configured as in Mode 2: one set can be SSDs and the other set can be HDDs
		  – Cannot be mixed when configured as in Mode 4 because the SSDs are not supported by the adapter that is required to configure the 5887 for Mode 4

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.
8231-E2B	• (2053) - 3 Gb/s SAS RAID Controller with 4X SSD Sockets • (5278) - SAS Controller	• SSD and HDD can never be mixed in the same RAID array or mirroring group. • Cannot split DASD. • Can be connected to the 5886 from the external SAS port.
8202-E4B and 8205-E6B	• (5631) - Split DASD Enablement adapter	• SSD and HDD can never be mixed in the same RAID array or mirroring group. • Can be connected to the 5886 from the external SAS port. • 5631 can be used to split DASD

Table 2. Solid-state drive rules for the Linux 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 3. Solid-state drive rules for the IBM i operating system

Machine type model	Adapter	Mixing rules
5887	• (5805) - PCIe 380MB Cache Dual - x4 3Gb SAS RAID Adapter • (5901) - PCIe Dual - x4 SAS Adapter • (5908) - PCI-X DDR 1.5 GB Cache SAS RAID Adapter (BSC)	• A maximum of 24 drives are supported in this expansion unit. • The EXP24S can be configured as only one set of 24 bays (Mode 1). • The EXP24S SAS ports are attached to SAS controller(s) which can be a SAS PCI-X adapter, PCIe adapter, or a pair of adapters. The EXP24S can also be attached to an imbedded SAS controller in a server with an imbedded SAS port. • Mixing of the Solid-state drives and hard disk drives: – Cannot be mixed in a logical group when configured as in Mode 1
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.
8231-E2B	• (2053) - 3 Gb/s SAS RAID Controller with 4X SSD Sockets • (5278) - SAS Controller	• SSD and HDD can never be mixed in the same RAID array or mirroring group. • Cannot split DASD. • Can be connected to the 5886 from the external SAS port. • Not supported on IBM i
8202-E4B and 8205-E6B	• (5631) - Split DASD Enablement adapter	• SSD and HDD can never be mixed in the same RAID array or mirroring group. • Can be connected to the 5886 from the external SAS port. • 5631 can be used to split DASD

Table 3. Solid-state drive rules for the IBM i 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 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.
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 power turned 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 power turned on"
on page 19
Learn how 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.

"Installing a disk drive or solid-state drive with the IBM i system or logical partition power turned on"
on page 39
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
51
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 power turned 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 power turned on" on page 65. 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 Fix Central.

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 51.

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.

Preparing the system

1. Perform prerequisite tasks as described in Before you begin.
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 129.

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 must be installed. For example, the next available disk drive slot might be P3-D4.
6. Perform the following steps to install a disk drive. See "Installing a disk drive in the 5887 disk drive enclosure unit" on page 18 for the steps to install a disk drive in the 5887 expansion unit.

Installing 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 129.
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 15

   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.

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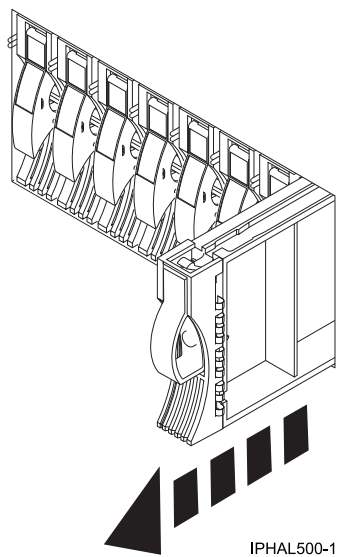
Figure 1. Removing a disk-drive filler from a model

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 2.

IPHAL501-2

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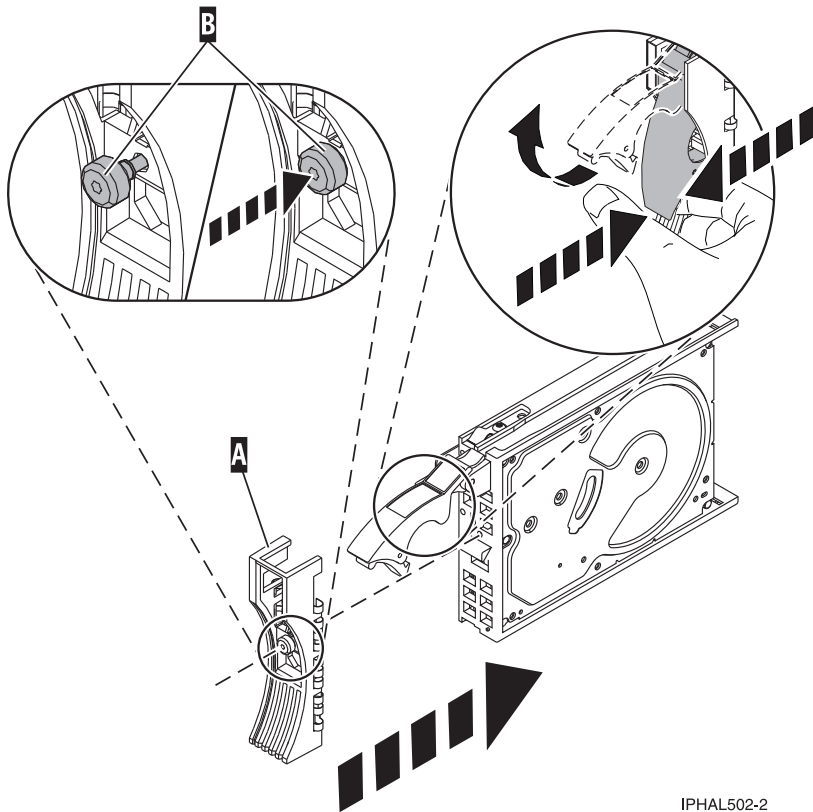
Figure 3. Installing a disk-drive bezel on a disk drive

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 17.

19. Push the disk drive handle in until it locks. The light on the disk drive turns on.

IPHAL951-0
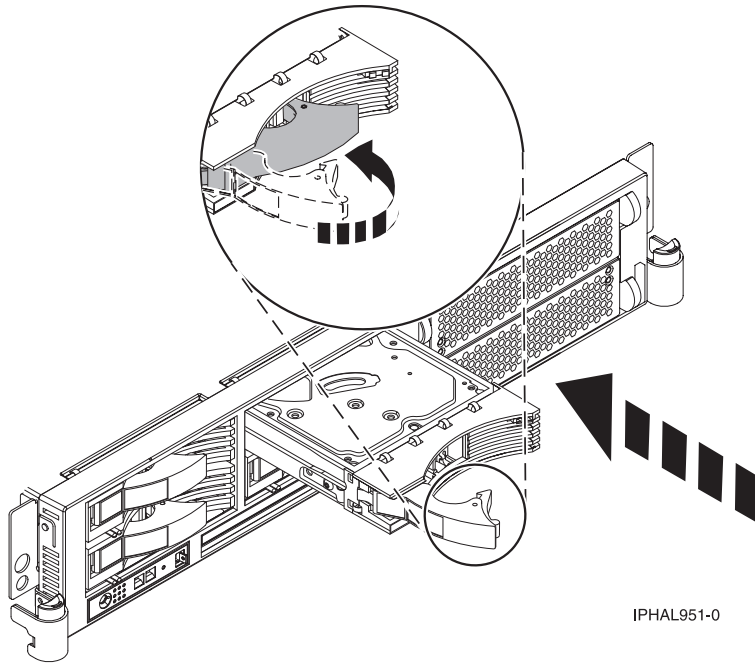
Figure 4. Installing a disk drive in model
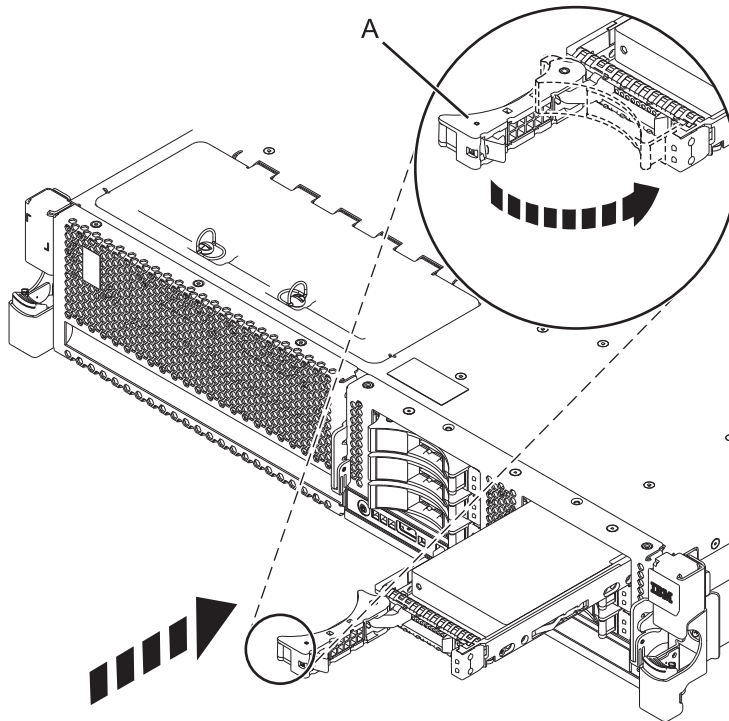
Figure 5. Installing a small-form factor disk drive
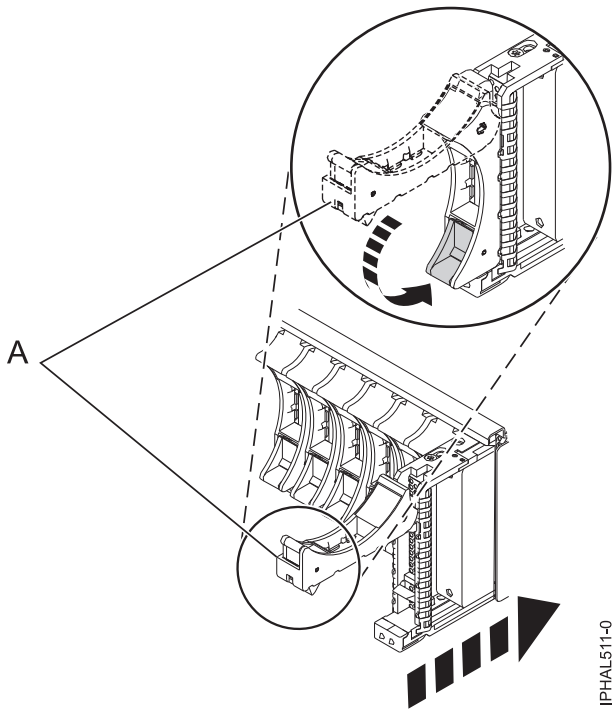
Figure 6. Installing a small-form factor disk drive in the 5803 expansion unit

20. Press Enter.
21. If you are installing more than one disk drive, repeat step 1 on page 14 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.

Installing a disk drive in the 5887 disk drive enclosure unit

1. With the handle in the unlocked position, see Figure 7 on page 19, support the bottom of the disk unit as you align it with the guide rails in the expansion unit. Do not hold the disk unit solely by the handle.
2. Slide the disk unit into the expansion unit until the drive stops.
3. Rotate the handle to the locked position.
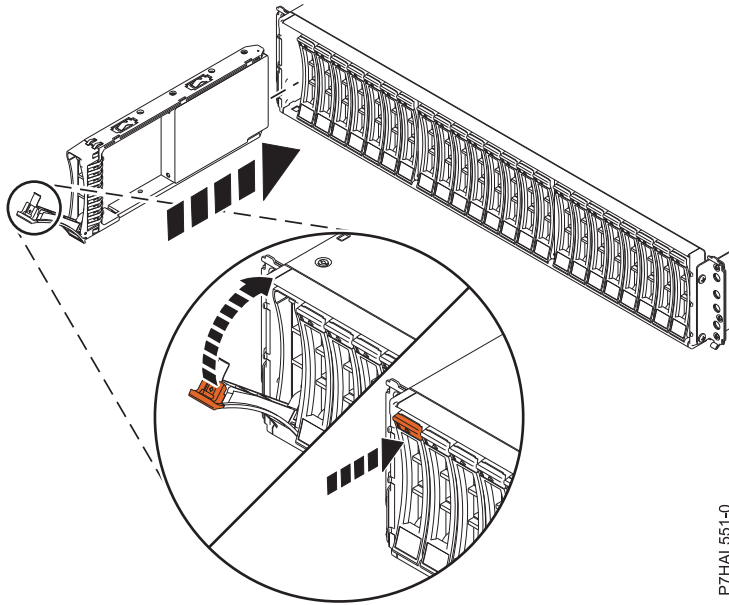
Figure 7. Installing the disk drive in the 5887

Completing 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 on an AIX system or logical partition.
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.

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

Learn how 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.

Attention: If you are servicing a failing part, see the service procedures for "Replacing a disk drive with the Linux system or logical partition power turned on" on page 74. 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 Fix Central.

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: Be sure you read these instructions carefully and understand the complexity of the power turned on procedure before you begin.

If any of the following steps applies to you, go to "Installing a disk drive or solid-state drive with the system or logical partition power turned off" on page 51.
- You are installing a disk drive that will be connected with the 6203 or 6204 SCSI adapter.
- You do not feel comfortable using the power turned 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. See

Preparing the system
1. Perform the prerequisite tasks as described in Before you begin.
2. If applicable, remove the system unit door, expansion unit door, or the rack door.
3. If applicable, 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 129.

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 are to be installed. For example, the next available disk drive position might be P3-D4. See "Installing a disk drive in the 5887 disk drive enclosure unit" for the steps to install a disk drive in the 5887 expansion unit.

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

Installing a disk drive in the 5887 disk drive enclosure unit

1. With the handle in the unlocked position, see Figure 8, support the bottom of the disk unit as you align it with the guide rails in the expansion unit. Do not hold the disk unit solely by the handle.
2. Slide the disk unit into the expansion unit until the drive stops.
3. Rotate the handle to the locked position.
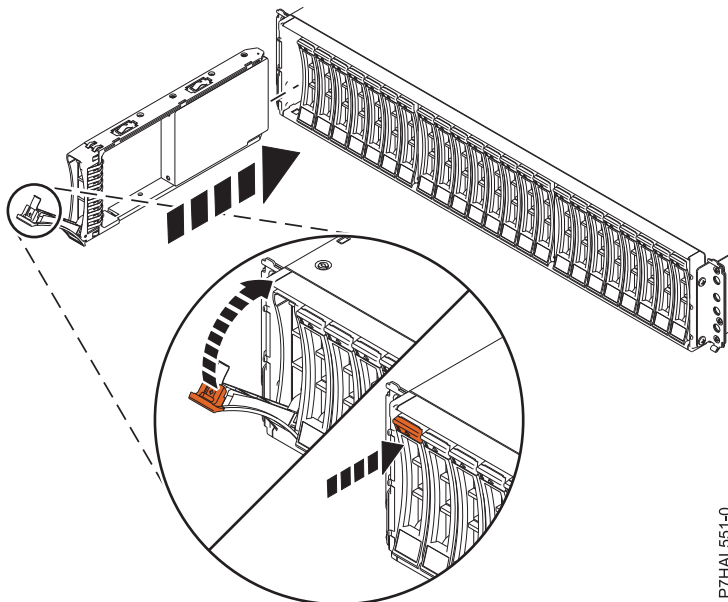
Figure 8. Installing the disk drive in the 5887

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, pull the disk-drive filler from the slot that you want to use.

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.

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

   Attention: Disk drives are fragile. Handle with care.

3. Store the removed filler for future use, or discard it.

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

5. Unlock the disk drive handle by pressing the latch lock **(A)** as shown in Figure 9 and pull out the disk drive handle towards you. If the handle is not all the way out, the disk drive does not slide into the system or expansion unit.

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 unit until it stops, as shown in Figure 9.
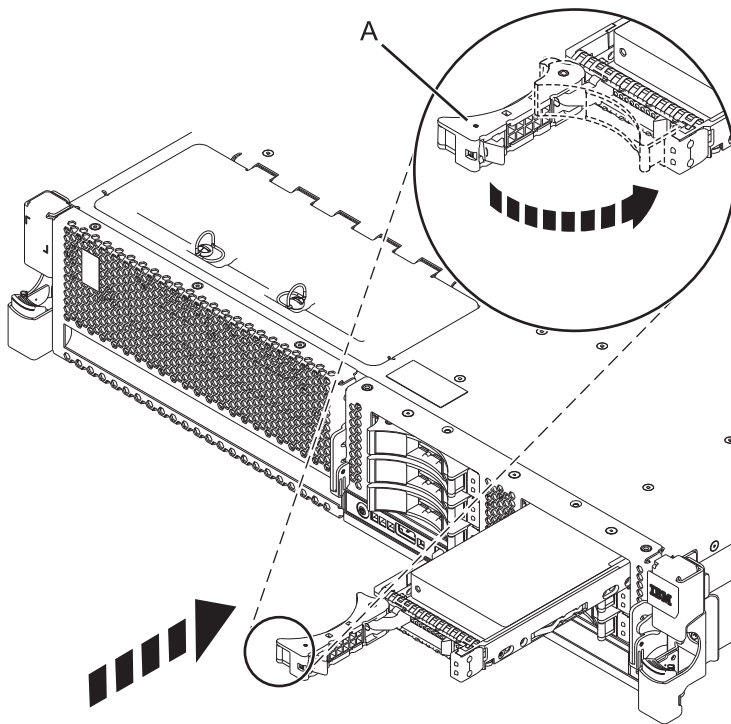
Figure 9. Installing a disk drive

Note: The concurrent maintenance light stops flashing 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 21 through step 7 on page 22, 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 10. 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.

Installing a disk drive or solid-state drive   **23**

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/sgx` 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 is displayed on the Display Hardware Status display.

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

Completing 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 187
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.

Installing 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 11. 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 12. 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 13.

IPHAL500-1

Figure 13. 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.
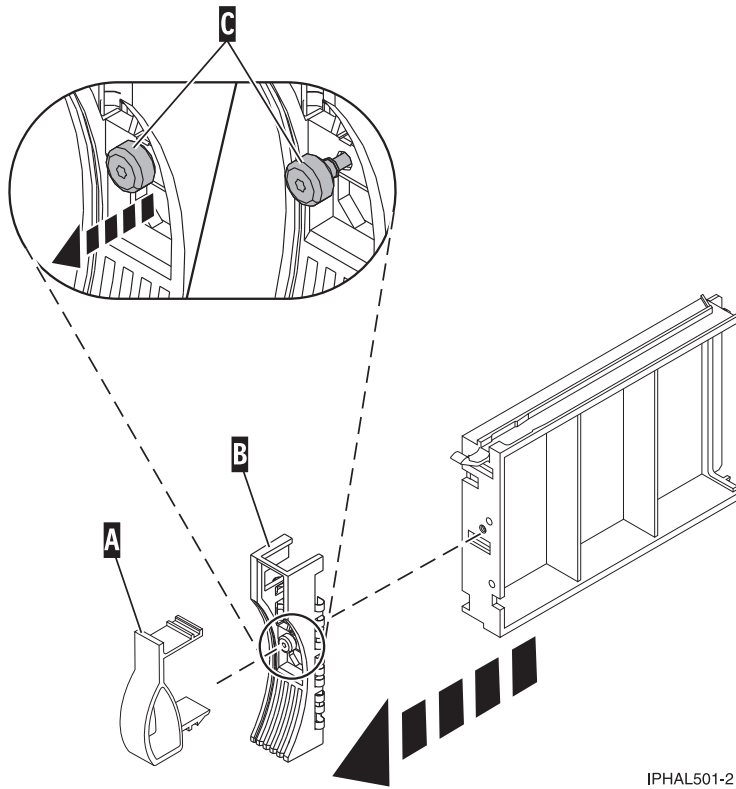
IPHAL501-2

Figure 14. 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.
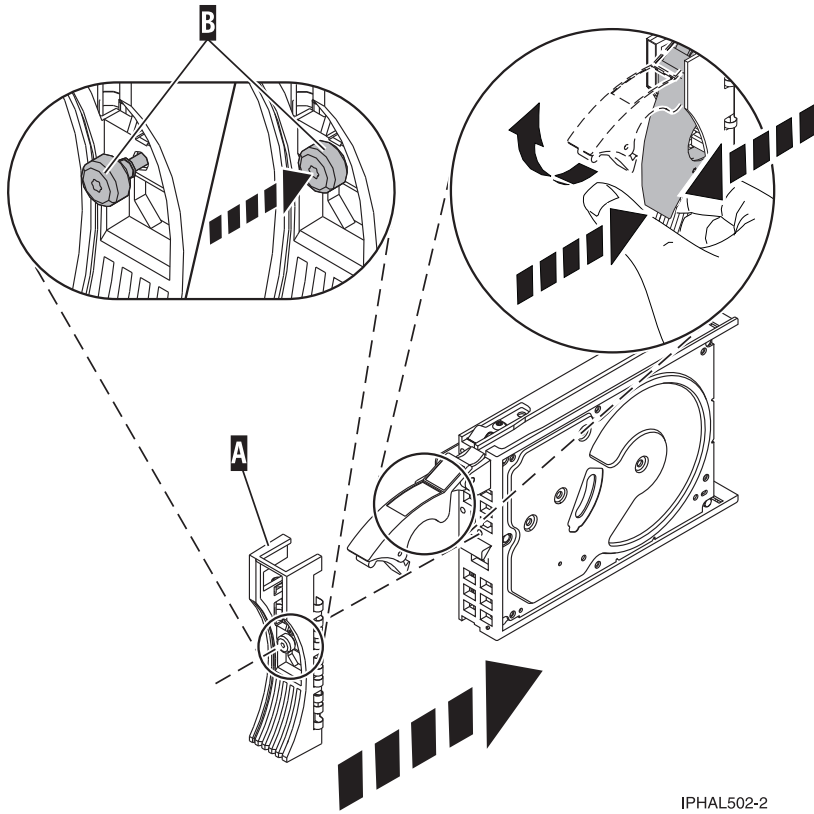
Figure 15. Attaching the disk-drive bezel to the disk drive.

      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 16 on page 29.

IPHAL503-0
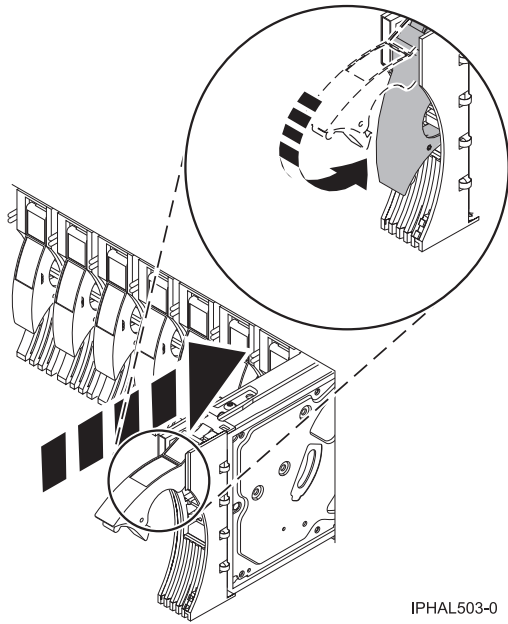
Figure 16. Installing a disk drive in a model
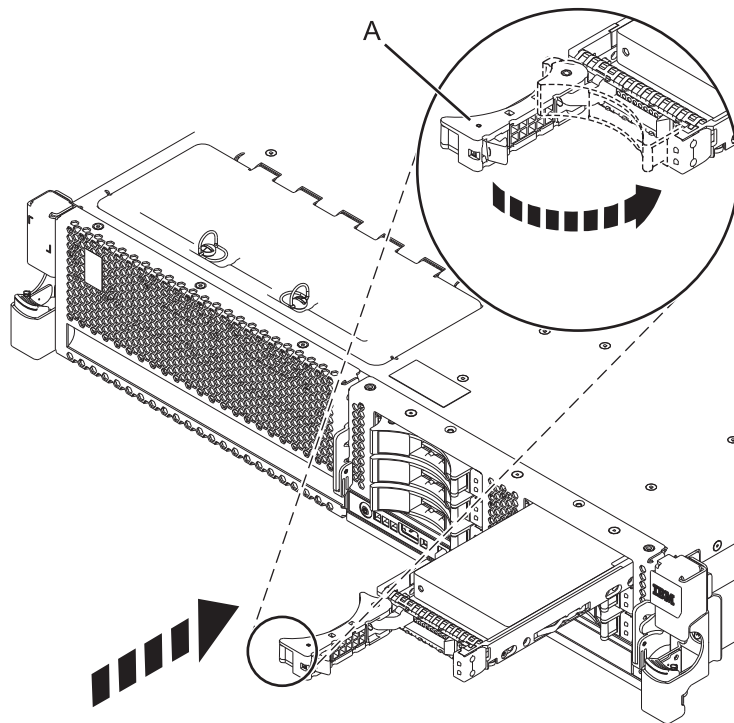
Figure 17. Installing a small-form factor disk drive
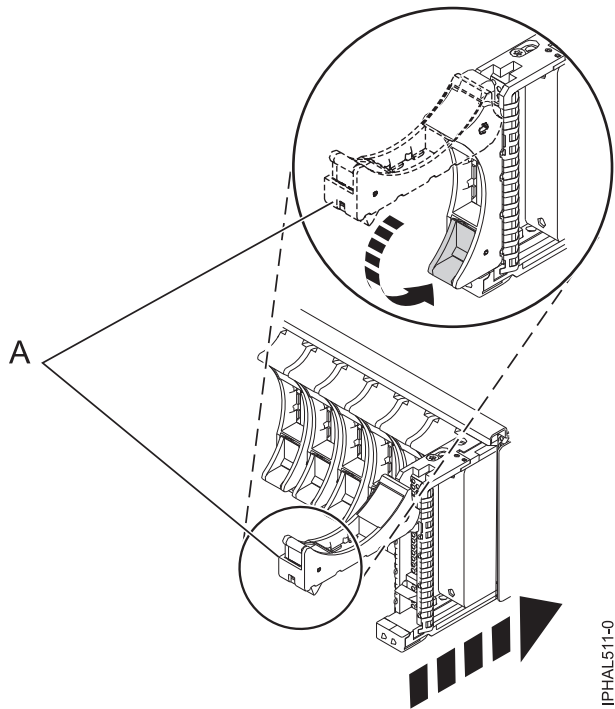
Figure 18. Installing a small-form factor disk drive in the 5803 expansion unit

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 24 through step 17 until all disk drives are installed.

Verifying 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 19. Example Display Hardware Status

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

Completing 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 187
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 power turned 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 Fix Central.

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 51.

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.

Preparing the system

1. Perform prerequisite tasks as described in Before you begin.
2. Remove the front covers. For instructions, see Removing and replacing covers and doors
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 129.

   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.

Installing 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 129.

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 20 on page 35

   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.

IPHAL500-1
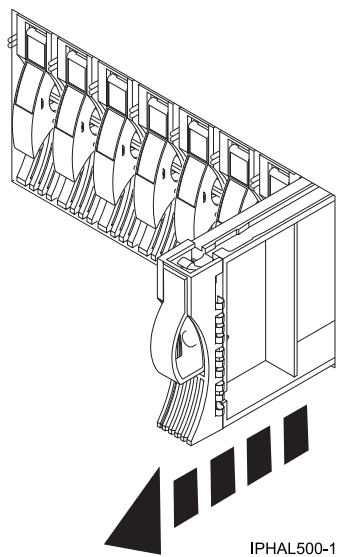
Figure 20. Removing a disk-drive filler from a model

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.

IPHAL501-2
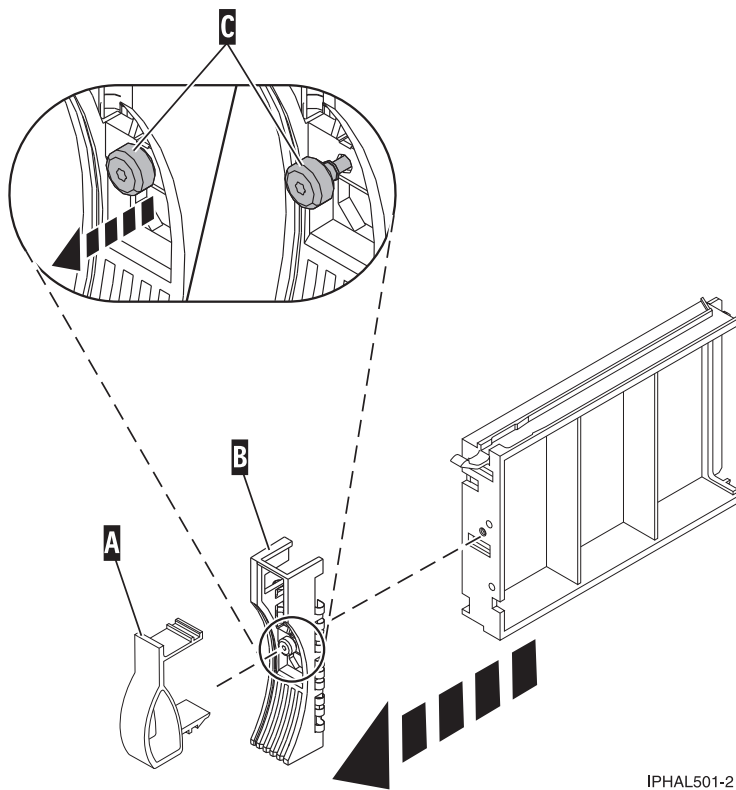
Figure 21. Removing a disk-drive bezel from a disk-drive filler

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. See "Installing a disk drive in the 5887 disk drive enclosure unit" on page 38 for the steps to install a disk drive in the 5887 expansion unit.

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.
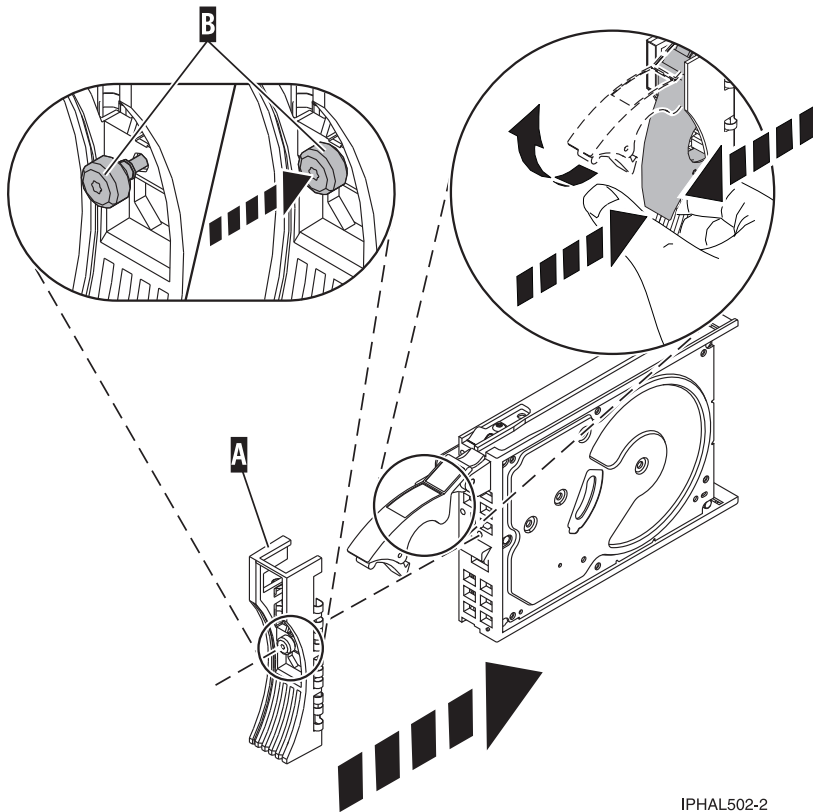
IPHAL502-2

Figure 22. 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 23 on page 37.

19. Push the disk drive handle in until it locks. The light on the disk drive turns on.
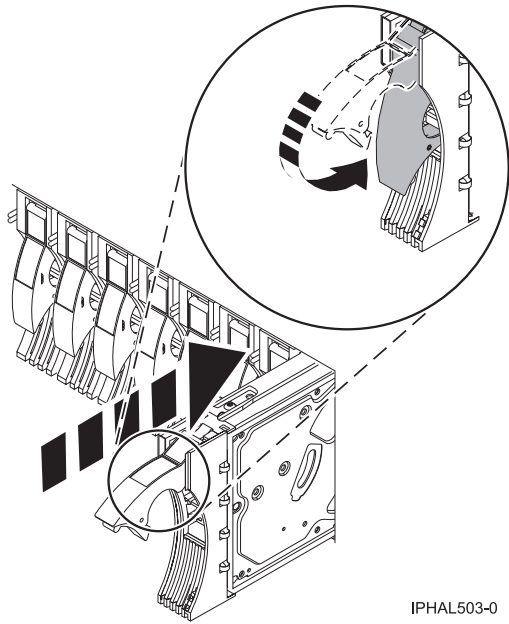
Figure 23. Installing a disk drive in a model

Figure 24. Installing a small-form factor disk drive
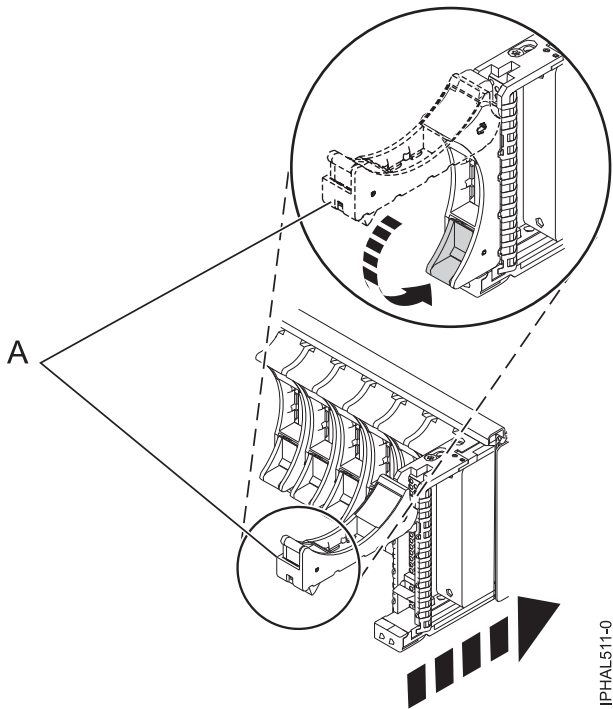
Figure 25. Installing a small-form factor disk drive in the 5803 expansion unit

20. Press Enter.
21. If you are installing more than one disk drive, repeat step 1 on page 34 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.

Installing a disk drive in the 5887 disk drive enclosure unit

1. With the handle in the unlocked position, see Figure 26 on page 39, support the bottom of the disk unit as you align it with the guide rails in the expansion unit. Do not hold the disk unit solely by the handle.
2. Slide the disk unit into the expansion unit until the drive stops.
3. Rotate the handle to the locked position.
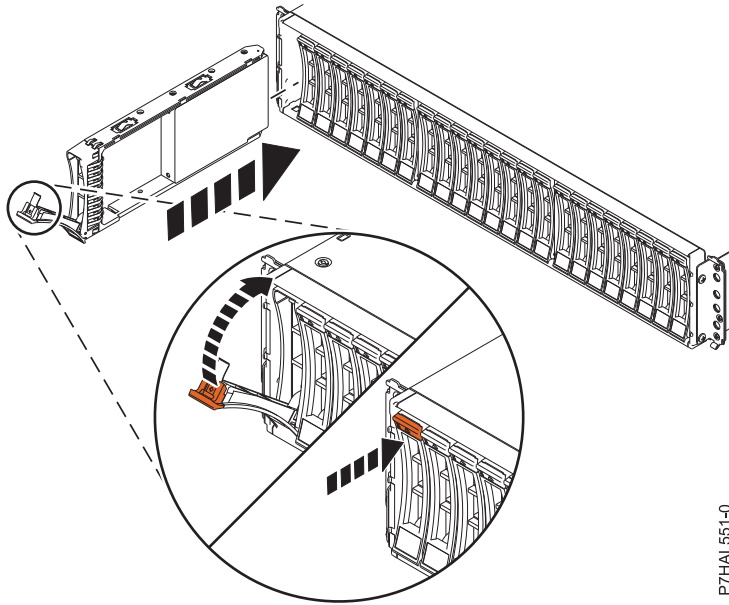
Figure 26. Installing the disk drive in the 5887

Completing the procedure

1. Replace the front cover. For instructions on replacing the cover, see Removing and replacing covers and doors.
2. Verify the installed part. For instructions, see Verifying the installed part.

Installing a disk drive or solid-state drive with the IBM i system or logical partition power turned 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 power turned on" on page 96. 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 Fix Central.

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 51.

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.

Preparing the system

1. Perform prerequisite tasks as described in Before you begin.
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 129.
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. Complete the following steps to install a disk drive.

Preparing 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.

   PN: 97P4957

   FC: 787A-001

   SN: 00AAAXXXX

   IPHAL552-0

   Figure 27. 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 129.

   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 "Installing the disk drive" on page 43. See "Installing a disk drive in the 5887 disk drive enclosure unit" on page 46 for the steps to install a disk drive in the 5887 expansion unit.

   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 28. 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.

IPHAL501-2
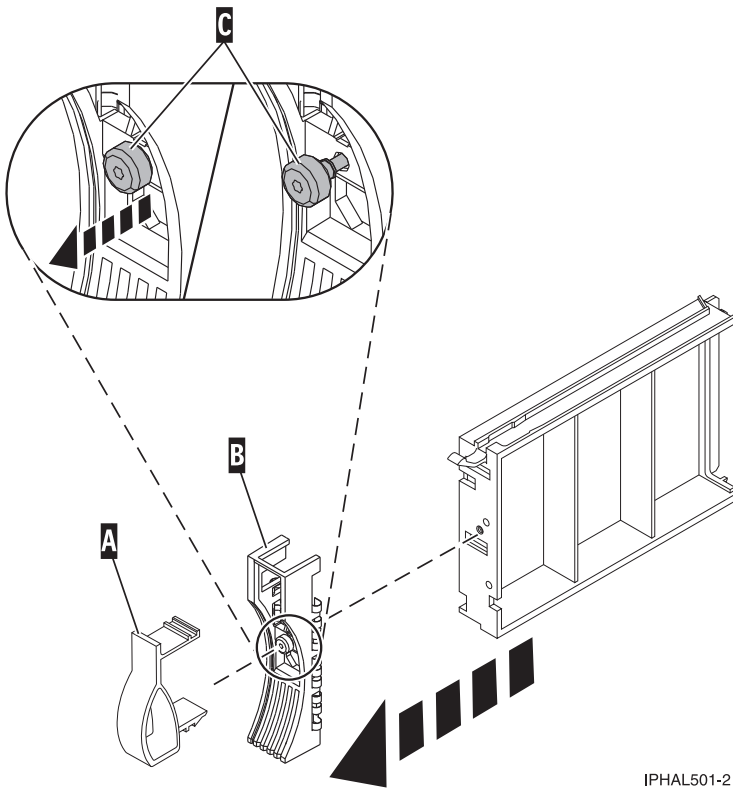
Figure 29. Removing a disk-drive bezel

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

Installing 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 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.
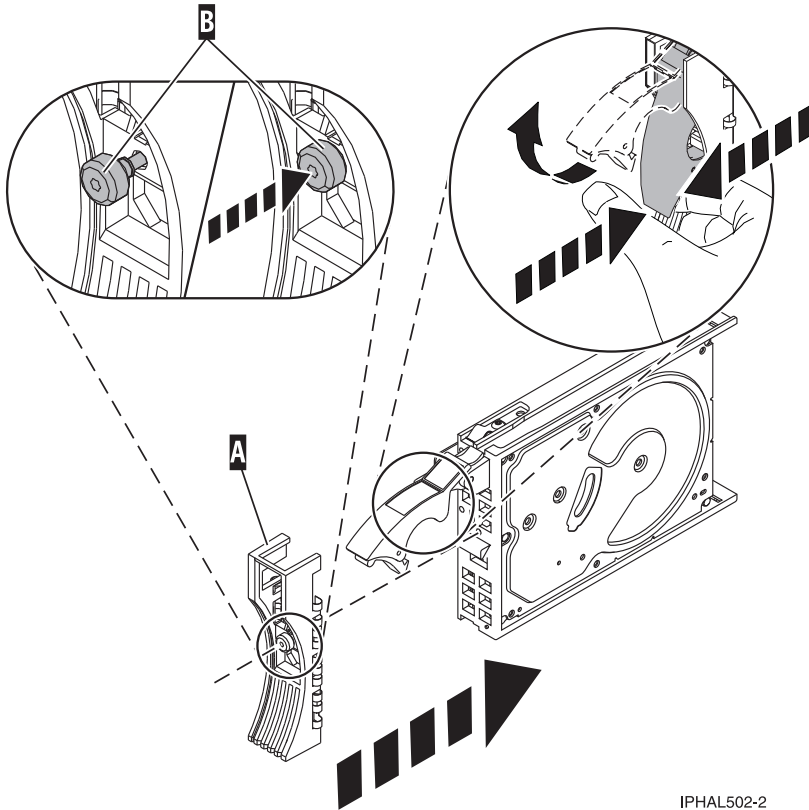
IPHAL502-2

Figure 30. 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
```
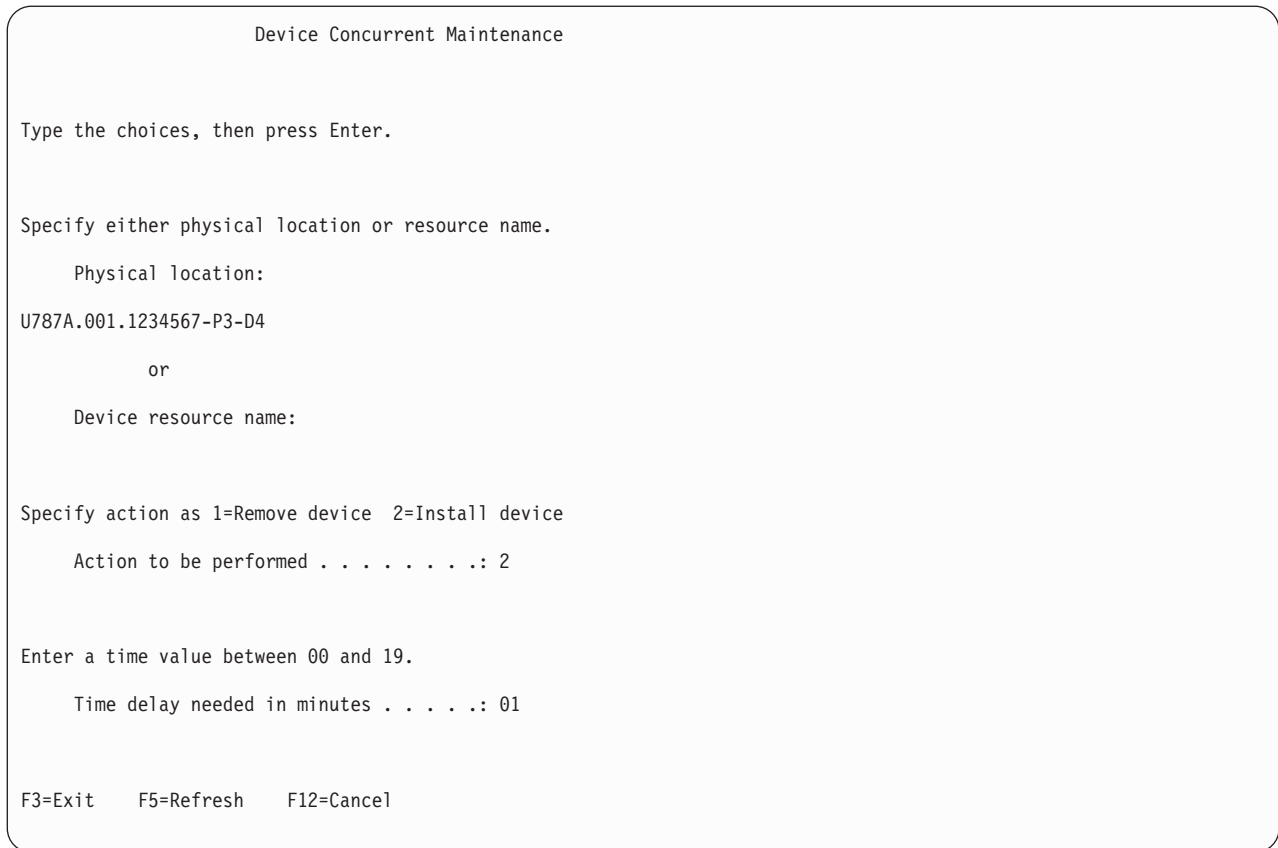
Figure 31. Example Device Concurrent Maintenance display

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 31.

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
   - "Disk drive locations and concurrent maintenance lights for the 5887 disk drive enclosure unit" on page 130

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.

Figure 32. Sliding the disk drive in to the system unit

Figure 33. Installing the small-form factor disk drive into the system

Figure 34. 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 41 through 13 on page 44 until all disk drives are installed.

Installing a disk drive in the 5887 disk drive enclosure unit

1. With the handle in the unlocked position, see Figure 35 on page 47, support the bottom of the disk unit as you align it with the guide rails in the expansion unit. Do not hold the disk unit solely by the handle.
2. Slide the disk unit into the expansion unit until the drive stops.
3. Rotate the handle to the locked position.

Figure 35. Installing the disk drive in the 5887

Completing 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 a system or logical partition."

Configuring a disk drive in a 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 must match the serial number you recorded (the last four 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 for mirroring or no protection, go to 1 on page 49 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.
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. Repeat 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 - 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 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**

25. The Confirm Add Units displays showing the configuration your system must 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 takes 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 must 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 wanted.
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 disks.

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 power turned off" on page 111. 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 Fix Central.

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)

Preparing the system

1. Perform prerequisite tasks as described in Before you begin.

   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 129.

   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 Stopping the system or logical partition.

Installing 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 36.
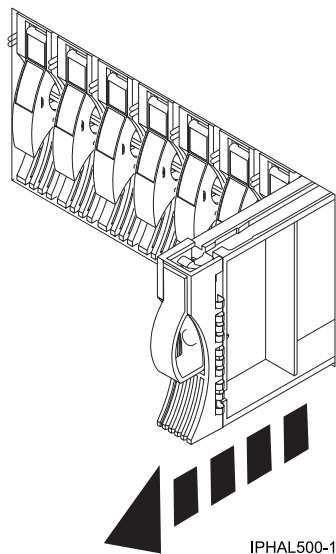
Figure 36. Removing a disk-drive filler from a model

   b. Pull off the disk-drive bezel latch **(A)** from the front of the filler, as shown in the following figure.
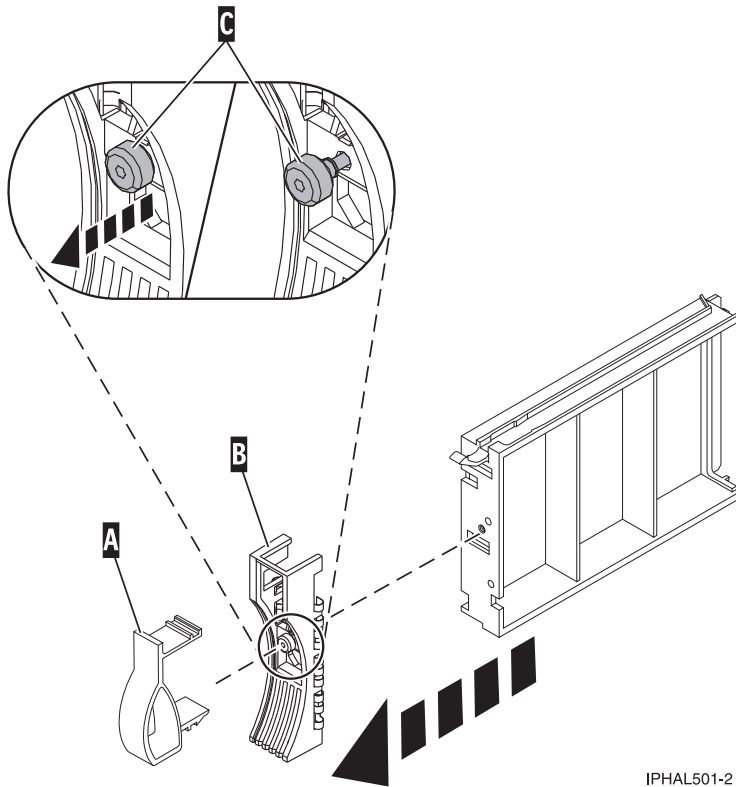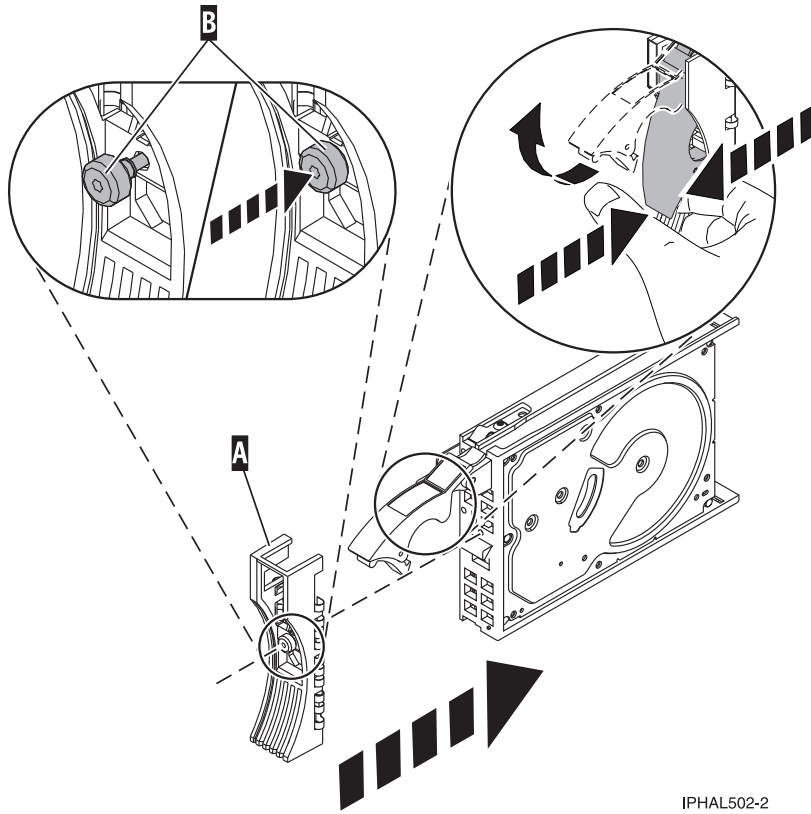
Figure 37. Removing a disk-drive bezel

    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. See "Installing a disk drive in the 5887 disk drive enclosure unit" on page 57 for the steps to install a disk drive in the 5887 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 38. 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 39 on page 56.
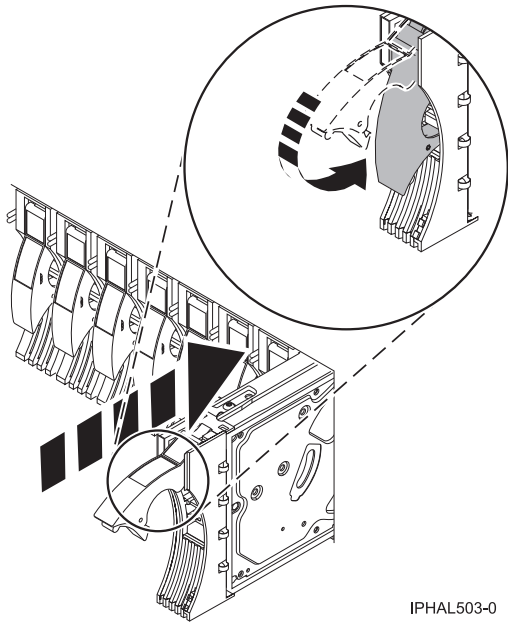
Figure 39. Installing a disk drive
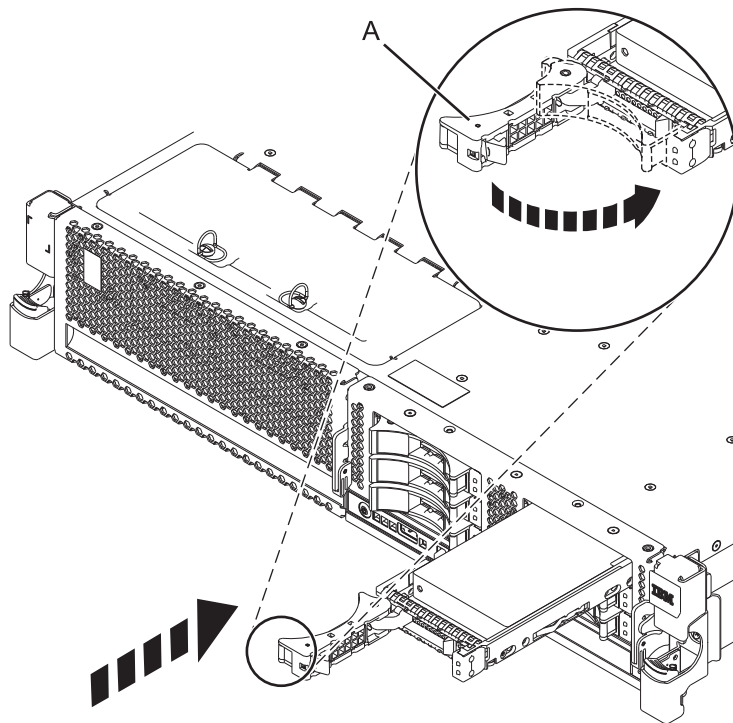
Figure 40. Installing a small-form factor disk drive
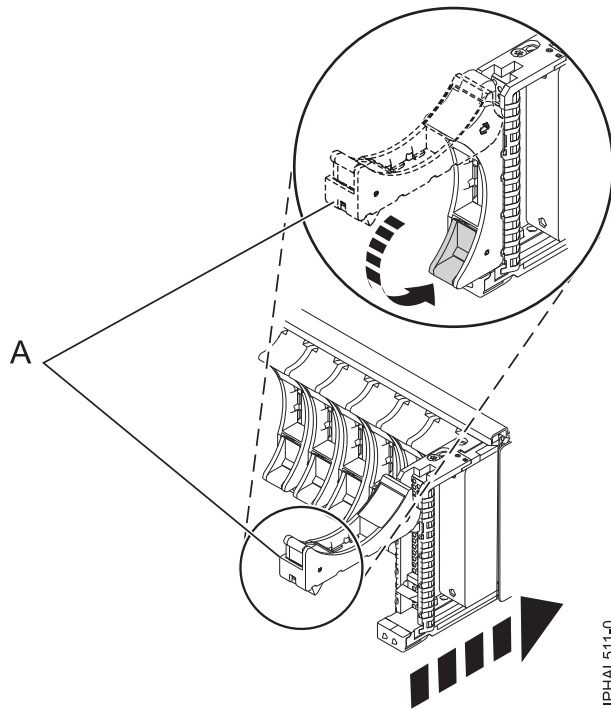
Figure 41. Installing a small-form factor disk drive in the 5803 expansion unit

9. If you are installing more than one disk drive, repeat step 1 on page 53 through step 8 on page 55 until all disk drives are installed.

Installing a disk drive in the 5887 disk drive enclosure unit

1. With the handle in the unlocked position, see Figure 42 on page 58, support the bottom of the disk unit as you align it with the guide rails in the expansion unit. Do not hold the disk unit solely by the handle.
2. Slide the disk unit into the expansion unit until the drive stops.
3. Rotate the handle to the locked position.
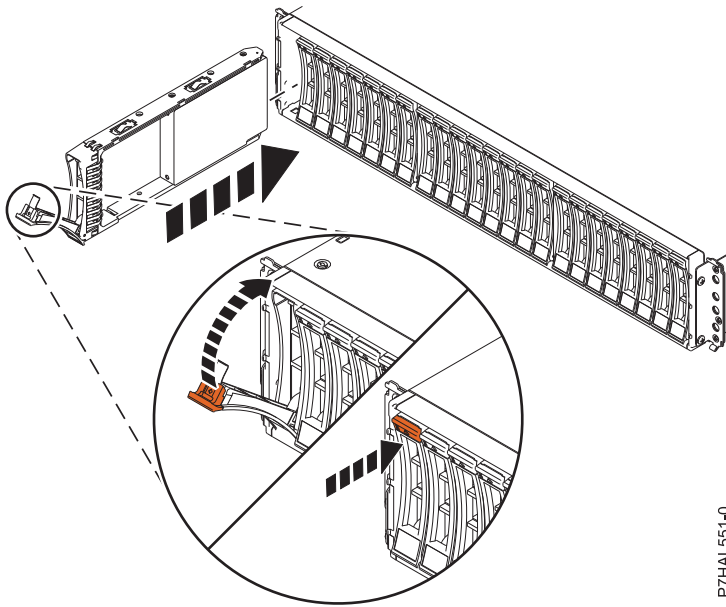
Figure 42. Installing the disk drive in the 5887

Completing 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.
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 187
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

Learn to remove a failed disk drive or solid-state drive from the server or an expansion unit with the system or logical partition power turned on.

To remove and replace a failed disk drive, go to "Replacing a disk-drive" on page 65.

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 power turned on" on page 65

"Replacing a disk drive with the Linux system or logical partition power turned on" on page 74

"Replacing a disk drive with the IBM i system or logical partition power turned on" on page 96

Related information

➡ Removing and replacing a disk drive in the 5887 disk drive enclosure unit

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

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

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 power turned on" on page 39. If you are removing a disk drive as part of a service procedure, continue to use the following procedure.

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 63.

3. Locate the disk drive to be removed. See "Disk drive locations and concurrent maintenance lights" on page 129.

4. Stop the system or logical partition that controls the disk drive location. For instructions, see Stopping the system or logical partition.

Related information

➥ Removing and replacing a disk drive in the 5887 disk drive enclosure unit

Preparing 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.

Removing 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
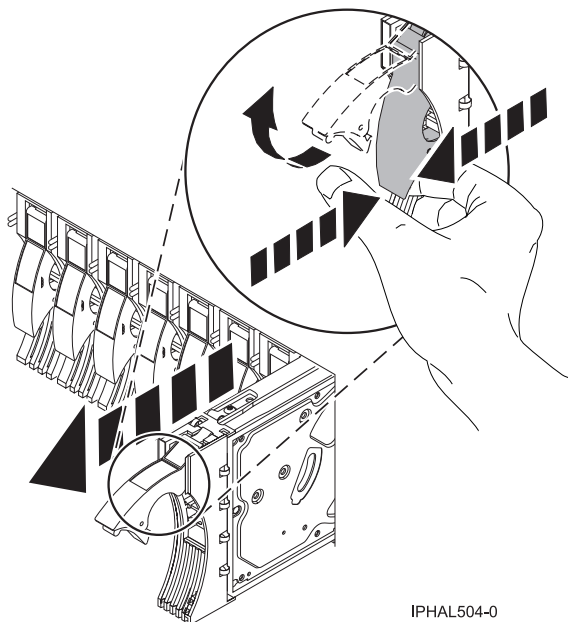
Figure 43. Removing a disk drive
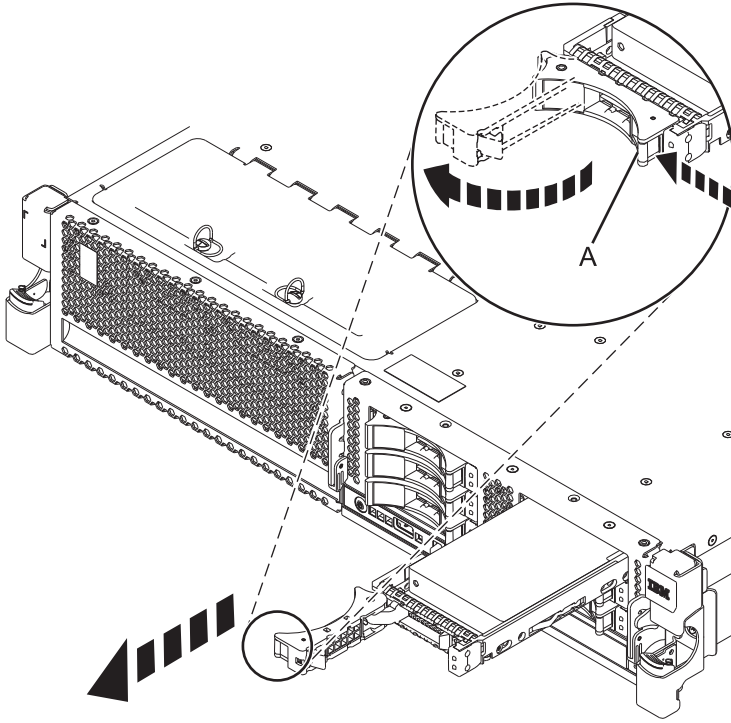
Figure 44. Removing a small-form factor disk drive
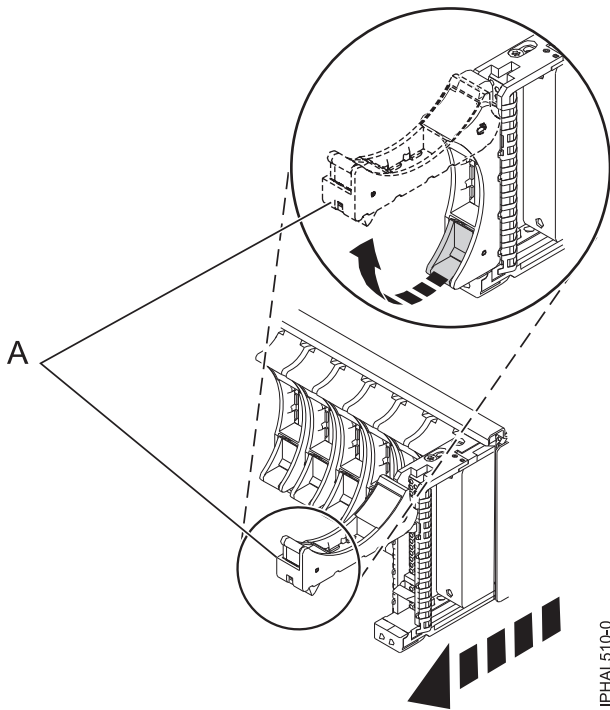
Figure 45. Removing a small-form factor disk drive from the 5803 expansion unit

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.

Completing 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.

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 187
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 50.

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

Learn how 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 topic to perform this task.

Note: These instructions (the first three 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 59, then install the new disk-drive as described in "Installing a disk drive or solid-state drive" on page 5.

The system or logical partition can be turned off or turned 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, or if it is a PCIe RAID adapter with integrated solid-state disk-drives, then replace the disk-drive using the power turned off procedure.

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

Learn to replace a failed Small Computer System Interface (SCSI) or serial-attached SCSI (SAS) disk drive in a system or an expansion unit while the power of the AIX operating system or logical partition that controls the disk drive location is turned on.

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 power turned on" on page 12. 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 power turned 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 power turned 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 power turned 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 power turned off procedure, go to Replacing a disk drive with the system or logical partition power turned off.

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.

Related information

⤷ Removing and replacing a disk drive in the 5887 disk drive enclosure unit

Preparing the system

1. Perform prerequisite tasks as described in Before you begin.

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 119.

Removing 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 119.
   - 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.

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 .

12. Select the drive that you want to remove and press Enter. The concurrent maintenance light for the slot flashes 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 129.

13. Unlock the disk drive handle by squeezing it and pulling it out toward you as shown in Figure 46 on page 68.
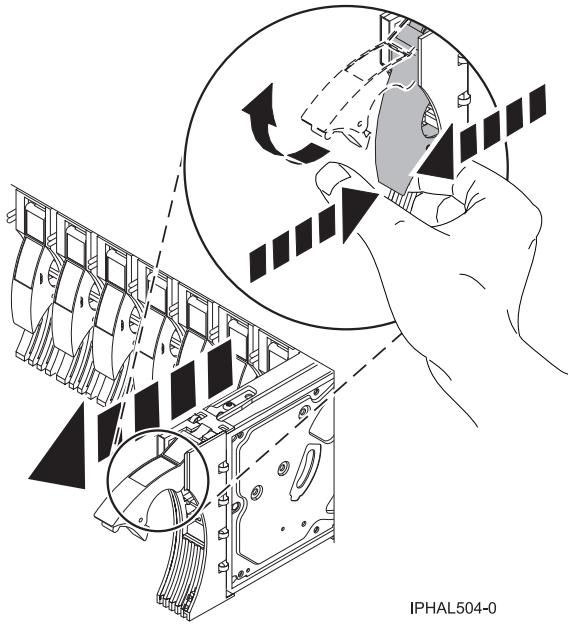
Figure 46. Removing a disk drive from a model
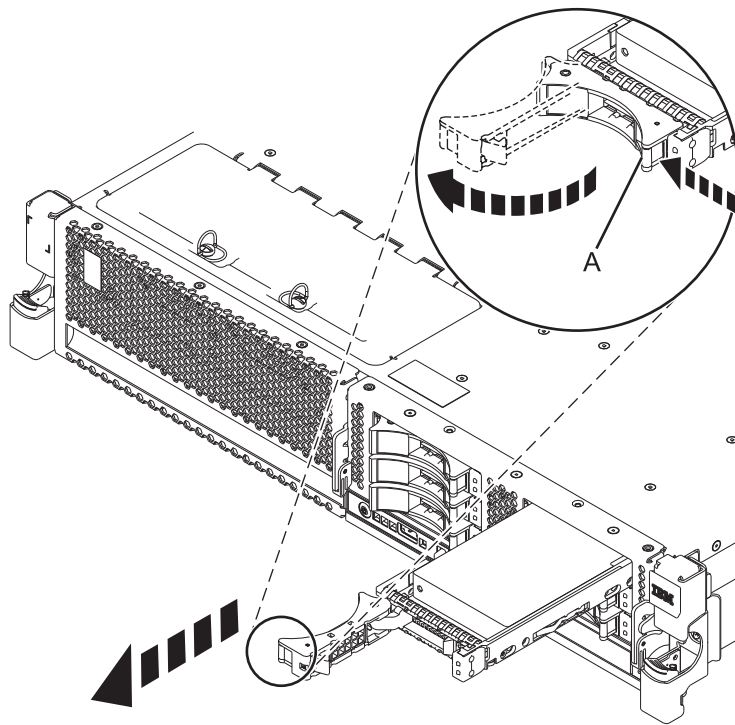
Figure 47. Removing a small-form factor disk drive
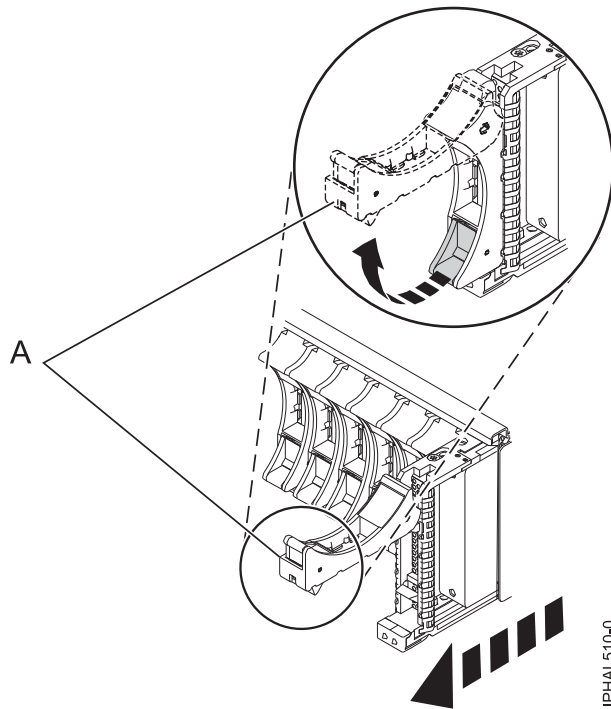
Figure 48. Removing a small-form factor disk drive from the 5803 expansion unit

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 71 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 comes 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.
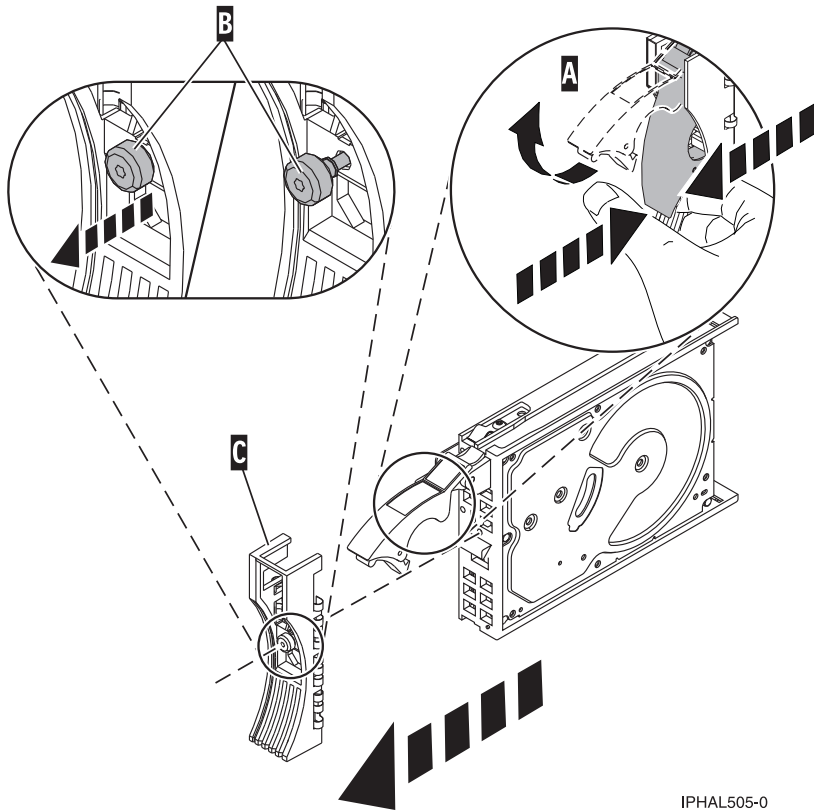
Figure 49. Removing a disk-drive bezel

Replacing 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 72.
   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.
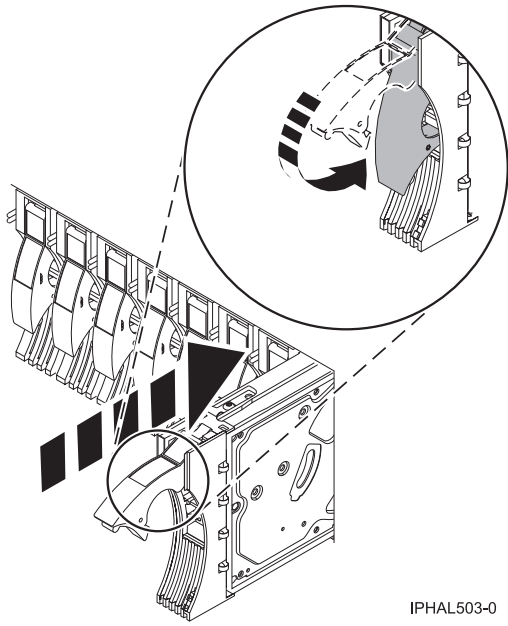
Figure 51. Installing a disk drive in a model
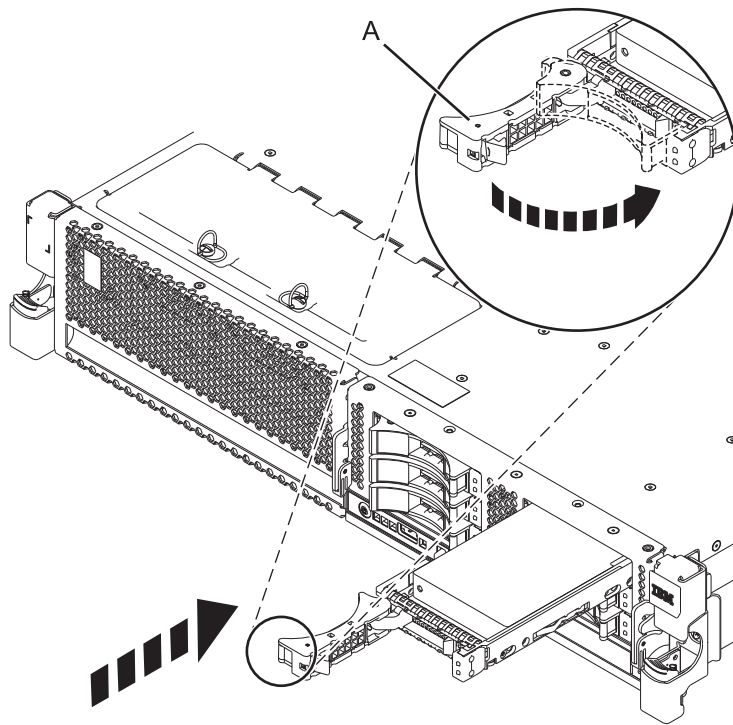
Figure 52. Installing a small-form factor disk drive

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.

Completing 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 187
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 power turned on

Learn to replace a Small Computer System Interface (SCSI) or serial-attached SCSI (SAS) disk drive in a system or expansion unit while the power of the Linux operating system or logical partition that controls the disk drive location is turned on.

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 power turned on" on page 19. 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 power turned off" on page 111, if:
- You are installing a disk drive that is to be connected with the 6203 or 6204 SCSI adapter
- You do not feel comfortable using the power turned 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.

Preparing the system

1. Perform prerequisite tasks as described in "Before you begin" on page 177.
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.

- 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.

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 187
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.

Related information

➡ Removing and replacing a disk drive in the 5887 disk drive enclosure unit

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.

Preparing 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
```
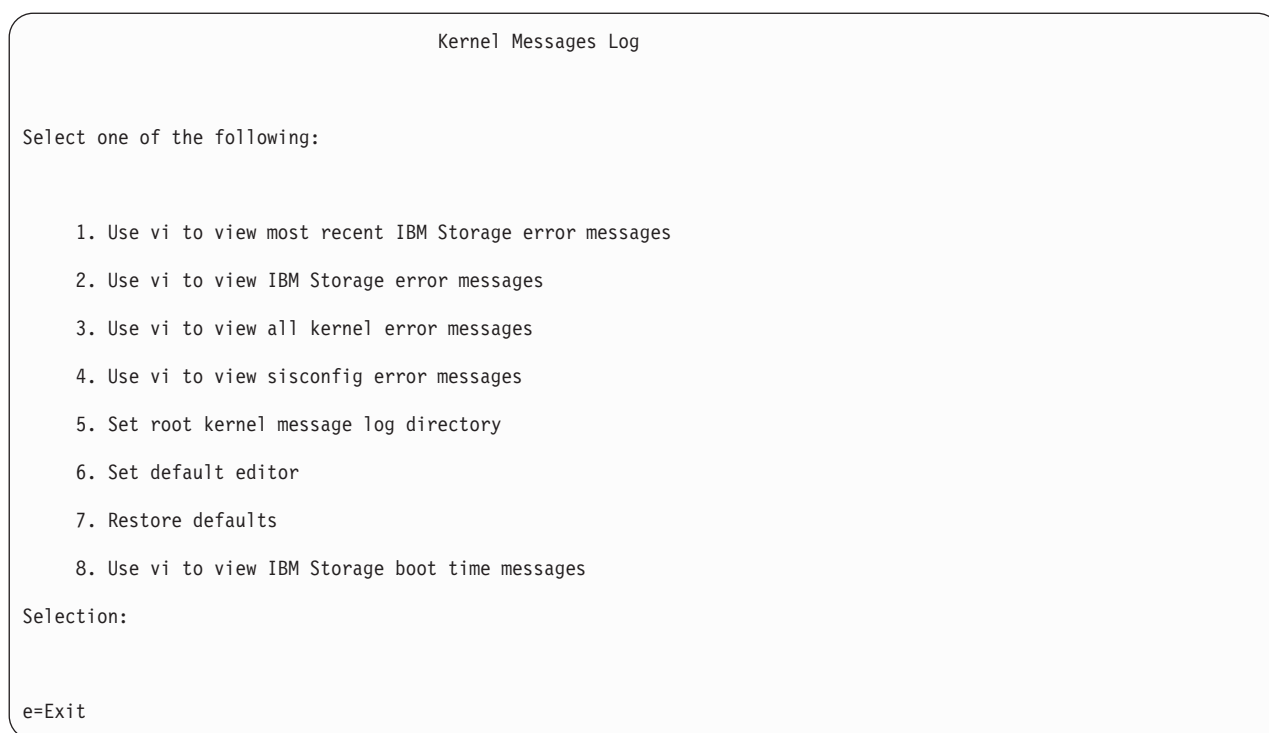
Figure 54. Kernel Messages Log

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.

Removing 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
```
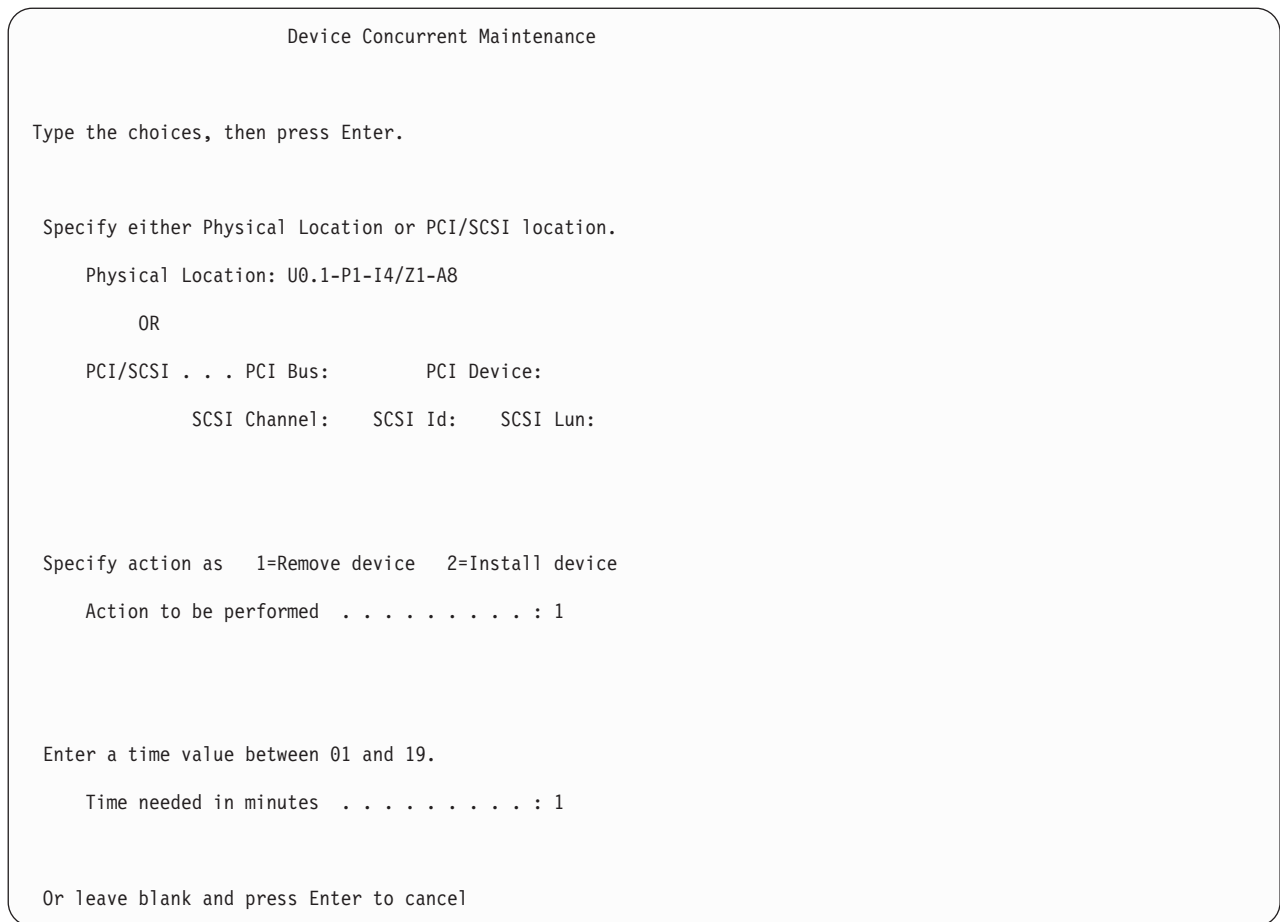
Figure 56. Example Device Concurrent Maintenance display

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
```
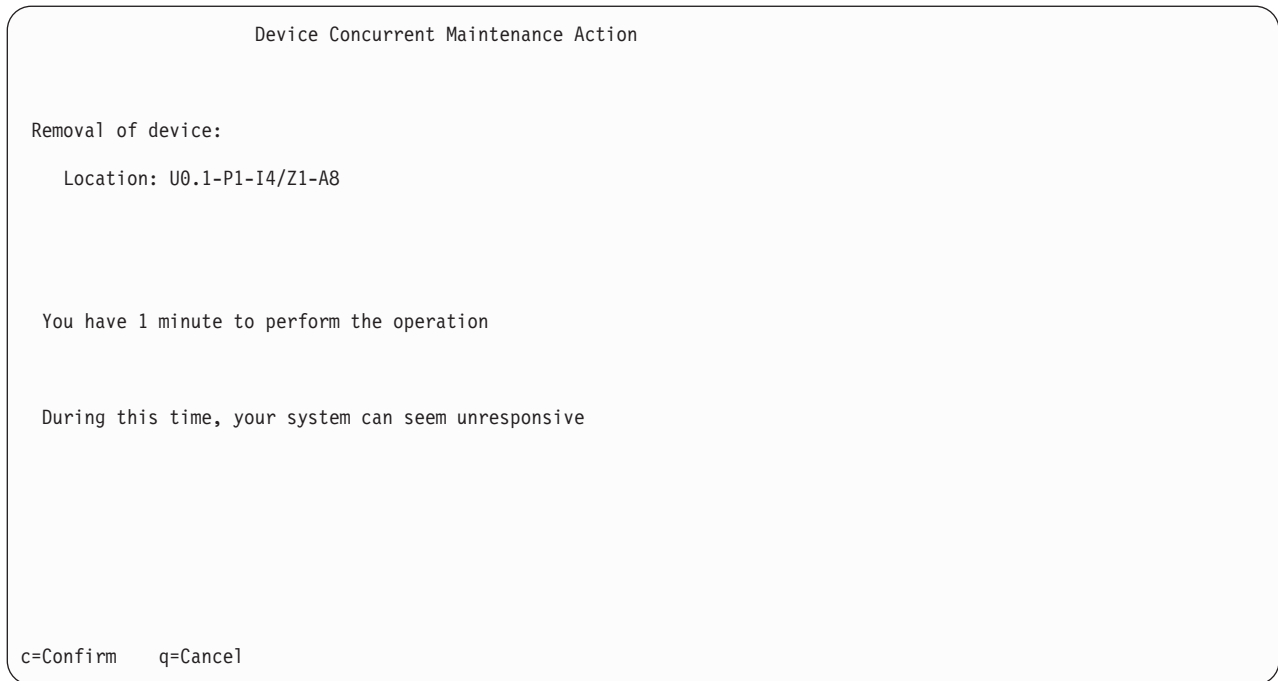
Figure 57. Example Device Concurrent Maintenance Action display

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
```
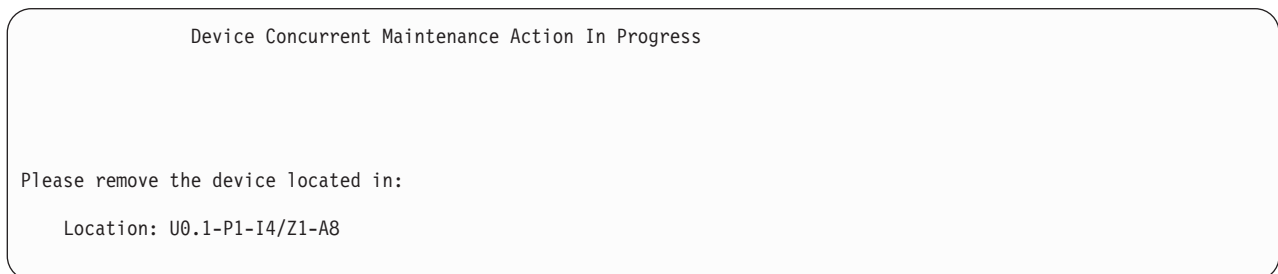
Figure 58. Example Device Concurrent Maintenance Action In Progress display

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 on page 81. If the handle is not all the way out, the disk drive cannot slide out of the system or expansion unit.
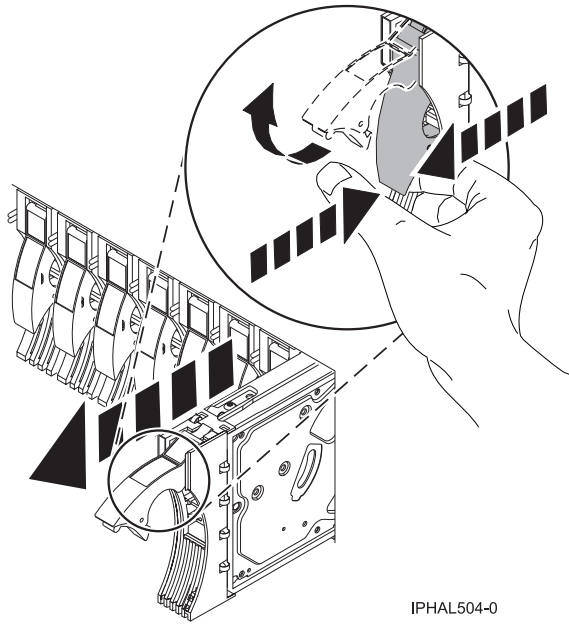
Figure 59. Removing a disk drive from a model or 7311-D20
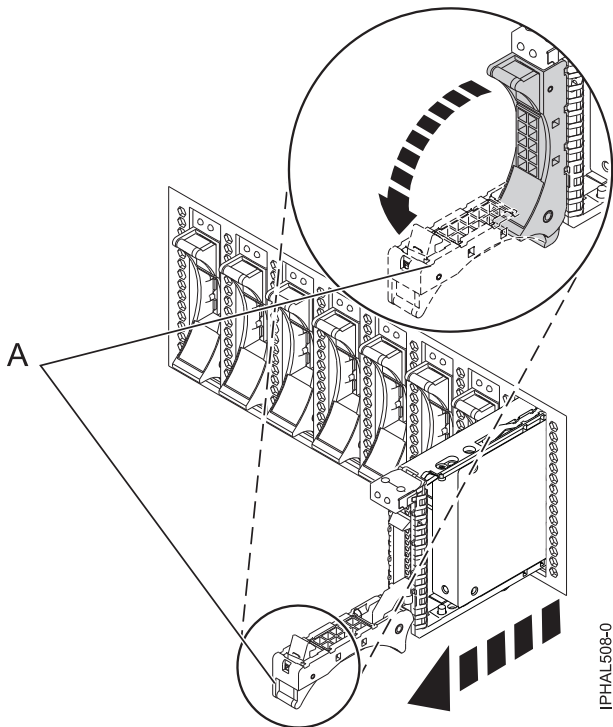
Figure 60. Removing a small-form factor disk drive
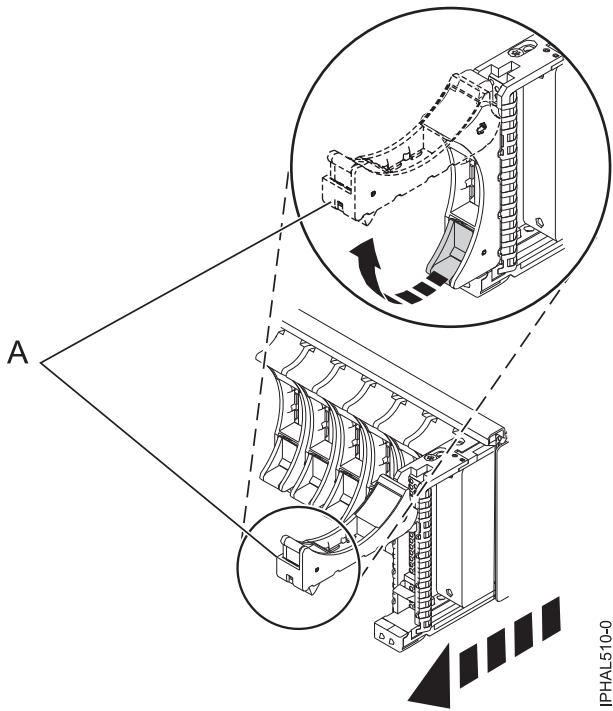
Figure 61. Removing a small-form factor disk drive from the 5803 expansion unit

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 84 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.
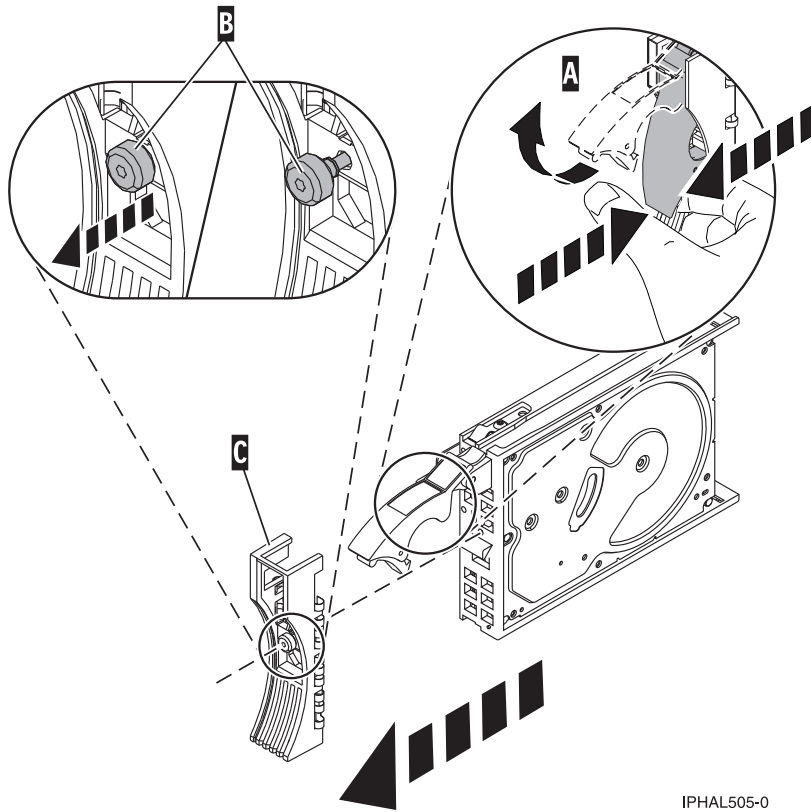
Figure 62. Removing a disk-drive bezel

Replacing 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.
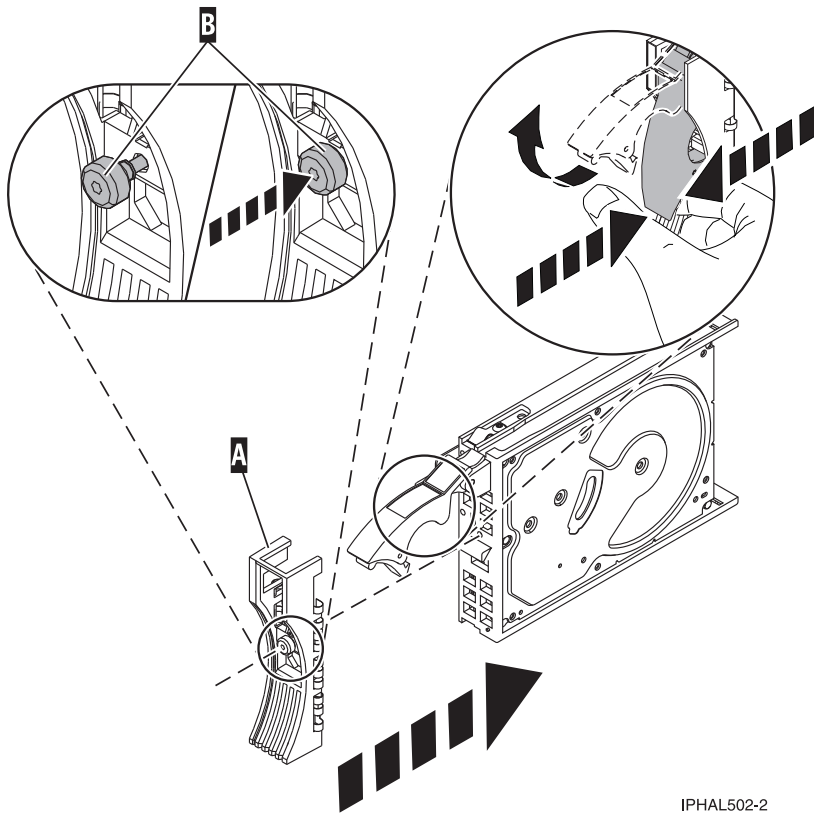
Figure 63. Attaching a bezel to the disk drive

    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
```
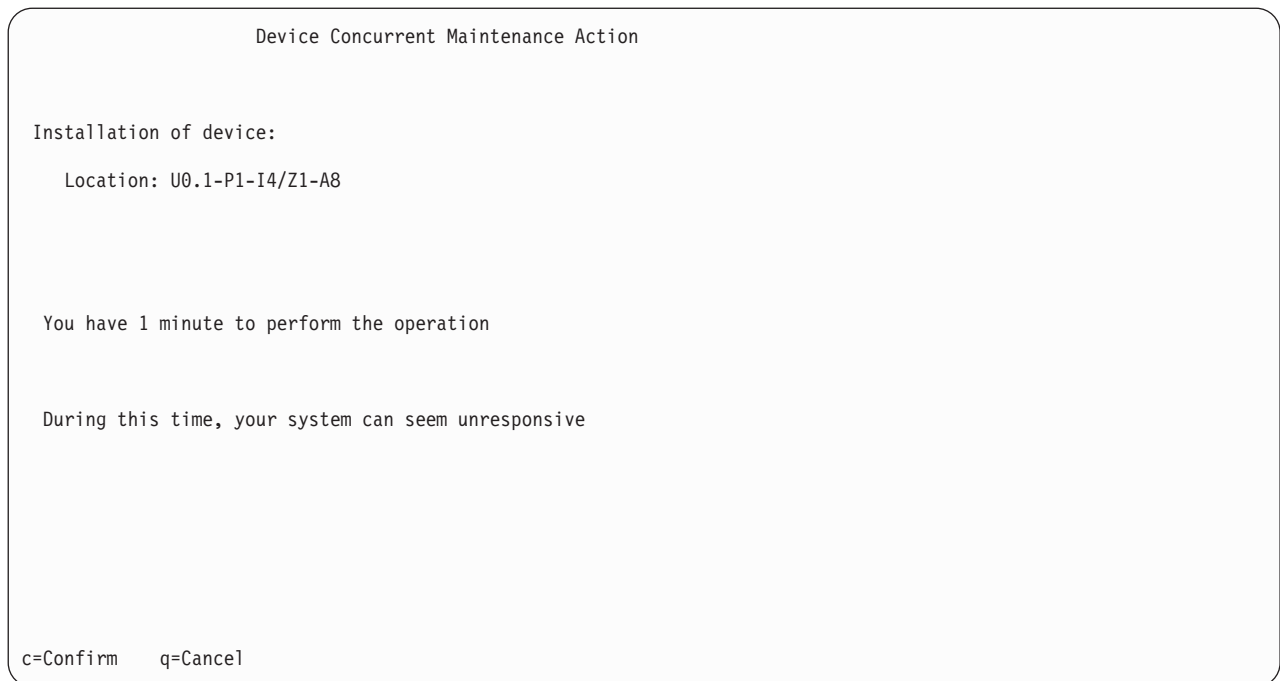
Figure 64. Example Device Concurrent Action Maintenance display

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

```
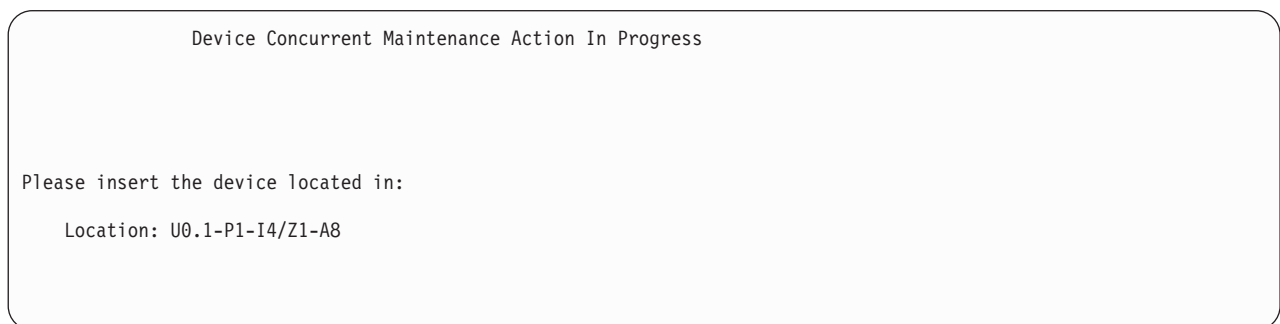
Figure 65. Example Device Concurrent Maintenance Action In Progress display

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 on page 86.

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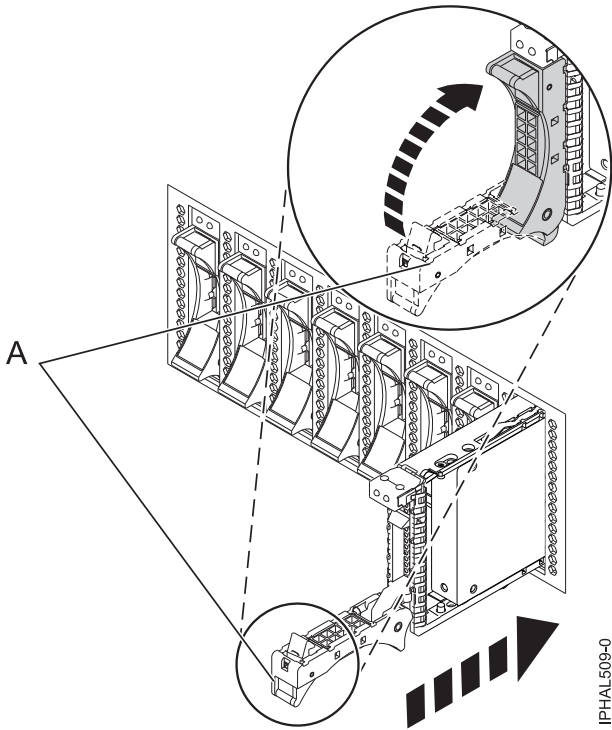
Figure 67. Installing a small-form factor disk drive
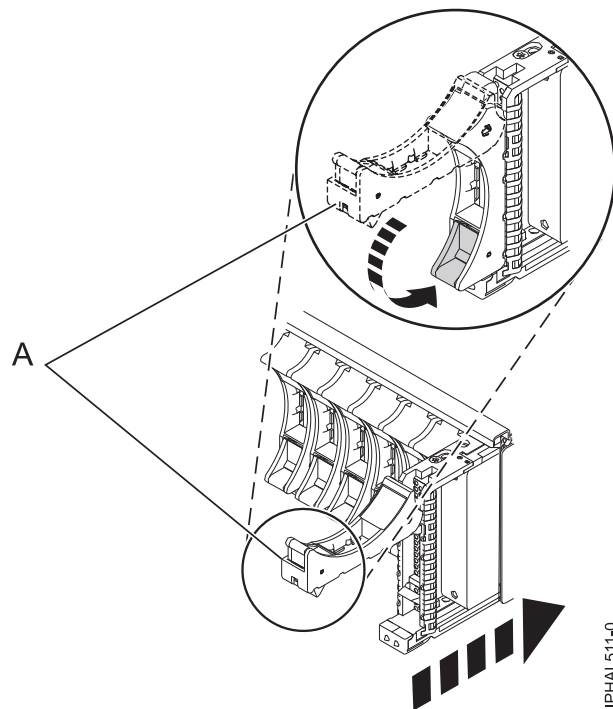
*Figure 68. Installing a small-form factor disk drive in the 5803 expansion unit*

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

Performing 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 187
   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.

Preparing 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.

Removing 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 on page 92. If the handle is not all the way out, the disk drive does not slide out of the system or expansion unit.
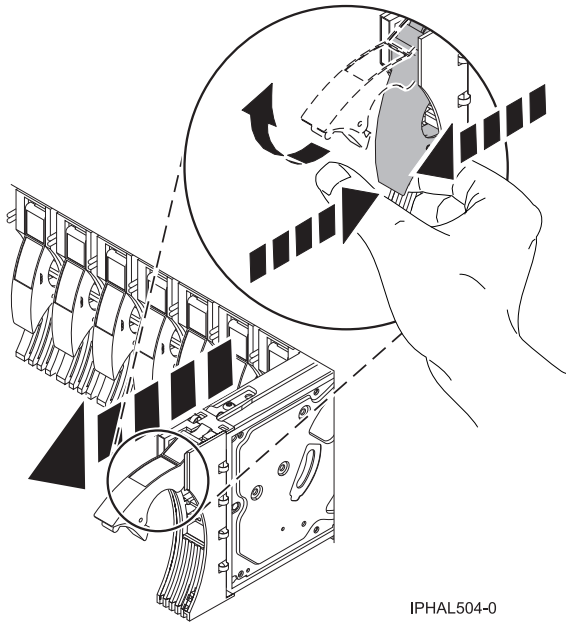
Figure 73. Removing a disk drive from a model or 7311-D20

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.
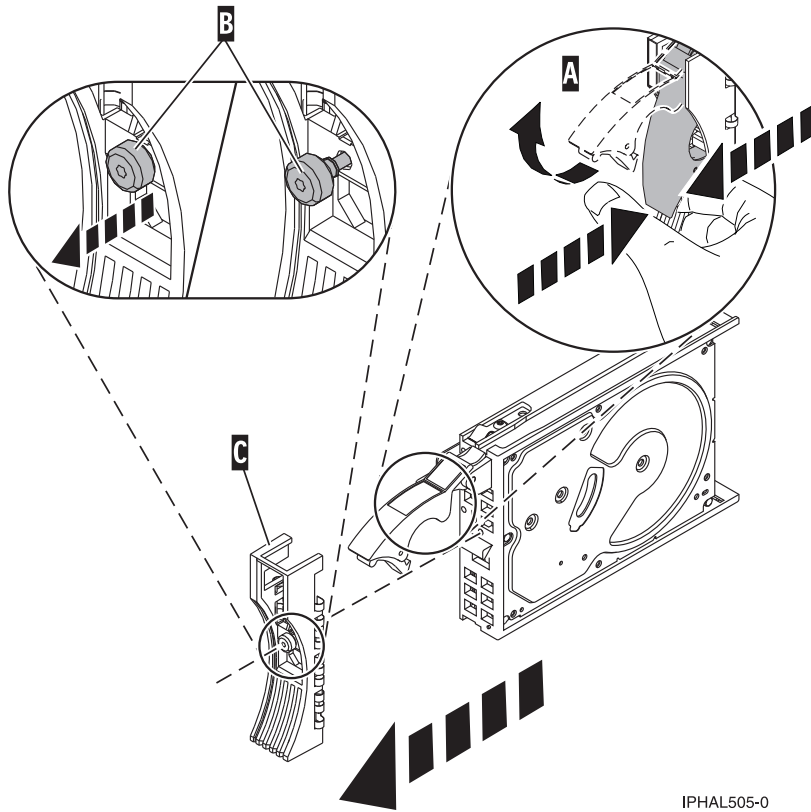
Figure 74. Removing a disk-drive bezel

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

Replacing 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 94.

   b. Press in and then tighten the thumbscrew **(B)** to secure the bezel to the disk drive.
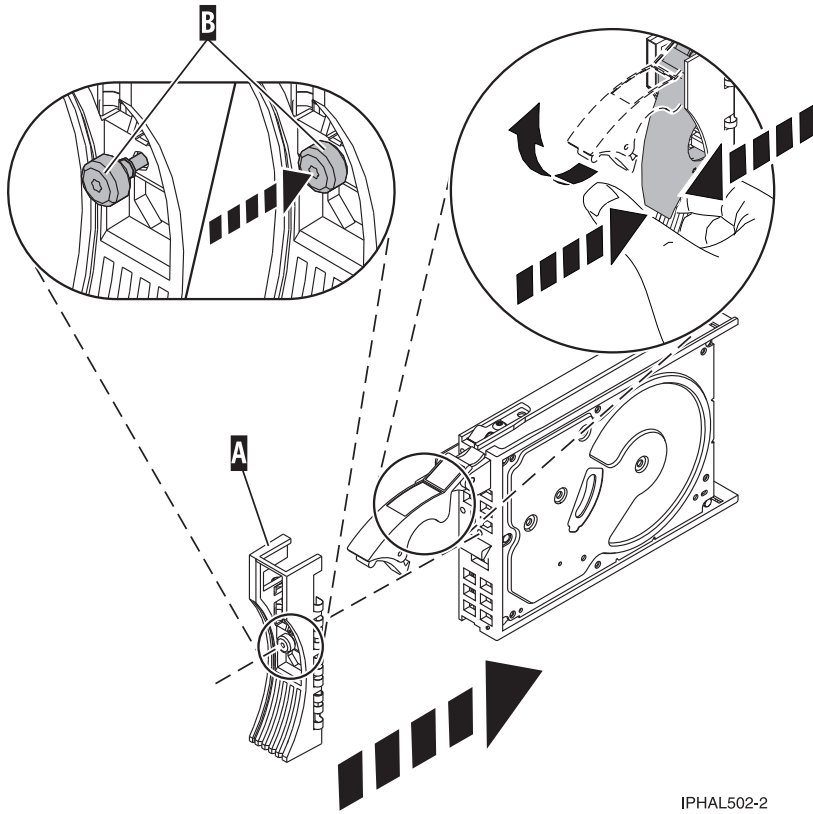
Figure 75. Attaching a bezel to the disk drive

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.

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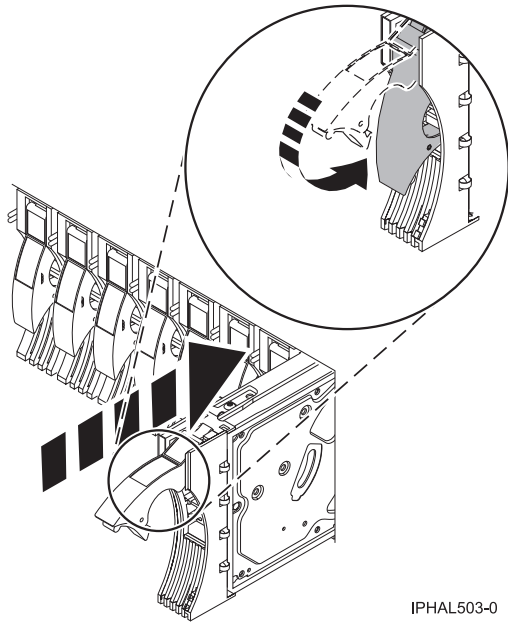
Figure 77. Installing a disk drive in a model or 7311-D20

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

Completing 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 187
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 power turned on

Learn how to replace a failed Small Computer System Interface (SCSI) or serial-attached SCSI (SAS) disk drive in a system or expansion unit while the power of the IBM i operating system or logical partition that controls the disk drive location is turned on.

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 power turned on" on page 39. 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 power turned-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 power turned-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 power turned off" on page 111.

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.

Related information

 Removing and replacing a disk drive in the 5887 disk drive enclosure unit

Preparing the system

1. Perform prerequisite tasks as described in "Before you begin" on page 177.
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.

Removing 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 180.

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 63.

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 99.

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.
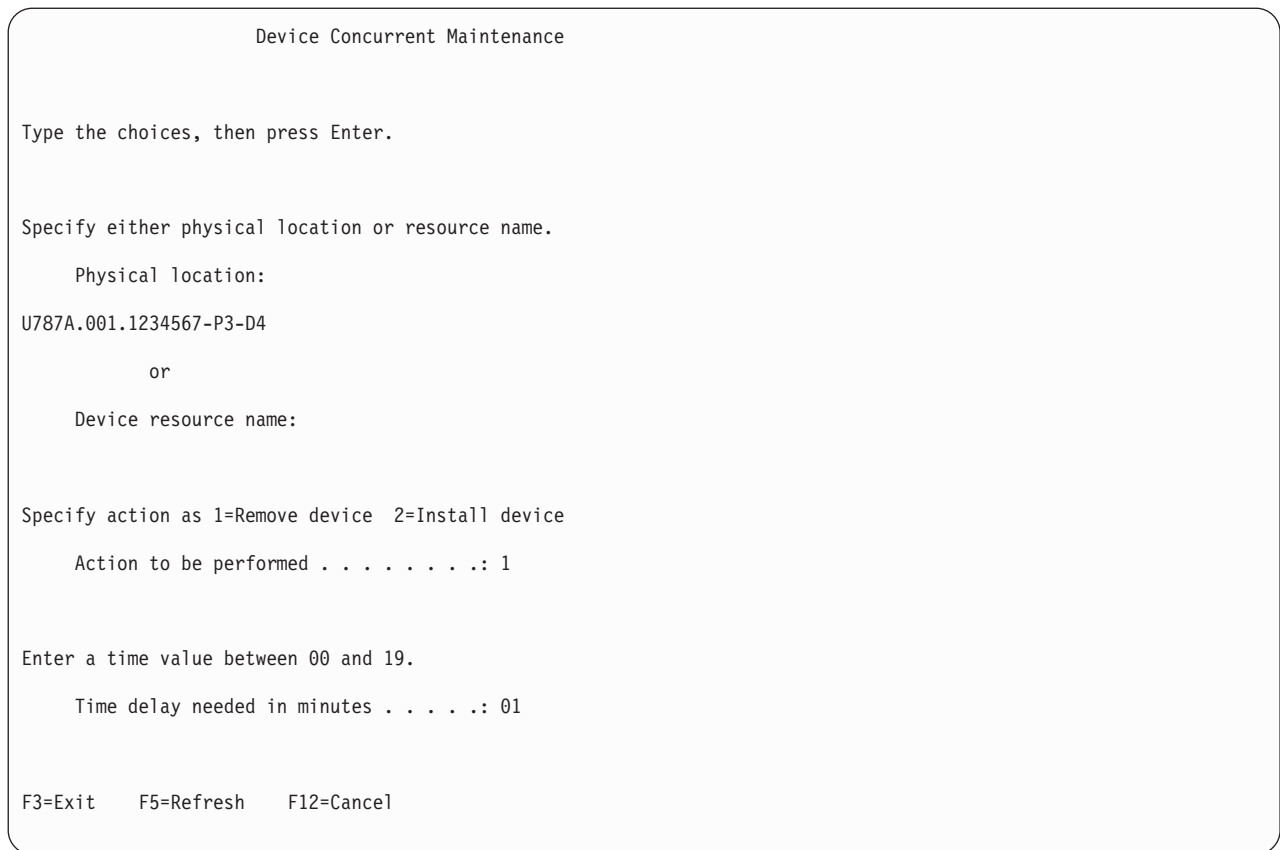
```
                    Device Concurrent Maintenance


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.

PN: 97P4957   FC: 787A-001

SN: 00AAAXXXX

IPHAL552-0

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 129.

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.
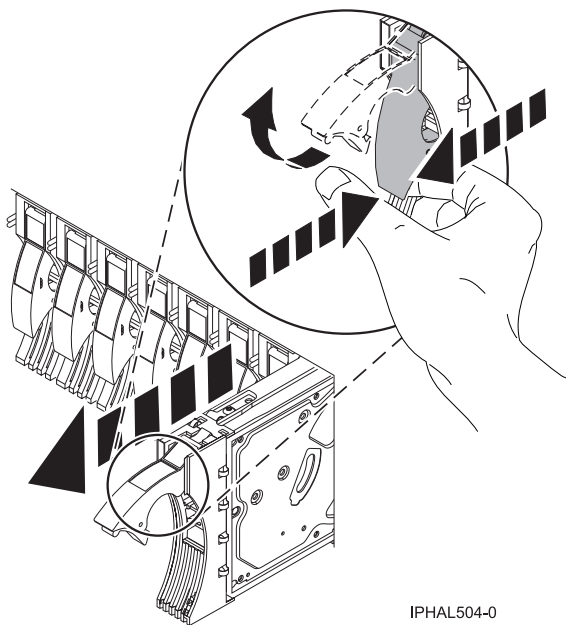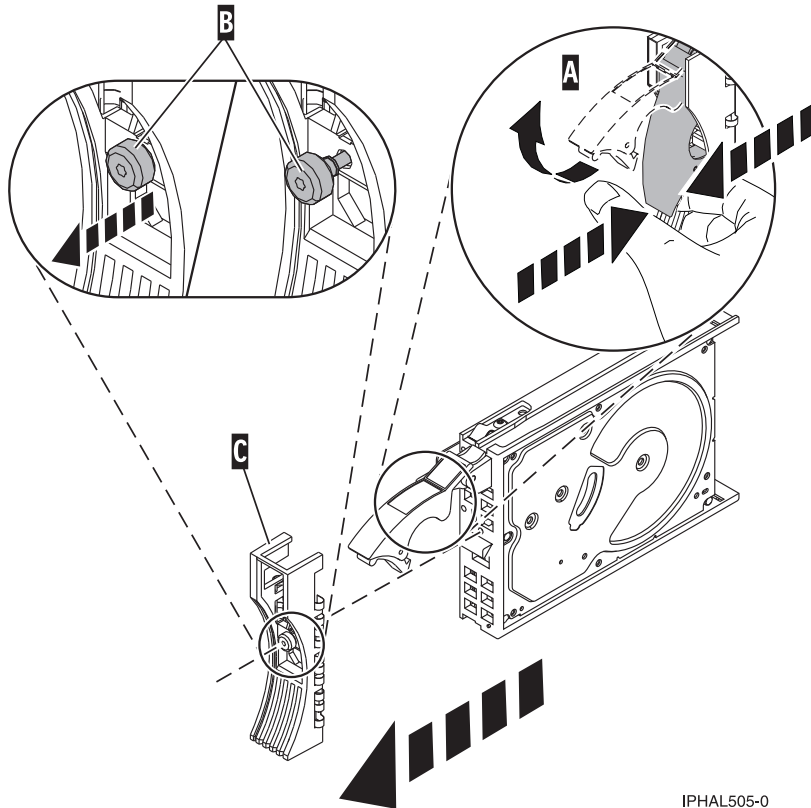

IPHAL504-0

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
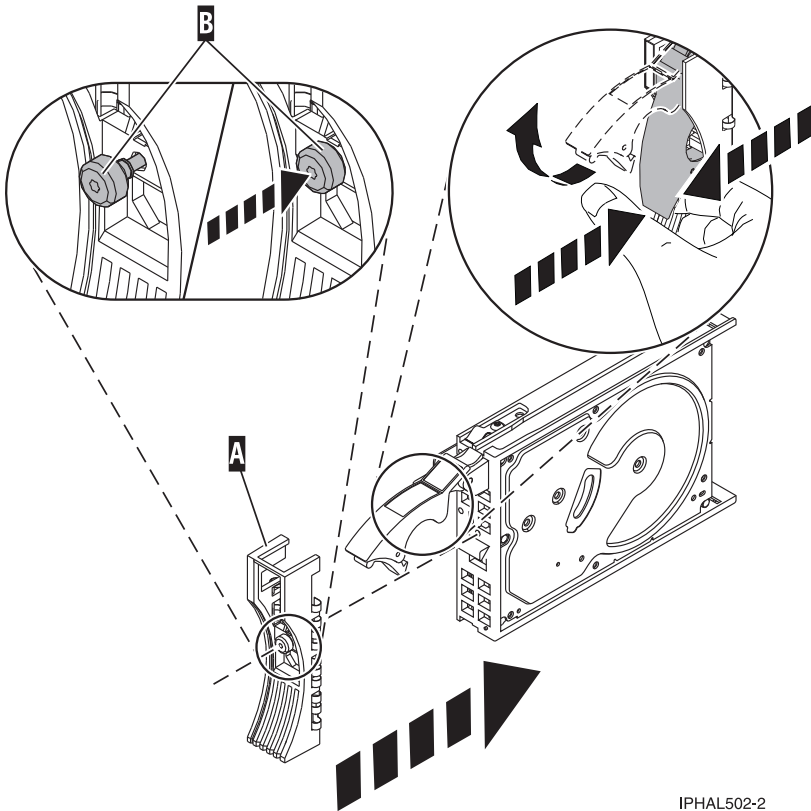
Replacing the disk drive

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 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 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.
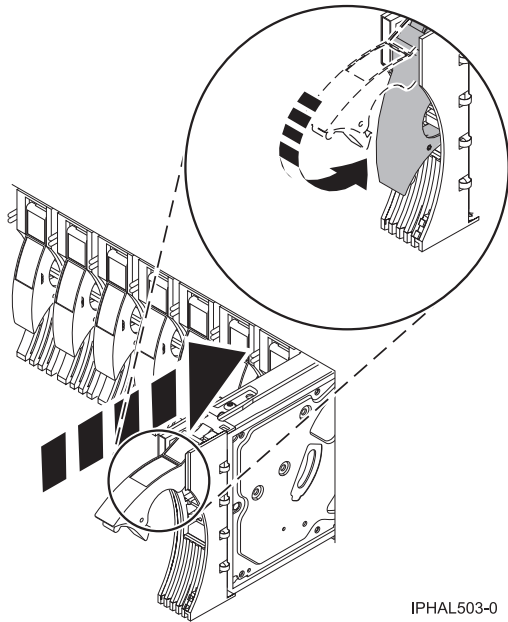
Figure 83. Installing a disk drive

Completing 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 49.

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 187
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.

Preparing the system

1. Perform prerequisite tasks as described in Before you begin.

2. Remove the front cover and door, if you need to, to access the disk drives. For instructions on removing the cover, see Removing and replacing covers and doors.

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

Removing 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 power turned on" on page 96.
   - 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 105.

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.
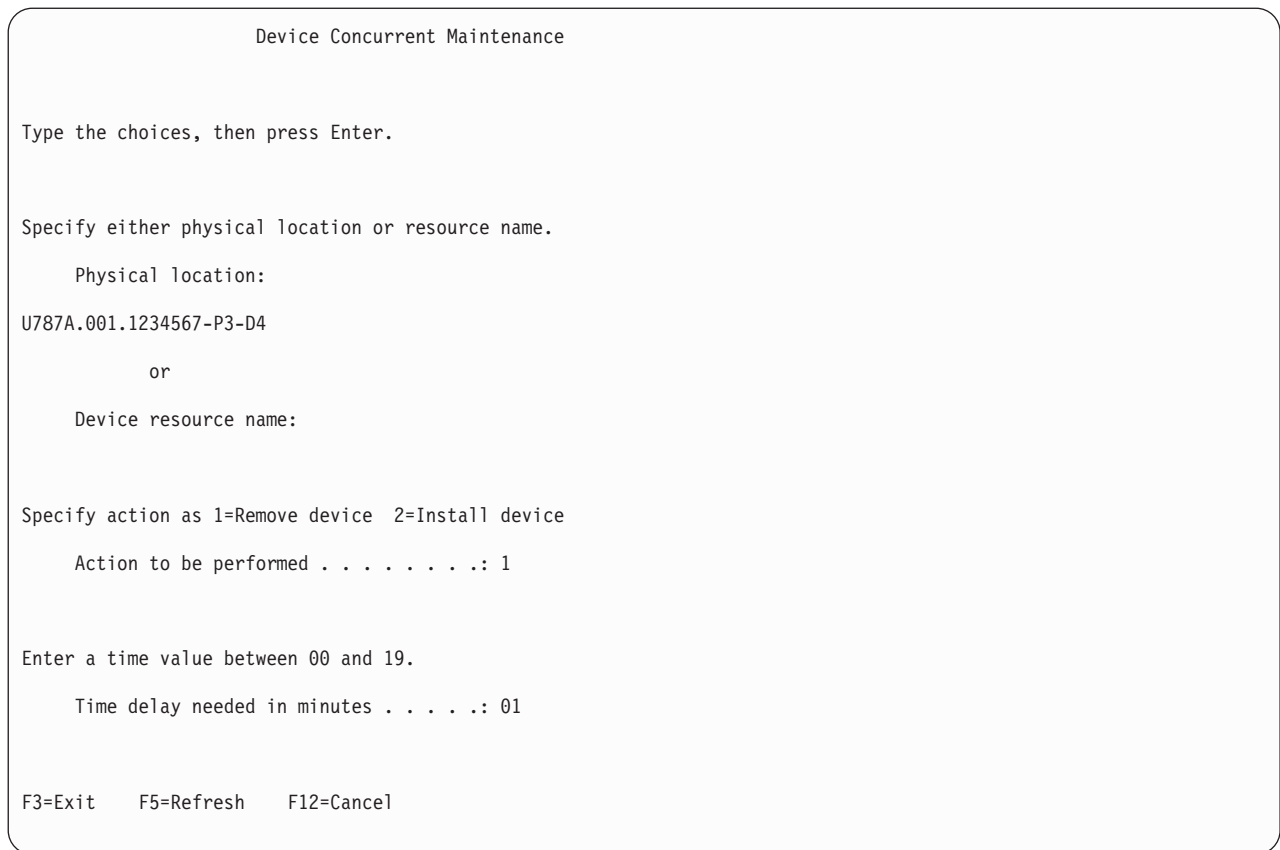
```
                      Device Concurrent Maintenance


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 129.

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**.

Replacing a disk-drive   **105**

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.
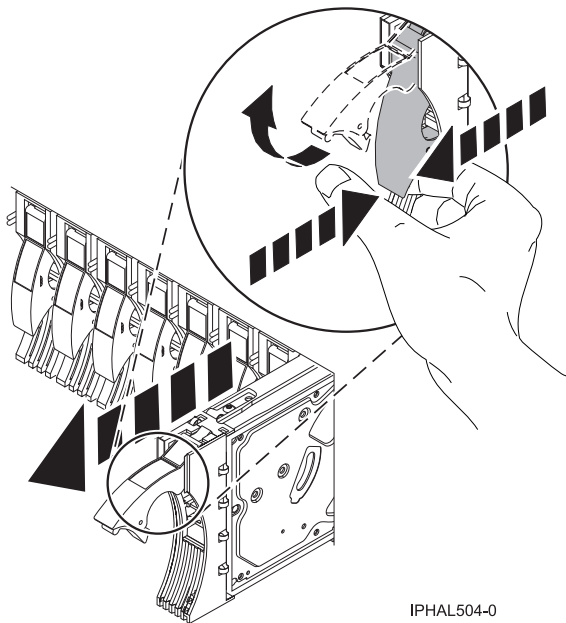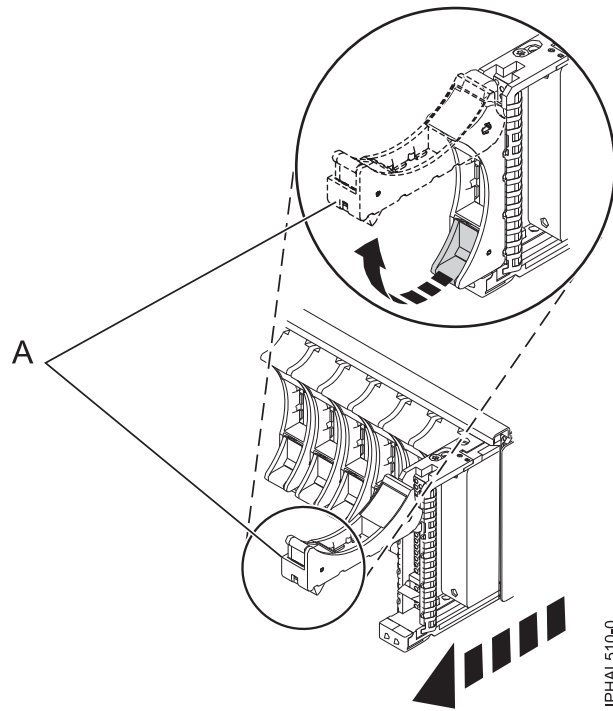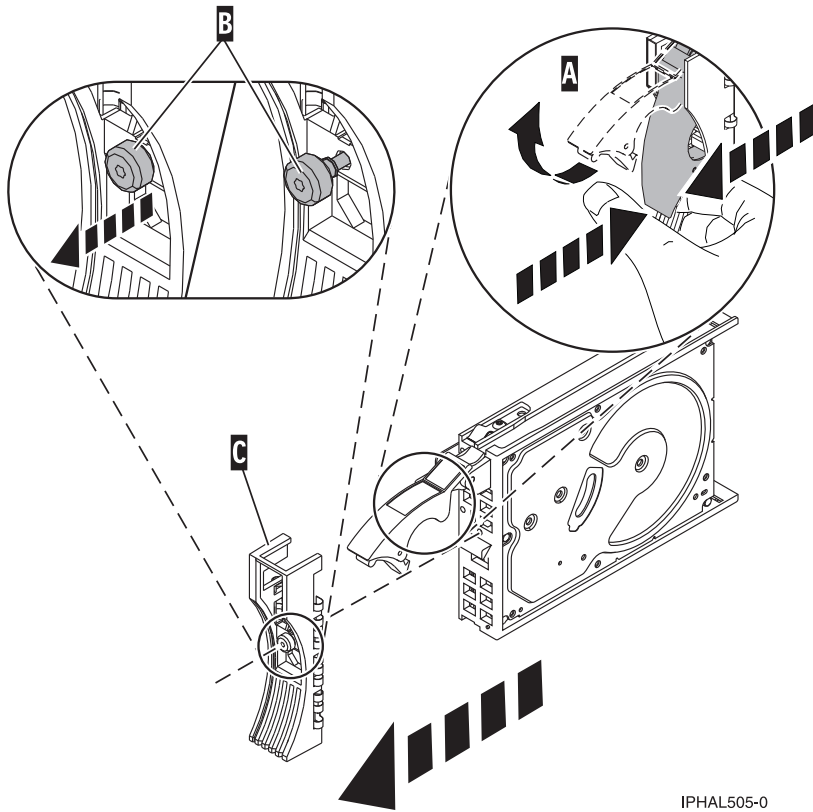

IPHAL504-0

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.

IPHAL505-0

Figure 88. Removing a disk-drive bezel

Replacing 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 105 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.
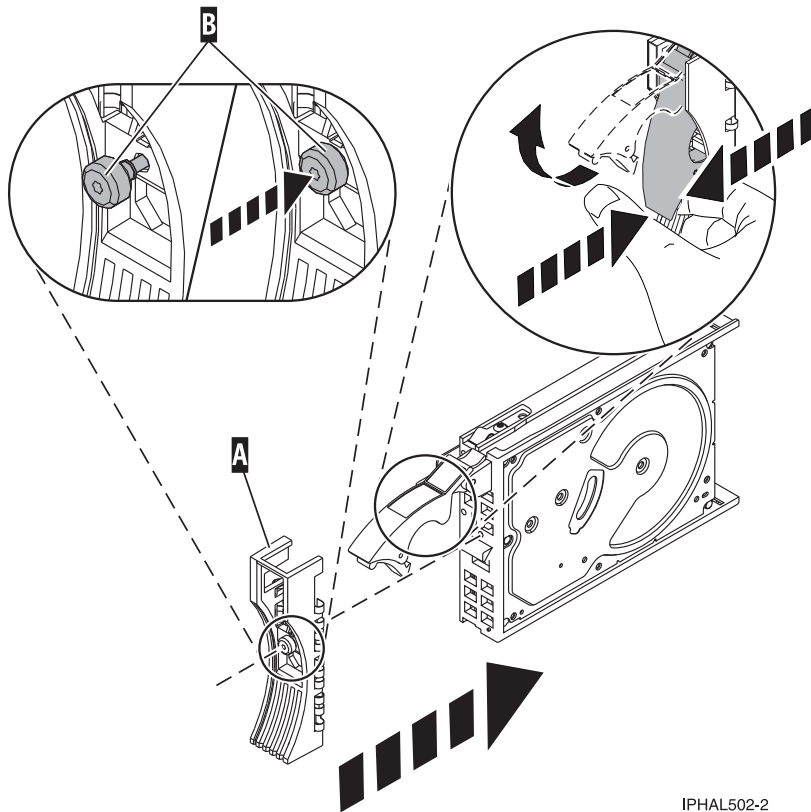4. Set the time delay for one minute:01.

   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.

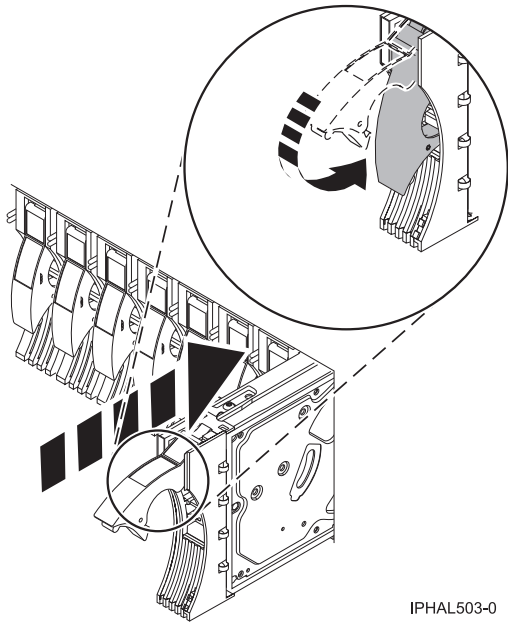   **Note:** The light stops blinking and remains on when you have installed the disk drive properly.
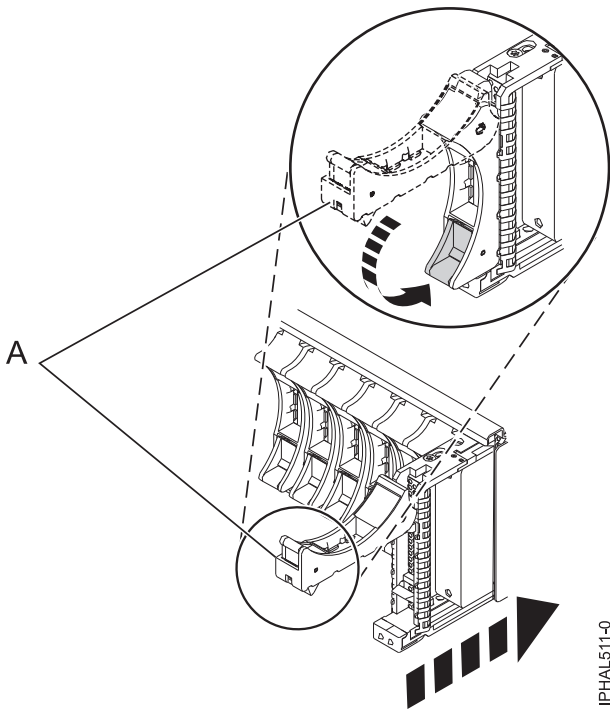
Figure 90. Installing a disk drive

Figure 91. Installing a small-form factor disk drive in the 5803 expansion unit

Completing 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 110 and start hot spare on the larger drive.

Replacing a disk drive with the system or logical partition power turned off

Learn to install a failed 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 turned off.

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 51. 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)

Preparing the system

1. Perform prerequisite tasks as described in Before you begin.
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 113.
3. Identify the disk drive to be replaced and record the location information. For information, see Identifying a failing part.
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 63.

- 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.

5. Stop the system or logical partition that controls the disk drive location. For instructions, see Stopping the system or logical partition.

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)**
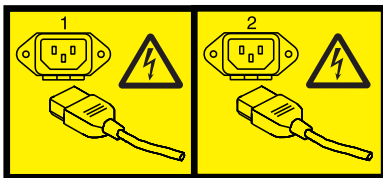
or

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 187

8. Remove the front cover.

Removing 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 114.

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.

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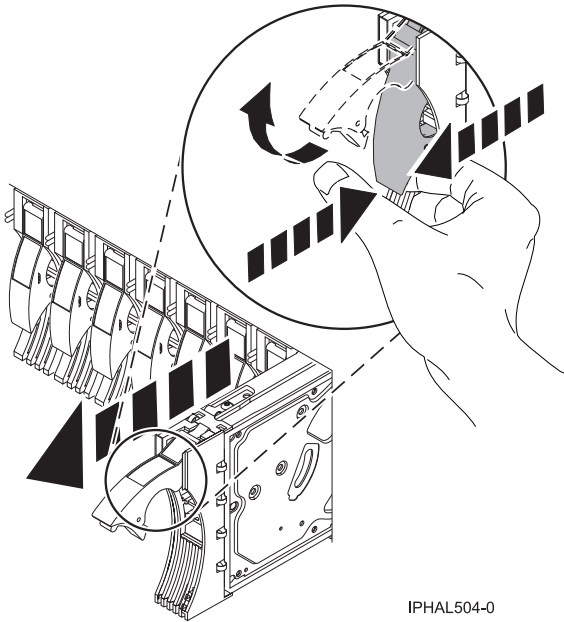
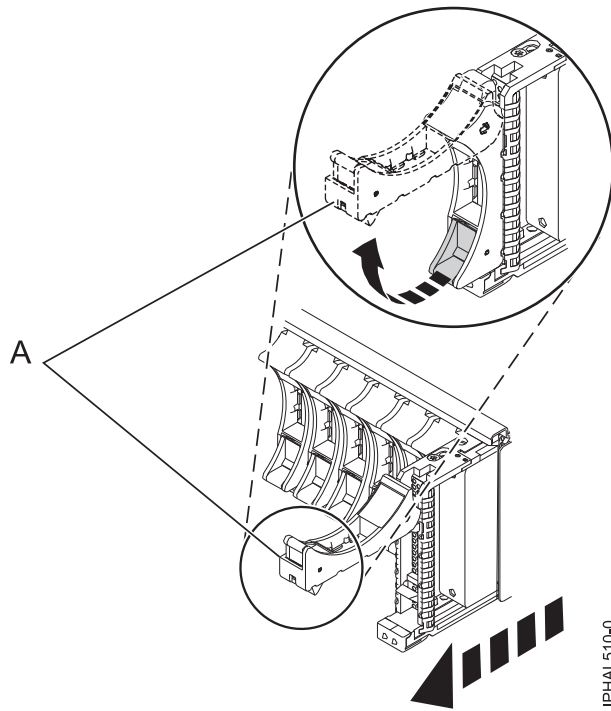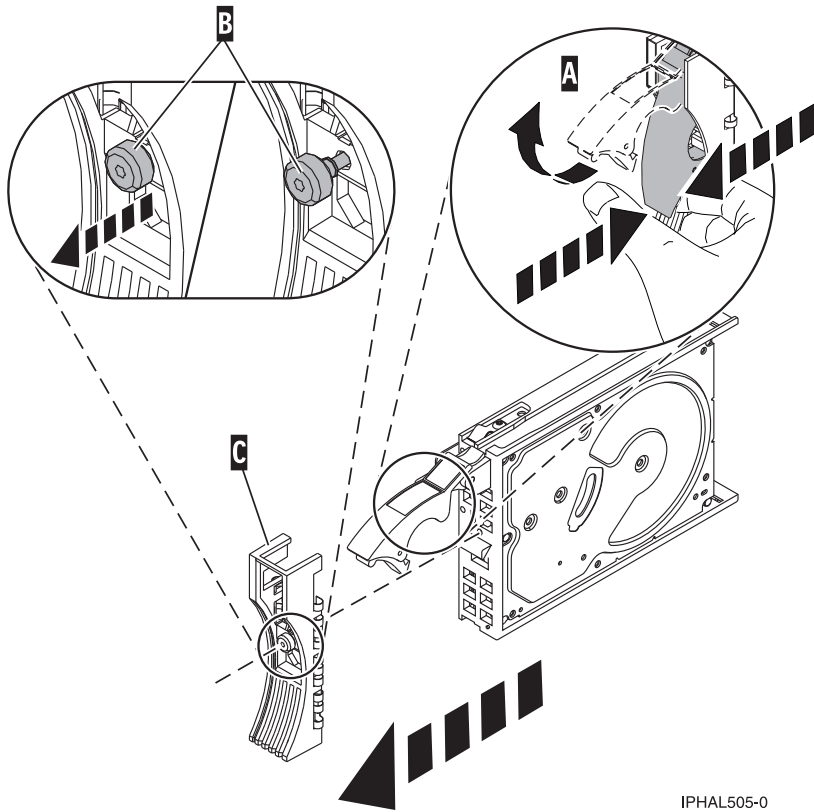*Figure 92. Removing a disk drive from a model*

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 comes with an attached bezel.
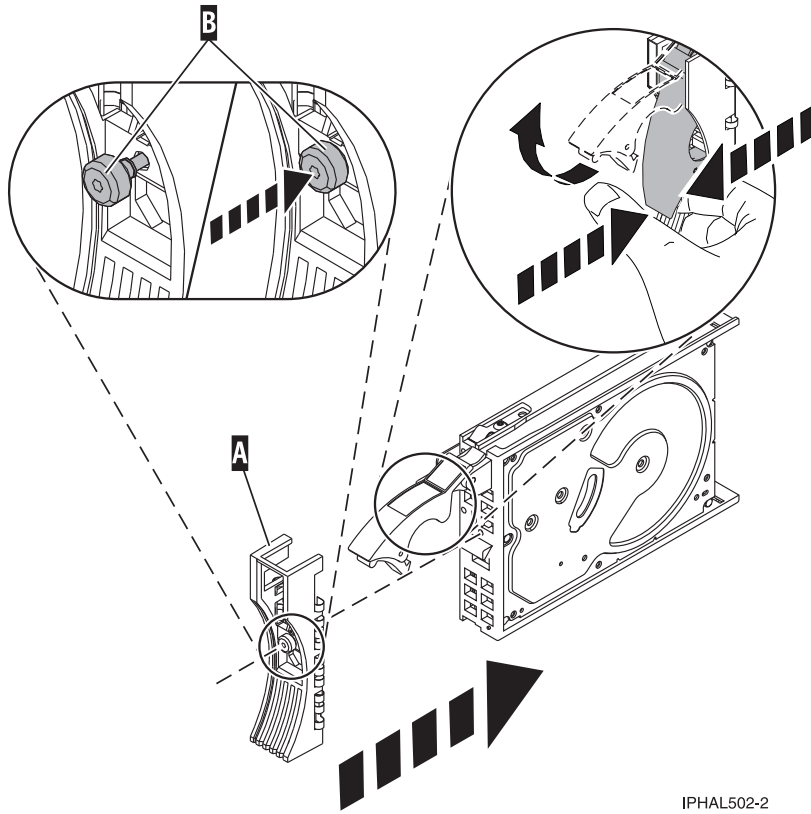
Figure 94. Removing a disk-drive bezel

Replacing 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 the 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.

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 118.
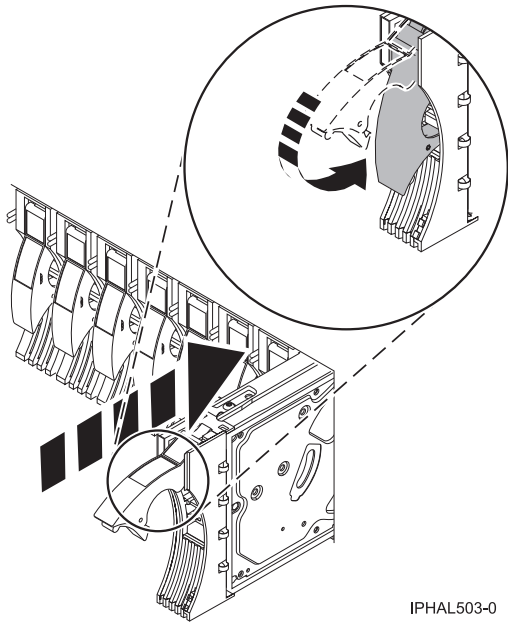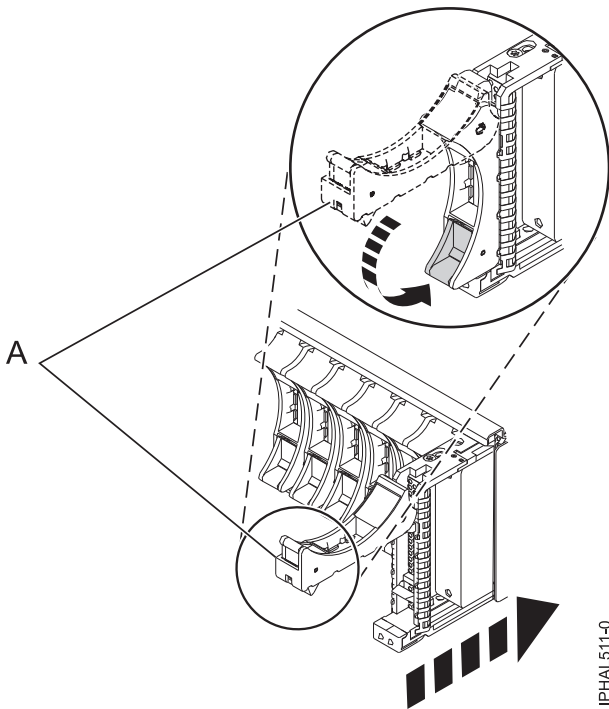
Figure 96. Installing a disk drive in a model

Figure 97. Installing a small-form factor disk drive in the 5803 expansion unit

Completing 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.

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 . If it is not possible to run online 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.

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 49
   - "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 187
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.

Removing 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 129.
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.
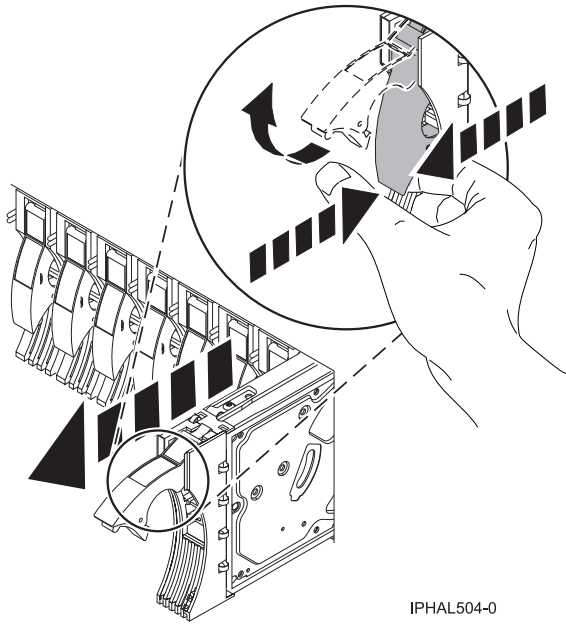
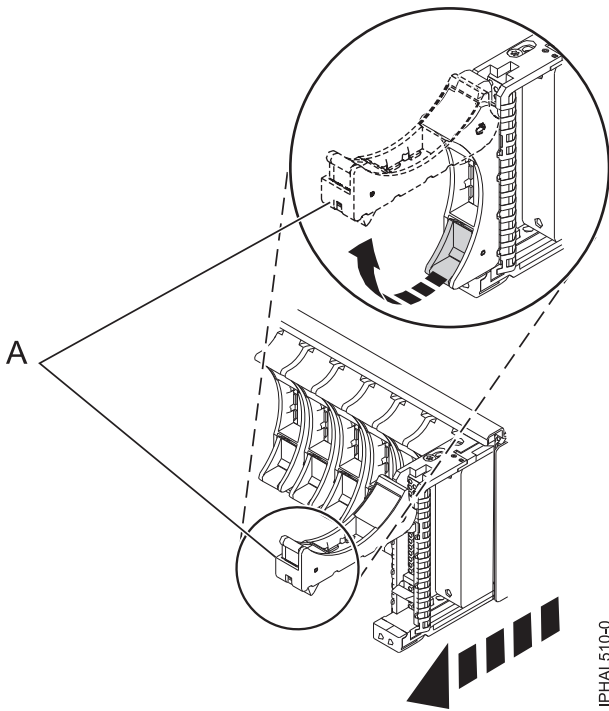*Figure 98. Removing a disk drive from a model or 7311-D20*

*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.
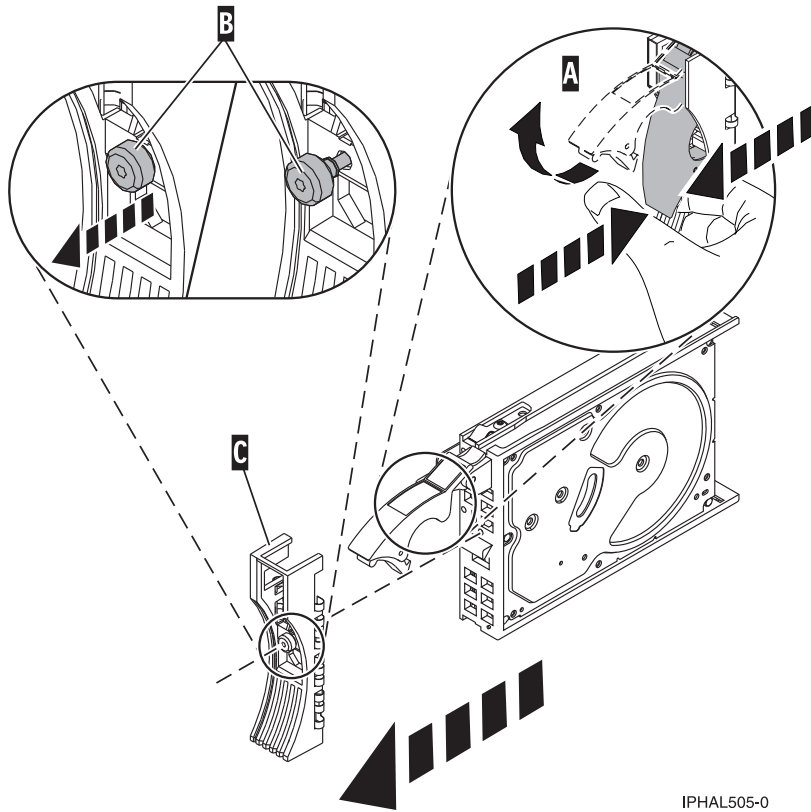
IPHAL505-0

Figure 100. Removing a disk-drive bezel

Replacing 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.
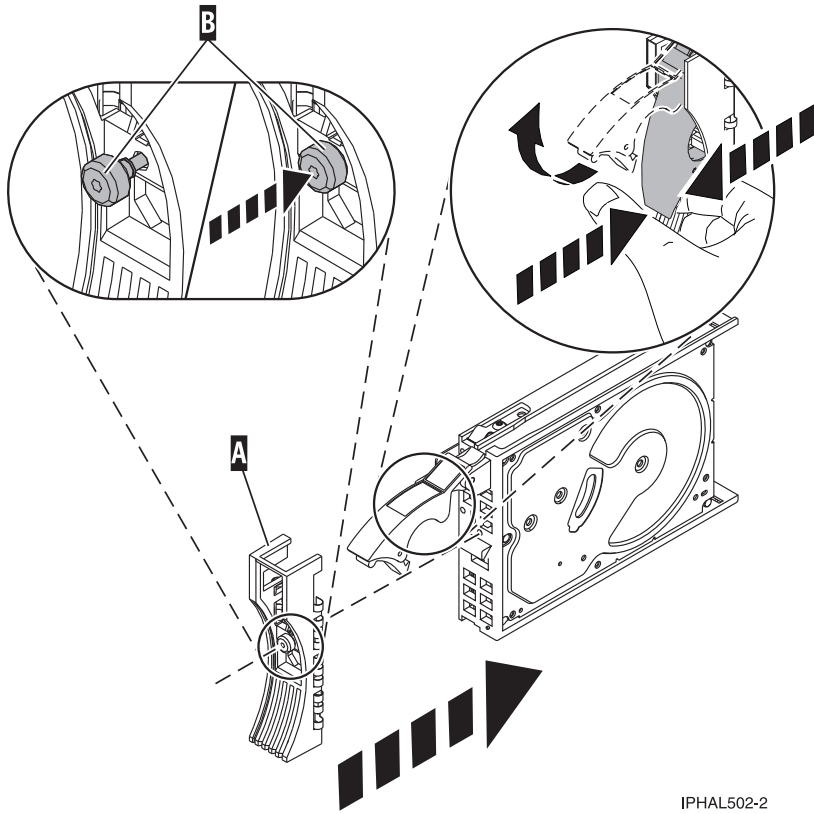
Figure 101. Attaching a disk-drive bezel

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 123.

Figure 102. Installing a disk drive in a model a model or 7311-D20
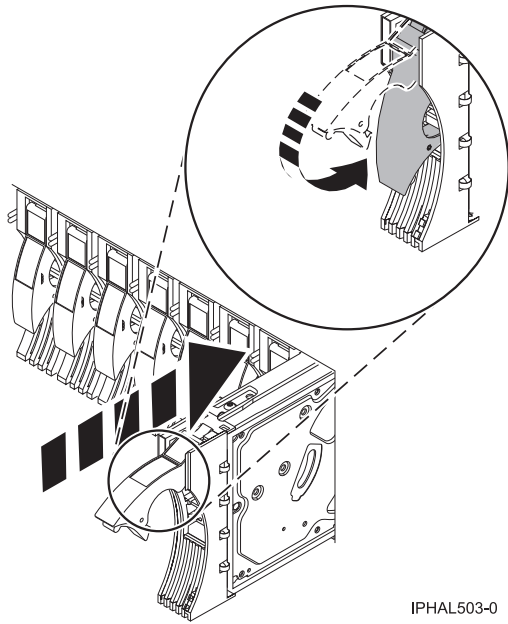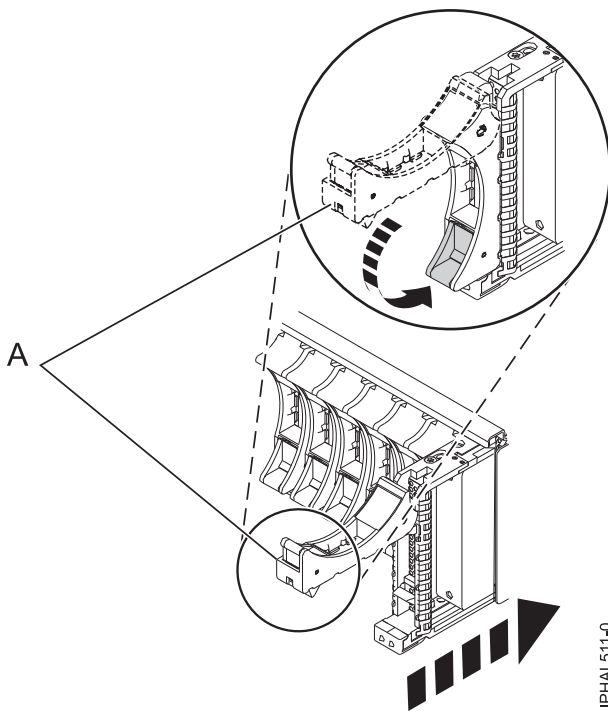

Figure 103. Installing a small-form factor disk drive in the 5803 expansion unit

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.

Completing 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 . 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.
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 187
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 187.
2. Remove the front cover. For instructions on removing the cover, see System covers. 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 126 and Figure 105 on page 126.

   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.
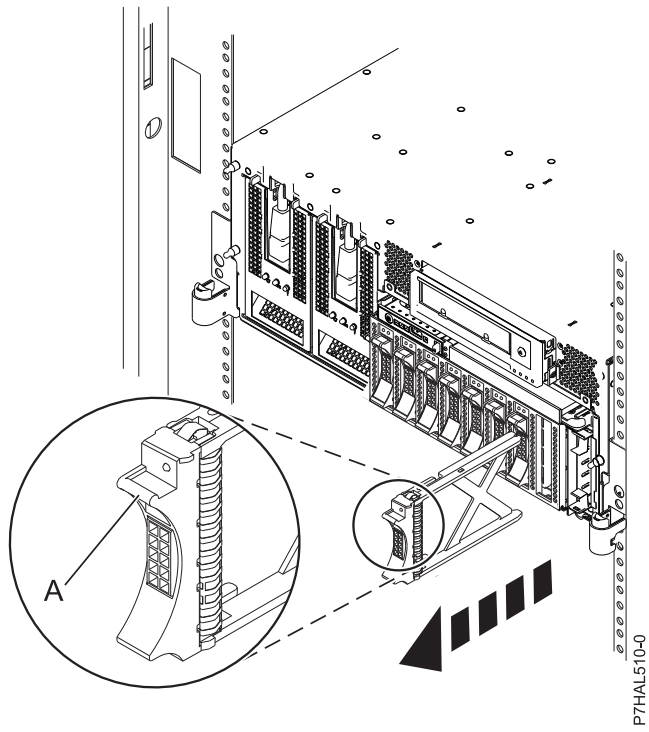
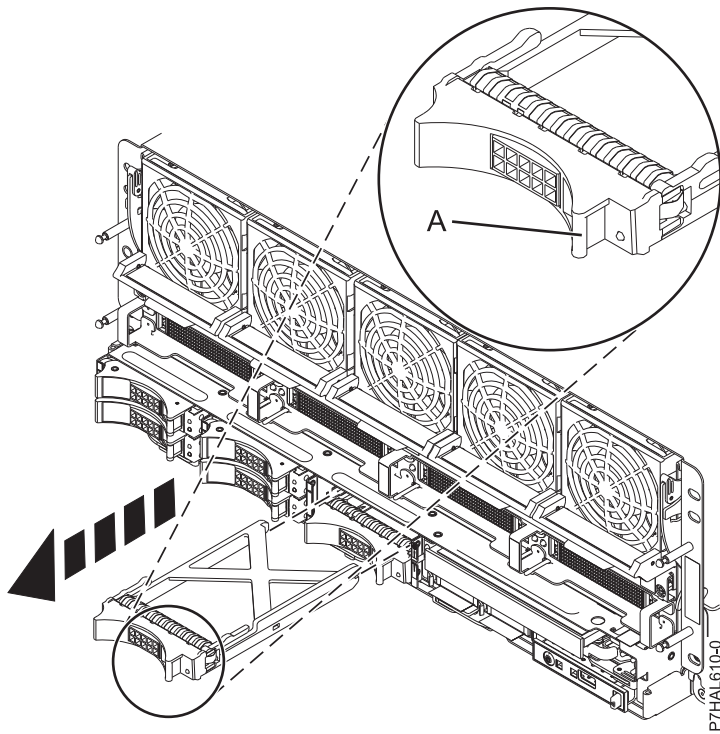*Figure 104. Removing a disk-drive filler from model 8233-E8B or 8236-E8C*

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 187.
2. Remove the front cover. For instructions on removing the cover, see System covers. 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.
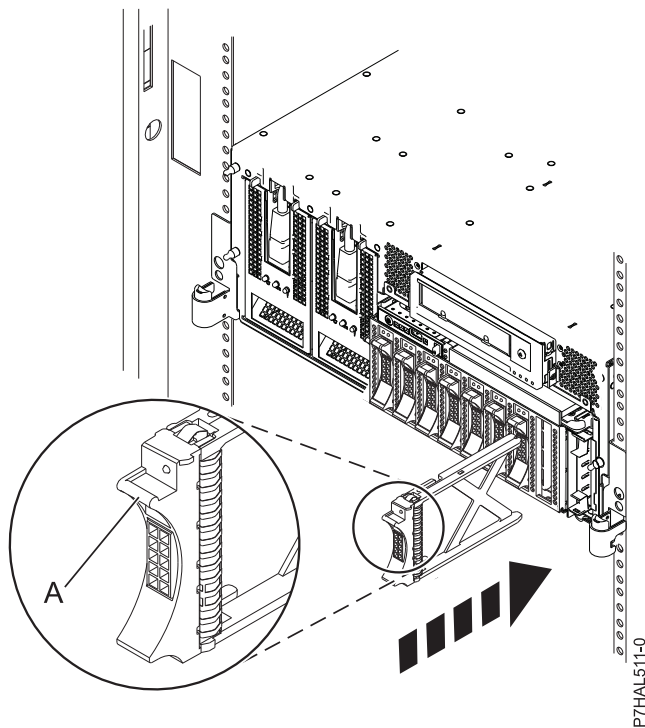
Figure 106. Installing a disk-drive filler for model 8233-E8B or 8236-E8C
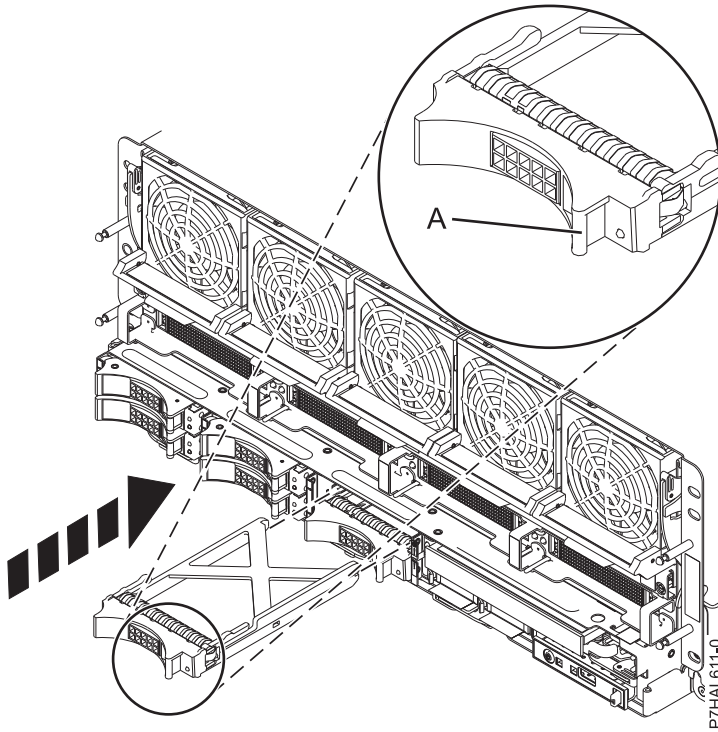
Figure 107. Installing a disk-drive filler for model 9117-MMB or 9179-MHB

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 187
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.

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.
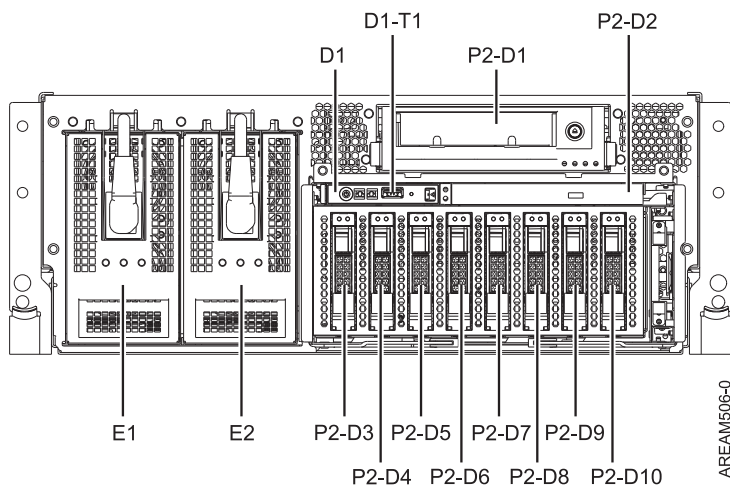
Figure 108. Disk drive locations

concurrent maintenance lights

P2-D3 P2-D5 P2-D7 P2-D9

P2-D4 P2-D6 P2-D8 P2-D10

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Figure 109. Concurrent maintenance light locations

Disk drive locations and concurrent maintenance lights for the 5887 disk drive enclosure unit

Learn about the disk drive locations and where the concurrent maintenance lights are located for the 5887 disk drive enclosure unit.

The following figures show the front view and rear view of the 5887 disk drive enclosure unit and the disk drive locations in the 5887 enclosure unit.

P1

P1-D1
P1-D2
P1-D3
P1-D4
P1-D5
P1-D6
P1-D7
P1-D8
P1-D9
P1-D10
P1-D11
P1-D12
P1-D13
P1-D14
P1-D15
P1-D16
P1-D17
P1-D18
P1-D19
P1-D20
P1-D21
P1-D22
P1-D23
P1-D24

P7HAL714-0
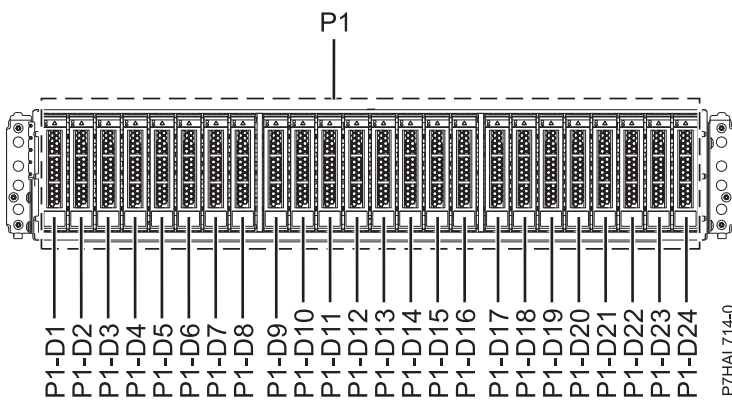
Figure 110. Front view of the 5887 disk drive enclosure unit showing the disk drive locations

Figure 111. Rear view of the 5887 disk drive enclosure unit

The following figure shows the locations of the disk-drive concurrent maintenance lights for the 5887 disk drive enclosure unit.

Figure 112. Front view of the 5887 disk drive enclosure unit showing the concurrent maintenance lights
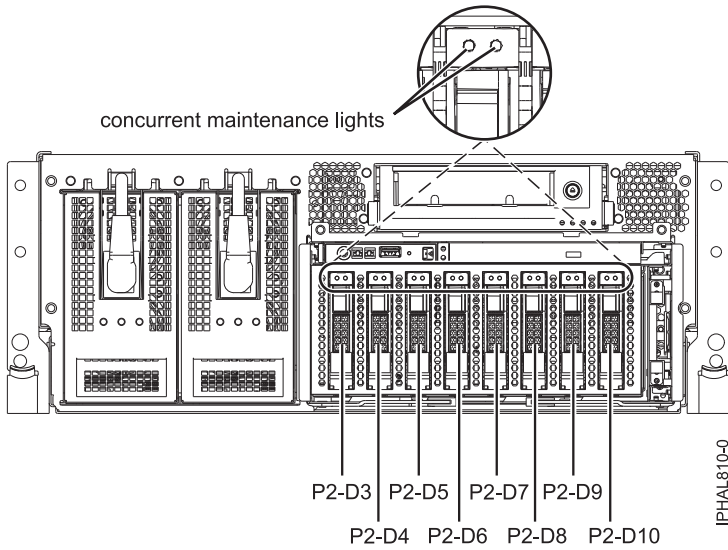
Disk drive locations and concurrent maintenance lights for the 5886 disk enclosure

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 113. Disk drive locations for the 5886 disk enclosure

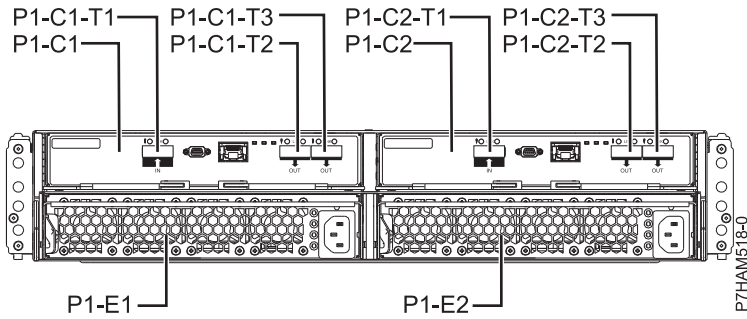The following figure shows the locations of the disk-drive concurrent maintenance lights for the 5886 disk-drive enclosure.
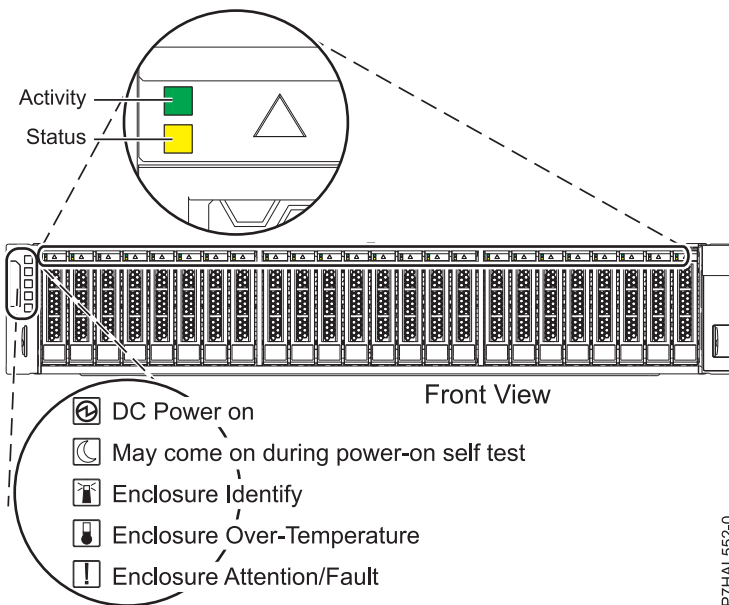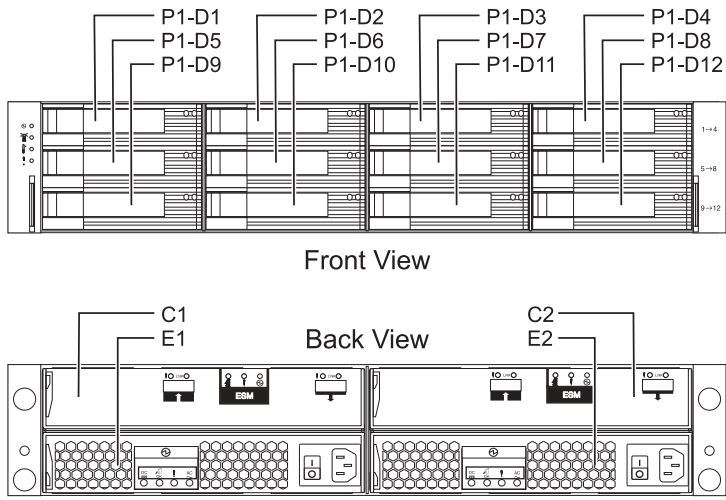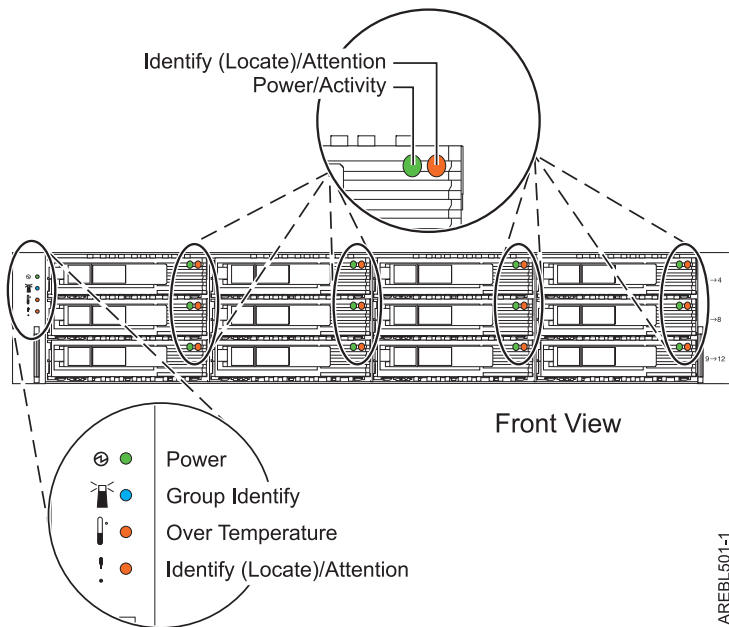

Figure 114. Front view of disk-drive enclosure concurrent maintenance lights for model 5886

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.
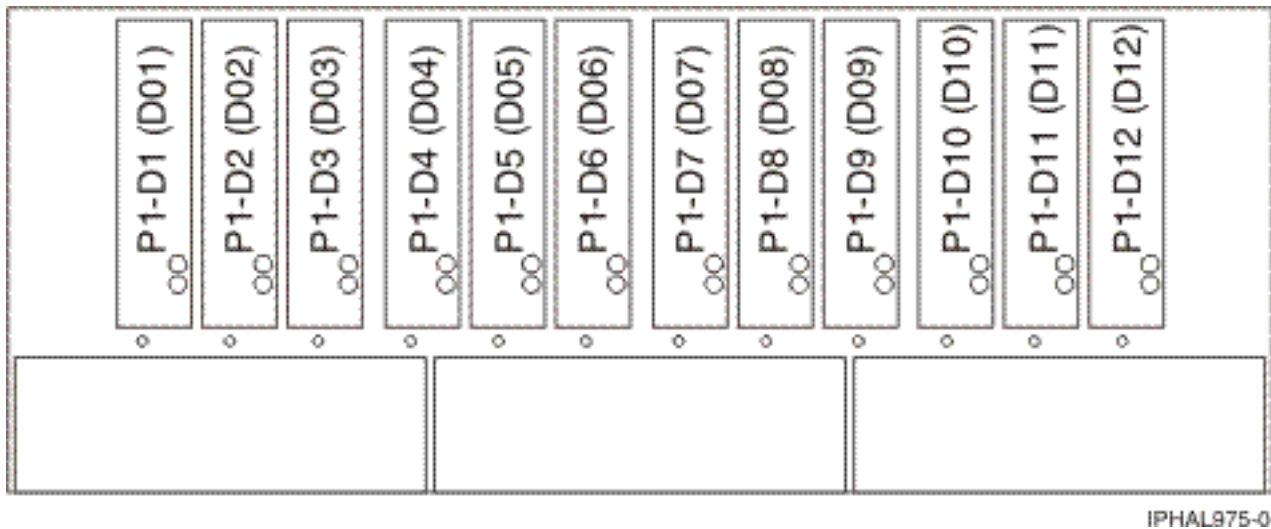
Figure 115. Front view of 5786, 5787, 7031-D24, and 7031-T24 SCSI disk-drive enclosures
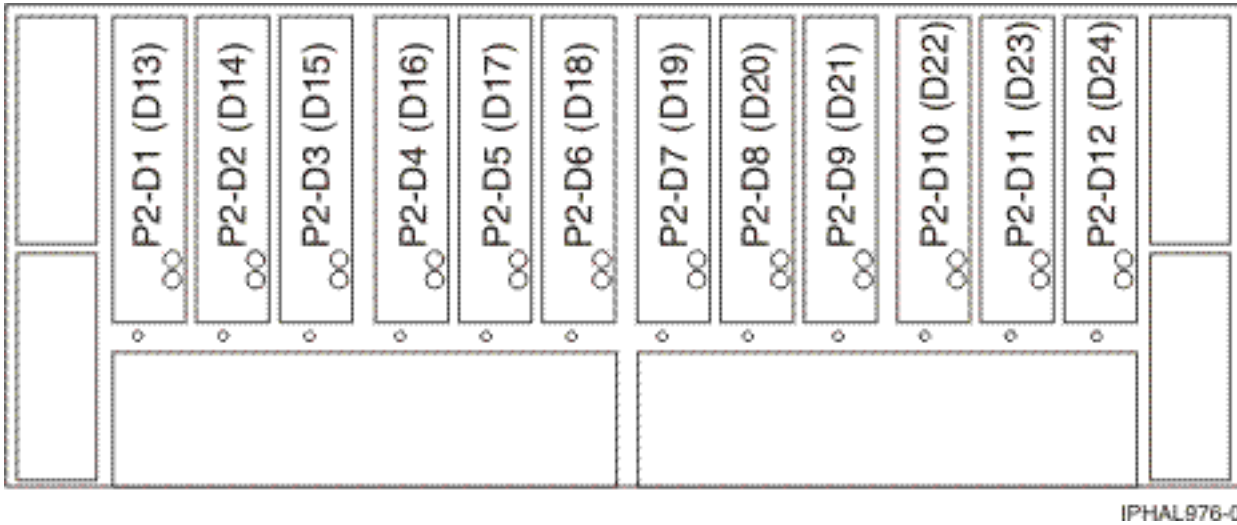
Figure 116. Back view of 5786, 5787, 7031-D24, and 7031-T24 SCSI disk-drive enclosures

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.
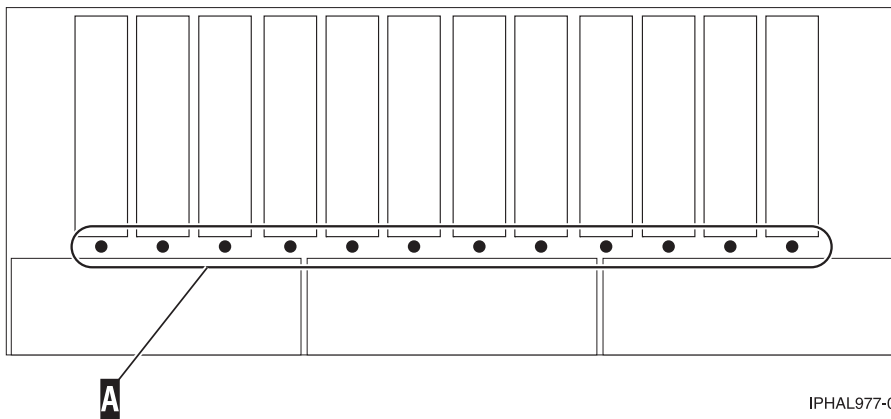
Figure 117. Front view of SCSI disk-drive enclosure concurrent maintenance lights for model 5786, 5787, 7031-D24, and 7031-T24
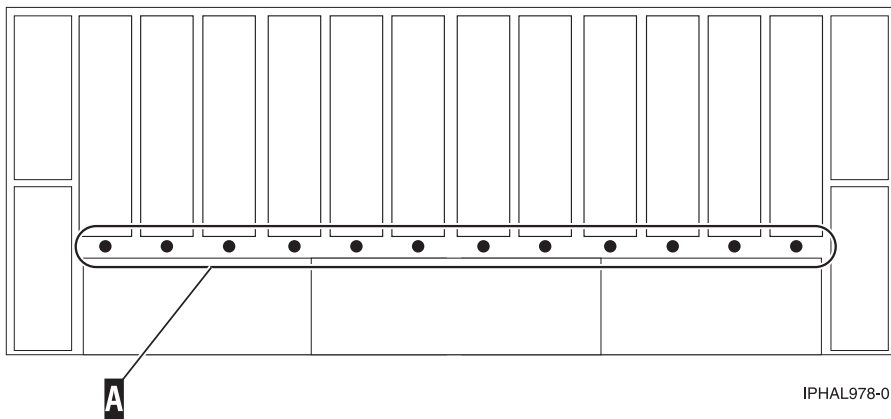
Figure 118. Back view of SCSI disk-drive enclosure concurrent maintenance lights for model 5786, 5787, 7031-D24, and 7031-T24

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.
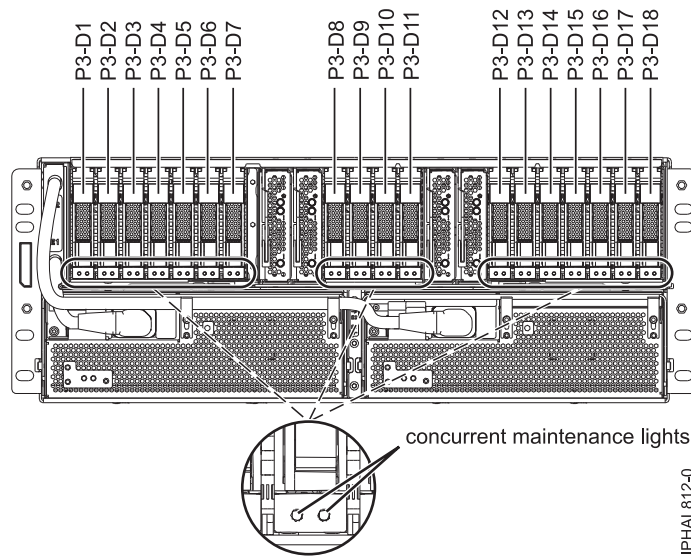
Figure 119. Disk drive locations

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 must 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.

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.

Rebuilding data on a replacement disk drive using Linux

You can rebuild data on the replacement disk drive that was replaced because of a failed disk drive or a new installation.

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.

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 120. 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 121. 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 122. 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 123. 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 disks.

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 a 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 must match the serial number you recorded (the last four 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 48 for mirroring or no protection, go to 1 on page 49 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 48.

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. Repeat 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 - 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 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**

25. The Confirm Add Units displays showing the configuration your system must 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 takes 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 must 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 wanted.

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 50.

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 power turned on" on page 96.
   - 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 185.

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 183.

9. Return to the procedure that sent you here and continue with the next step in that procedure.

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.

The following information is for use after the adapter is installed. Instal 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 177 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 185.
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.

   Important: This configuration is not supported with backplane feature code 8341.

MiniSAS (keyed to 2)   AI-cable

IPHAD721-0
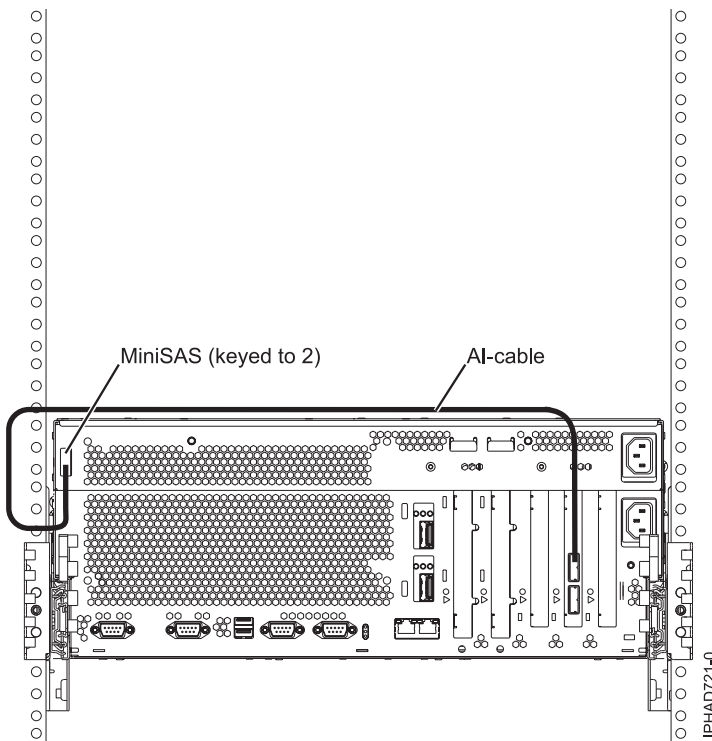
Notes: The second connector on the adapter can be used to attach a disk expansion or media expansion drawer.

Figure 124. 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 183.

4. Verify the feature is installed and working, see Verifying the installed part.

Once you have completed the procedure three of the disks in the system enclosure will be managed by the SAS Storage Controller adapter and three will be managed by the internal system.

Now, you can manage the disks as you would manage any other disks.

Installing the external SAS port on an 8233-E8B or 8236-E8C

Learn how 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.

1. Perform the prerequisite tasks described in "Before you begin" on page 177.

2. Stop the system. For instructions, see "Stopping a system or logical partition" on page 185.

3. If the system is rack-mounted, place the system into the service position. For instructions, see 8204serviceposition.dita#hwip2serpos.

4. Remove the service access cover. For instructions, see "Removing the service access cover from an 8233-E8B or 8236-E8C system" on page 189.

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 must remove only the assembly or filler in P1-C16. To remove a filler, grasp the filler in the center and lift the filler out of the system.
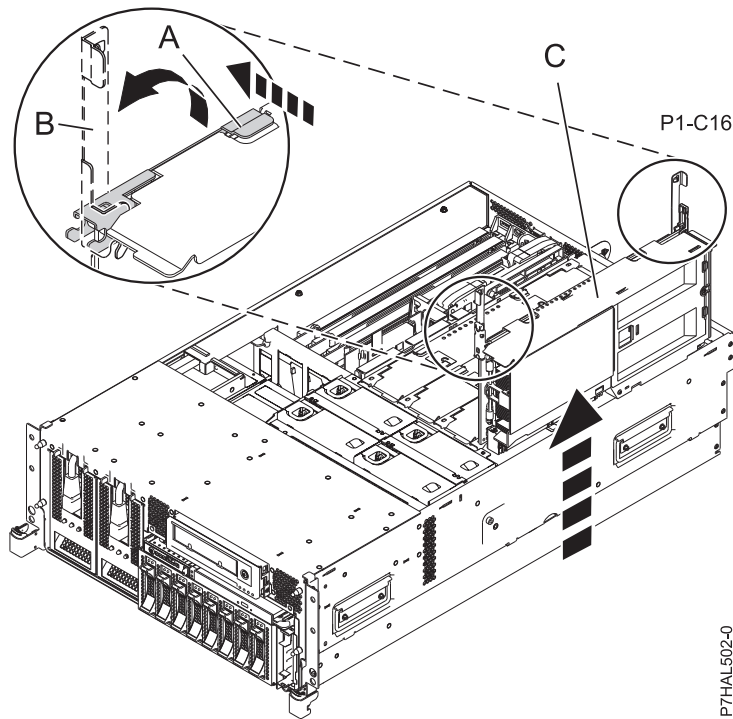
6. Remove the fans and fan cage from the system by doing the following steps:
   a. To remove the fans, squeeze the tab **(A)** and lift the fan out of the fan cage as shown in the following figure.
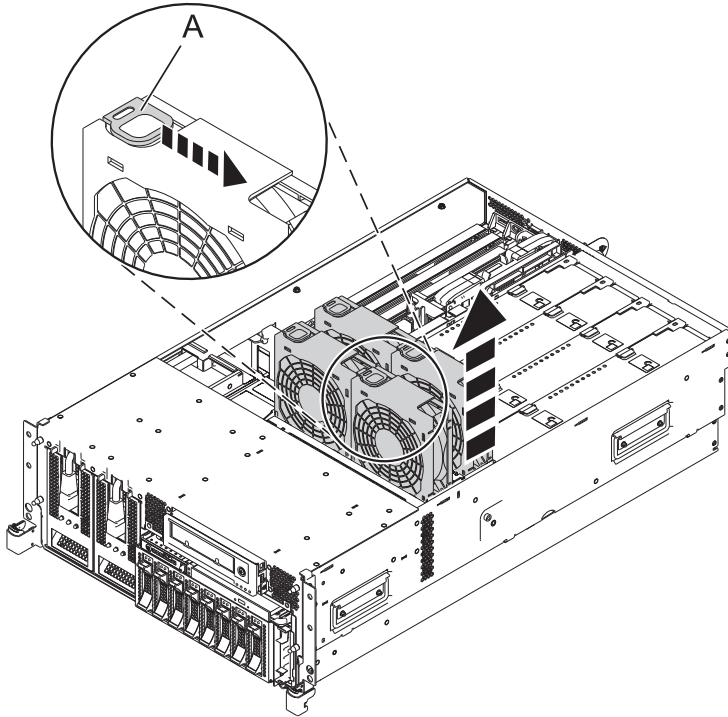
Figure 125. Removing the fan from the 8233-E8B or 8236-E8C fan cage

    b. To remove the air baffles, grasp and pull the air baffle out of the fan cage, as shown in the following figure.
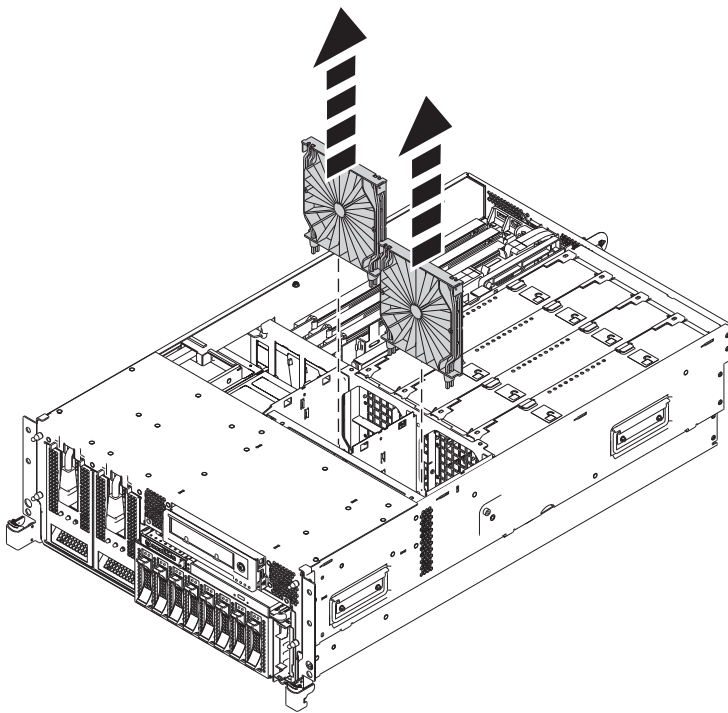

Figure 126. Removing the air baffles from the 8233-E8B or 8236-E8C fan cage

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.
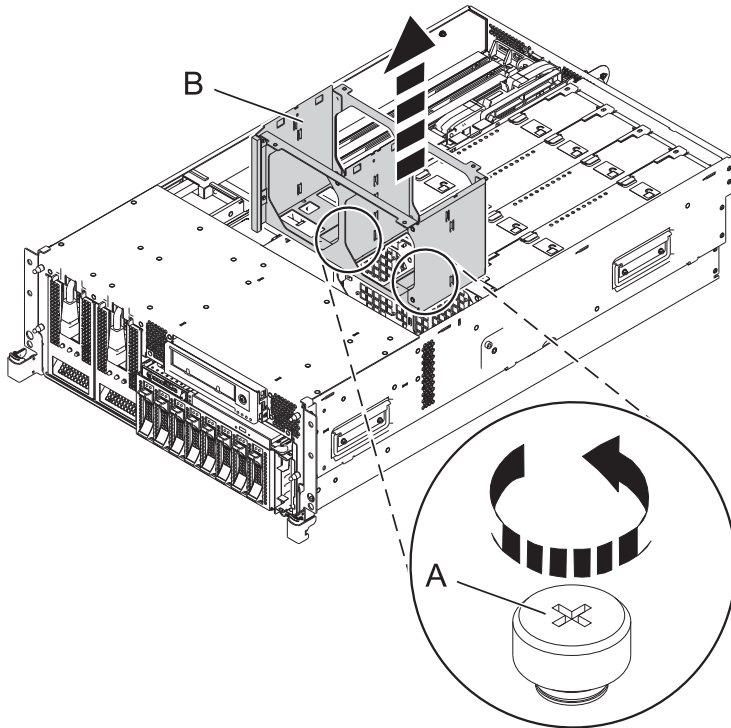

Figure 127. Removing the fan cage from the 8233-E8B or 8236-E8C system

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: See Figure 128 on page 152 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.

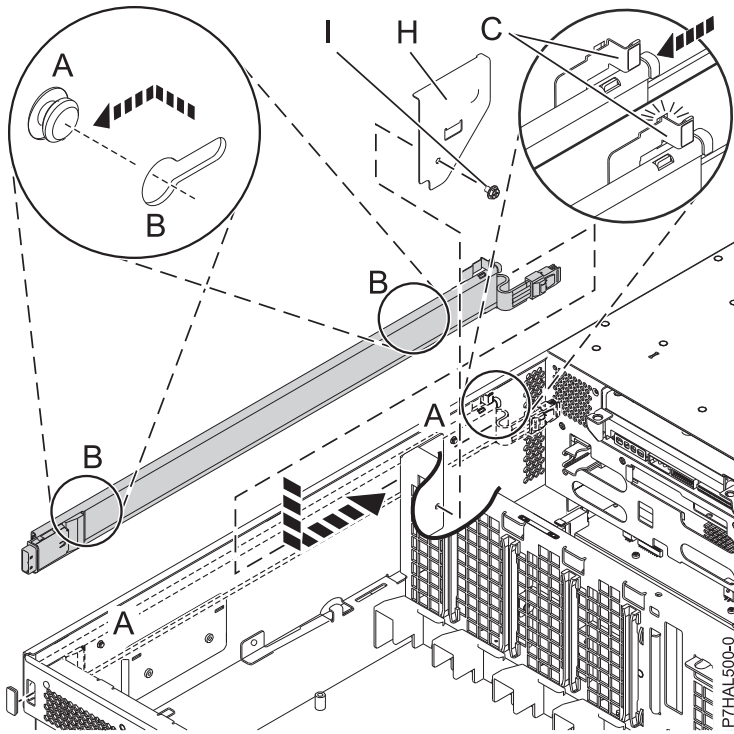   **Note:** The bracket should fit snugly over the SAS cable assembly.

Figure 128. Attaching the SAS cable

11. Depending on the disk-drive backplane you have, complete one of the following choices:

   Tip: See Figure 129 on page 153 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 153.
   - If you can see the SAS cable shroud **(E)** extending from the disk-drive backplane, continue to step 11a.
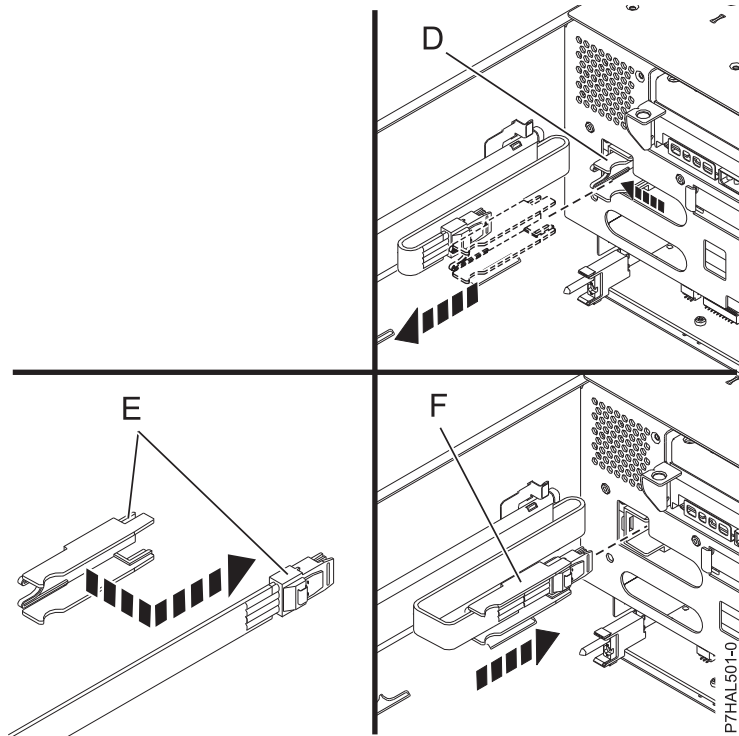
Figure 129. SAS cable connections

    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.
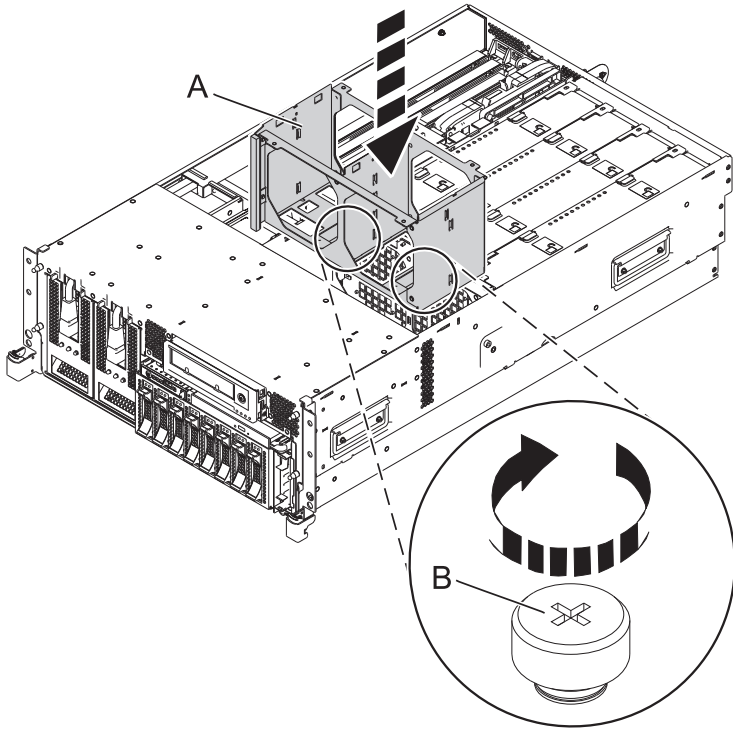
Figure 130. Installing the fan cage in the 8233-E8B or 8236-E8C system

    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.
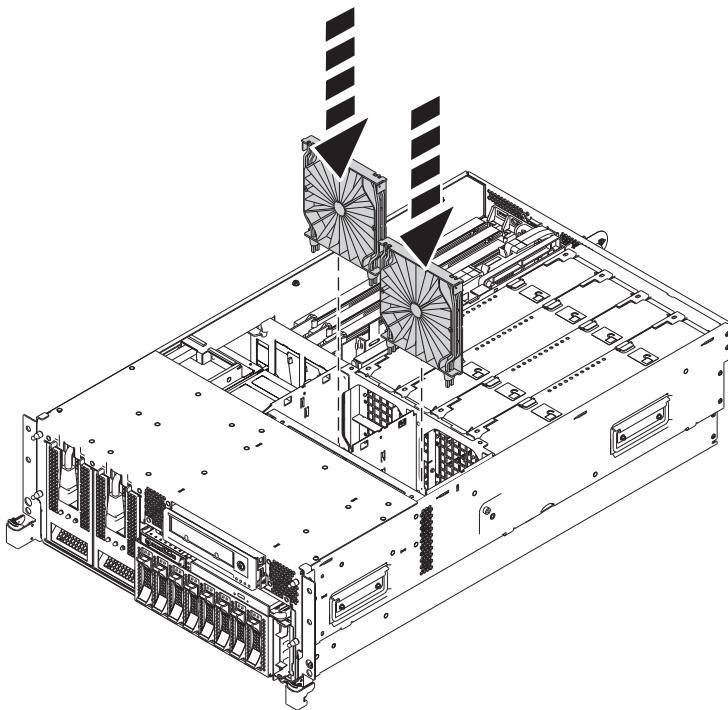

Figure 131. Installing the air baffles in the 8233-E8B or 8236-E8C fan cage

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.
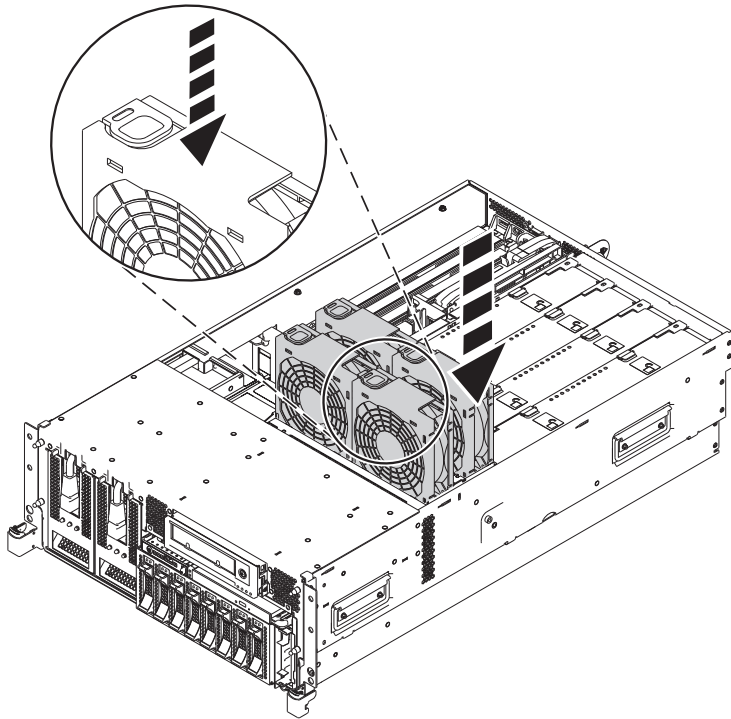

Figure 132. Installing the fans in the 8233-E8B or 8236-E8C fan cage

13. Install the system processor **(B)** and secure both latches **(C)**, as shown in the following figure.
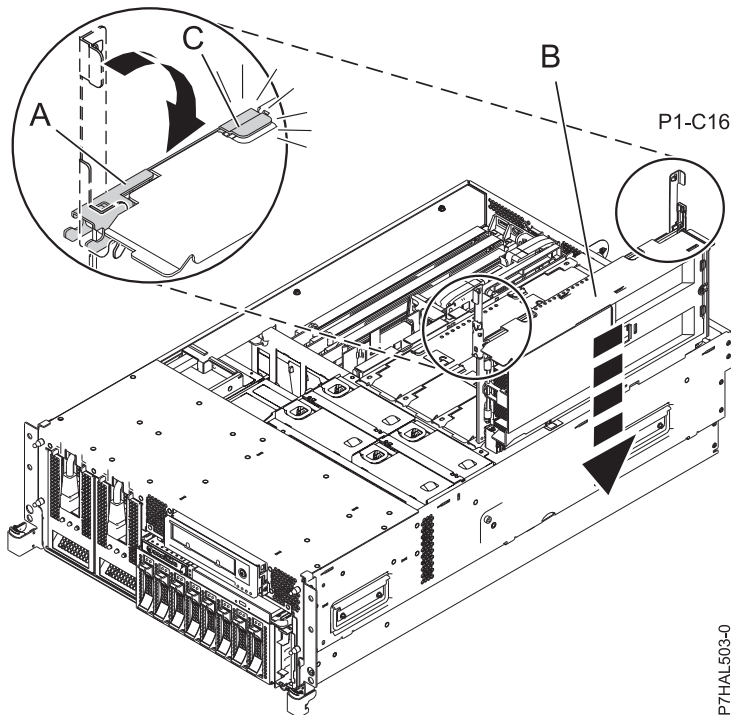
14. Replace the service access cover. For instructions, see "Installing the service access cover on an 8233-E8B or 8236-E8C system" on page 190.

15. Place the system back into the operating position. For instructions, see 8204operatingposition.dita#operatingposition8204.

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 183.

Replacing a SAS conduit card in a 5802 expansion unit with the power turned off

Learn how to replace a SAS conduit card in the 5802 expansion unit with the power turned off.

Perform the prerequisite tasks as described in Before you begin.

1. Stop the system if it is running. For instructions, see Stopping the system or logical partition.
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)
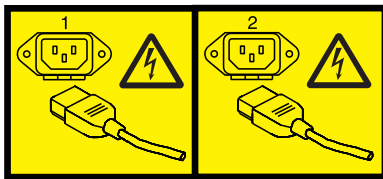
   or

3. Perform the following steps to replace the midplane and SAS conduit card into the system:

   a. Place the card connector **(C)** on the midplane connection **(D)** using the guide track **(B)** to ensure a good connection.
   b. Lift the handle **(A)** to seat and secure the SAS conduit card to the midplane as shown in Figure 133 on page 158.
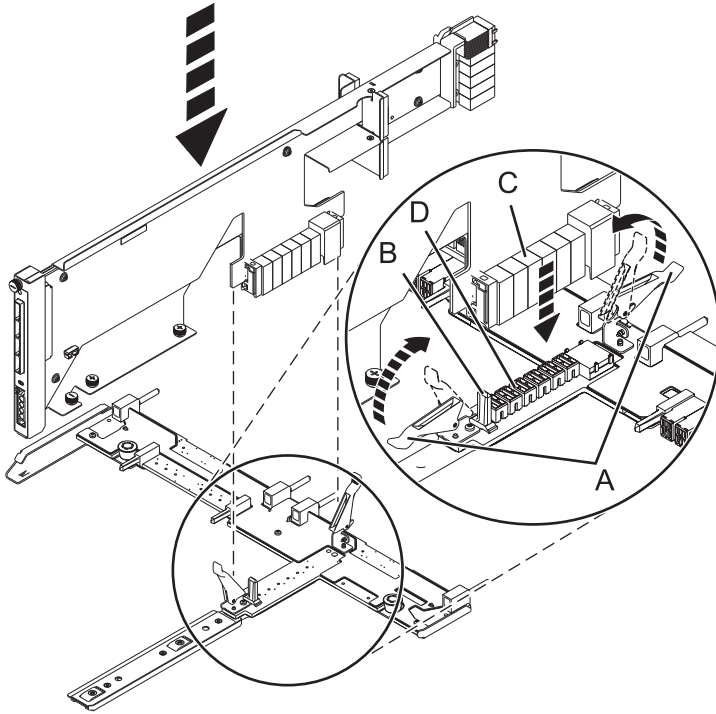
Figure 133. Installing the SAS conduit card into the midplane

4. Perform the following steps to replace the midplane and SAS conduit card into the system:
   a. Align the midplane with the track and ensure that 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.
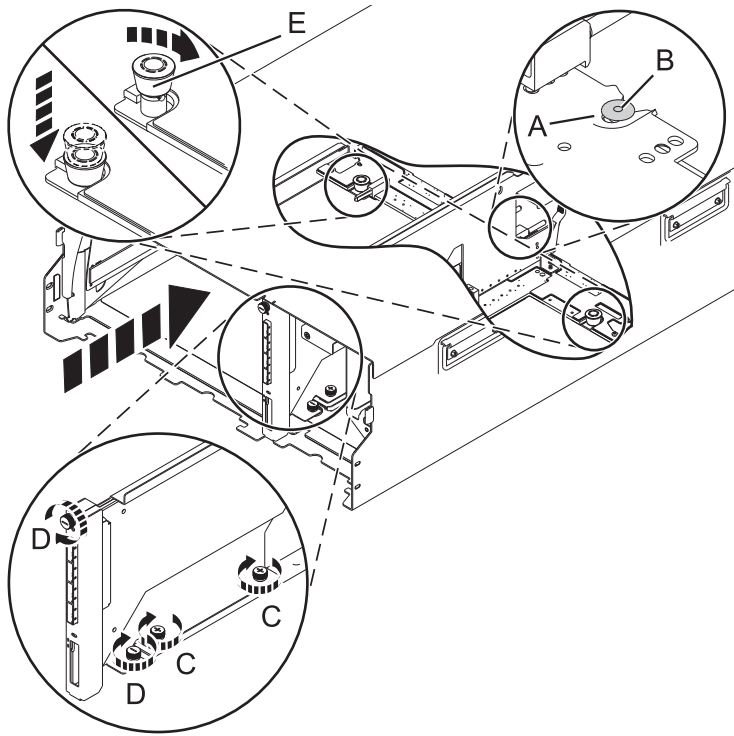
Figure 134. Installing the SAS conduit card and the midplane

5. Attach the power cord cover and secure the thumbscrew **(A)** to the system.
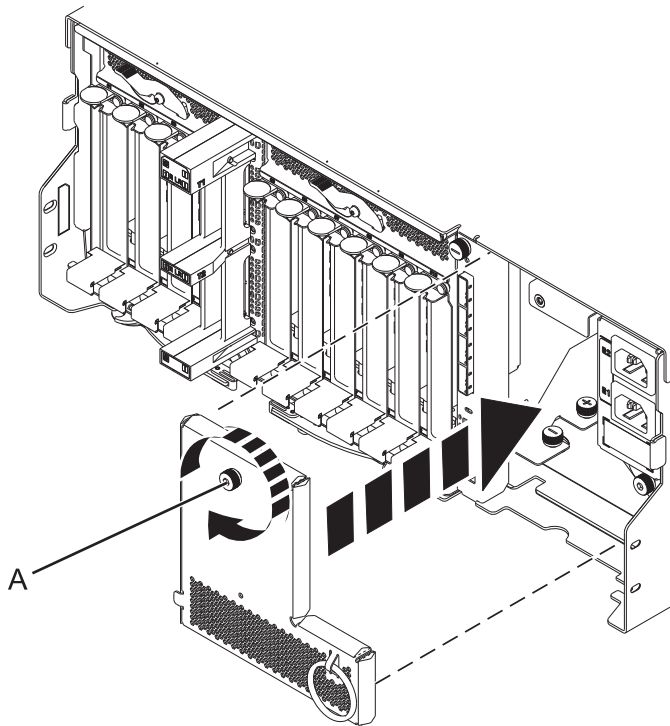
Figure 135. Installing the power cord plate

6. Carefully slide the enclosure management controller into the system and close the latch **(A)** as shown in Figure 136.
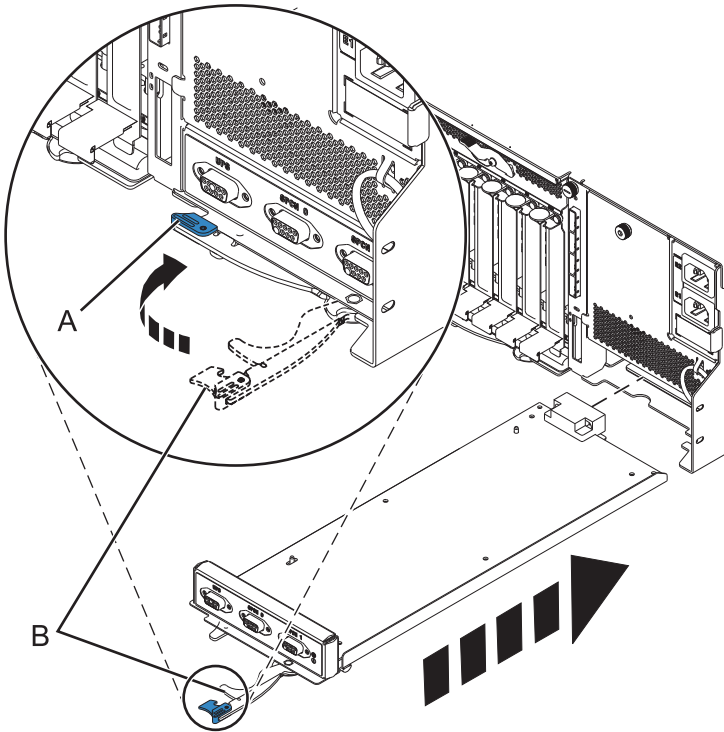
Figure 136. Replacing the enclosure management controller

7. Carefully lift and align the I/O system board with the slot at the rear of the expansion unit.
8. Insert the I/O system board firmly into the server, as shown in Figure 137 on page 161.
9. Secure the I/O system board with the locking tabs **(A)**, as shown in Figure 137 on page 161.
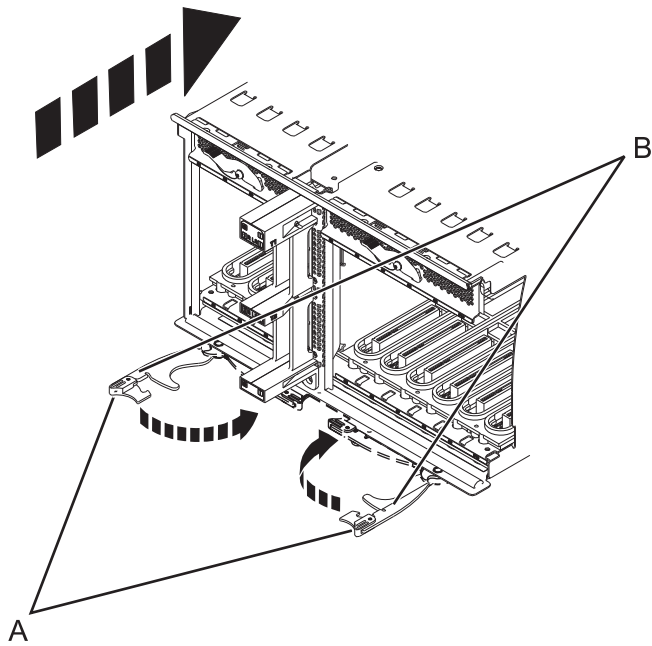
Figure 137. Install the I/O system board on a rack mounted model

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 Figure 138 on page 162.
11. Close the locking handle **(A)** until the power supply locks into position.
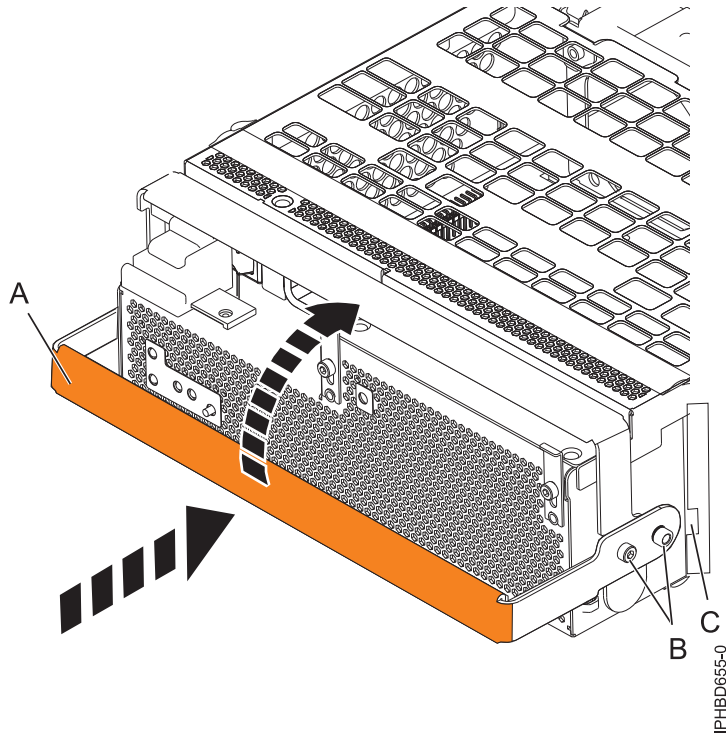
Figure 138. Replacing a power supply

12. To replace the disk drive backplane, lift the backplane along the two sides and align the backplane with the guide rails in the expansion unit.

    CAUTION:
    The backplane can be heavy to lift. 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 Figure 139 on page 163.

14. Secure the backplane in place by moving the locking tabs from the open position **(B)** to the locked position **(A)**.
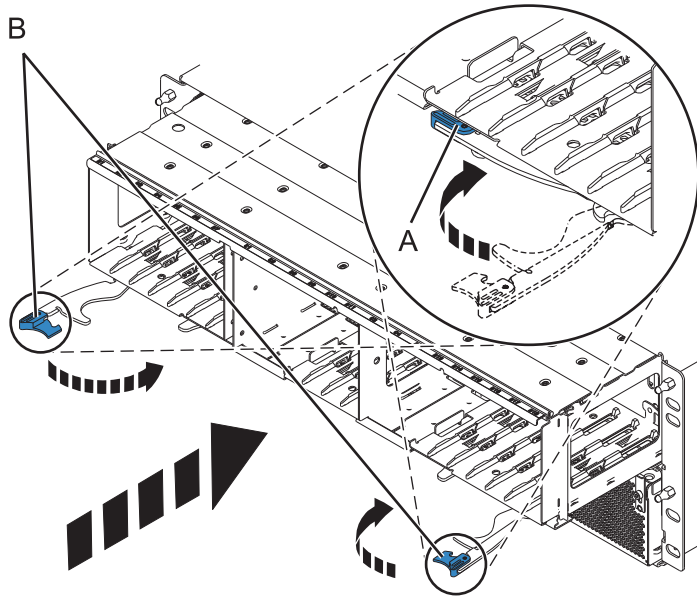
Figure 139. Installing the backplane on a rack-mounted model

15. Replace all disk drive units and fillers, if you had 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.
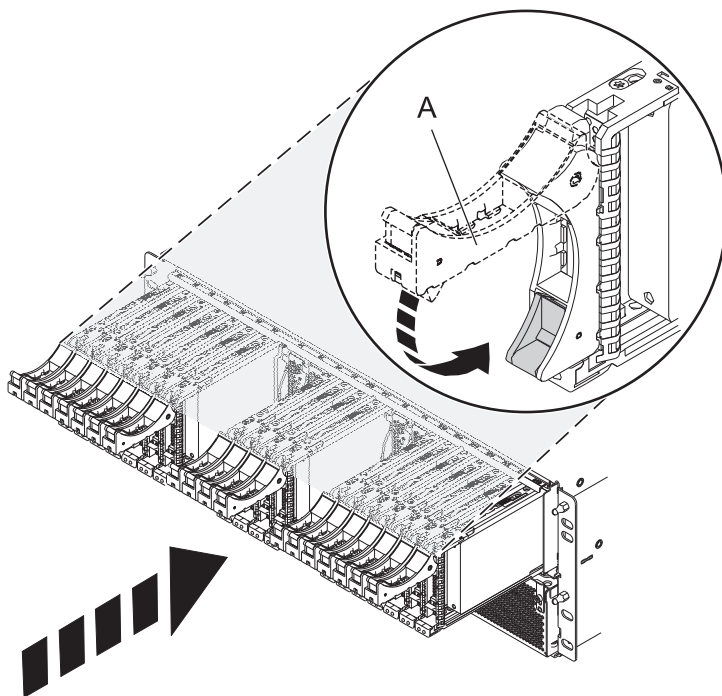
16. Replace all expander cards and fillers, if you had removed them earlier.
   a. Supporting the bottom of the expander card with your hand, align it with the guide rails in the backplane.
   b. Slide the expander card all the way into the backplane.
   c. Push the handle **(A)** toward the card to lock it into place.
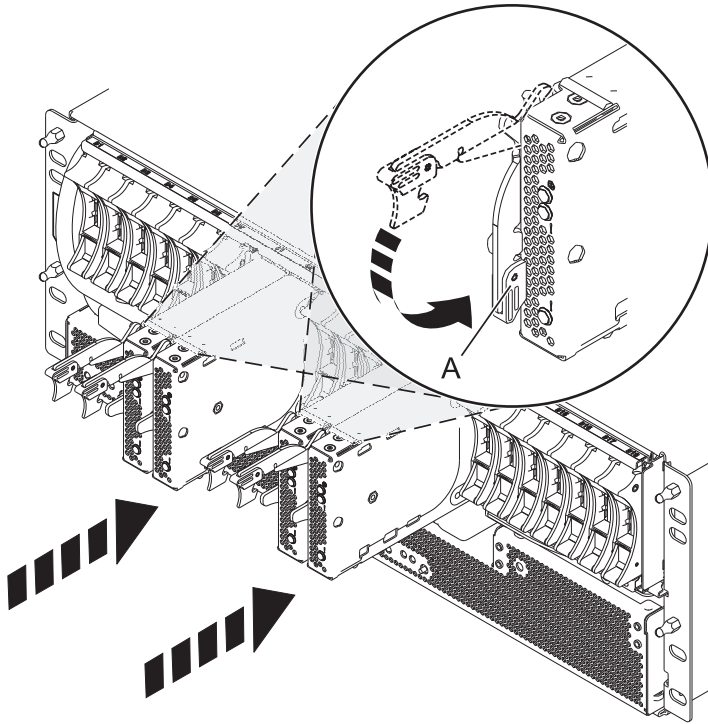
17. Start the system. For instructions, see Starting the system or logical partition.

Continue with any other service actions you are required to perform.

- For information about connecting the system, see Connecting the expansion units.
- For information about installing the PCI adapters into the system board, see Model 5802 and 5877 expansion units, PCI adapters, and cassettes.

Removing a SAS conduit card from a 5802 expansion unit with the power turned off

Learn how to remove a SAS conduit card from a 5802 rack-mounted expansion unit if you must replace a failing part with the power turned off.

Perform the prerequisite tasks as described in Before you begin.

1. Identify the card you want to remove. For instructions on identifying a failing part, see Identifying a failing part.
2. Stop the system if it is running. For instructions on stopping the system, see Stopping the system or logical partition.
3. Remove the disk drives and fillers as shown in Figure 140.
   a. Squeeze the latch of the disk drive and pull the handle **(A)** toward you to release the disk drive.
   b. Support the bottom of the disk drive with your hand and slide the disk drive out of the backplane.
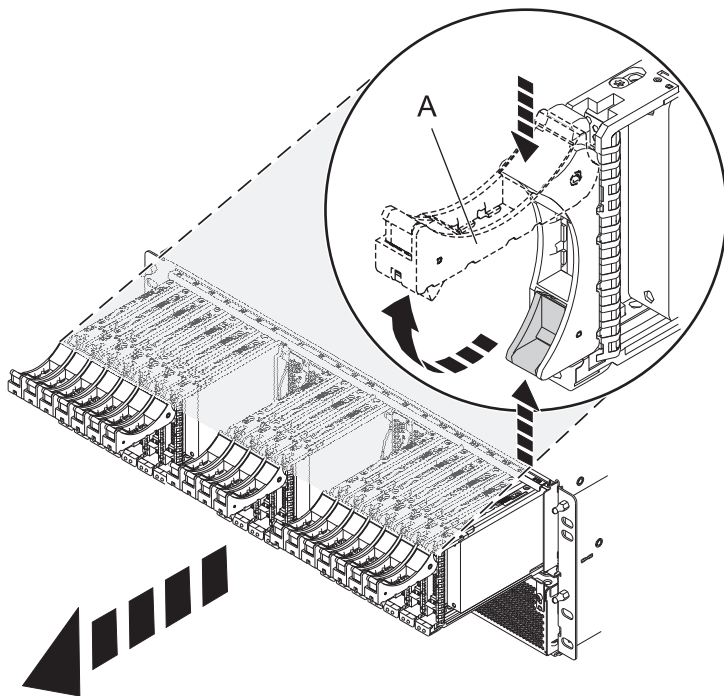
Figure 140. Removing the disk drives from the backplane

4. Remove the port cards and fillers as shown in Figure 141 on page 166.
   a. Hold 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 the port card out of the backplane.
   c. Place the port card on an electrostatic discharge (ESD) surface.
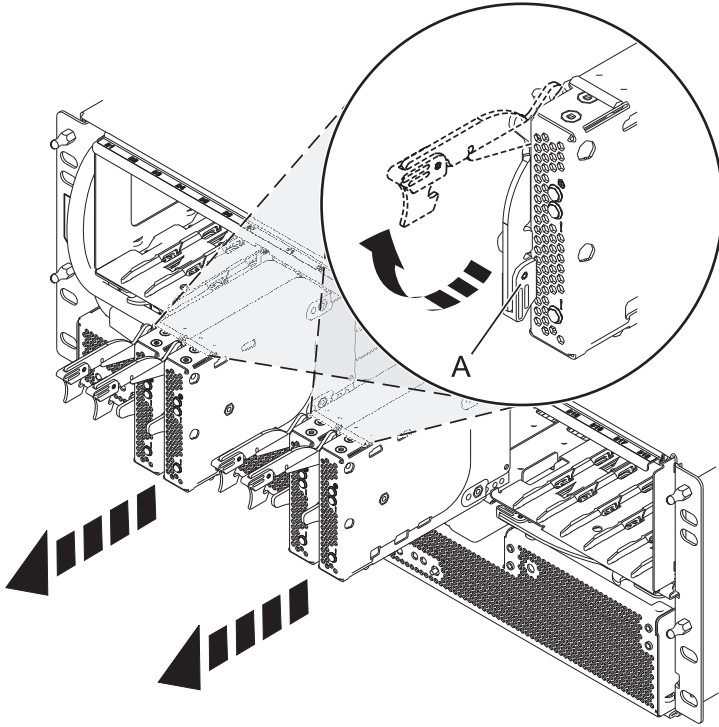
Figure 141. Removing the port card from the backplane

5. Remove the backplane as shown in Figure 142 on page 167.

   CAUTION:
   The backplane might be heavy. Ensure that you can safely perform 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 and use your hand to support the bottom of the backplane.
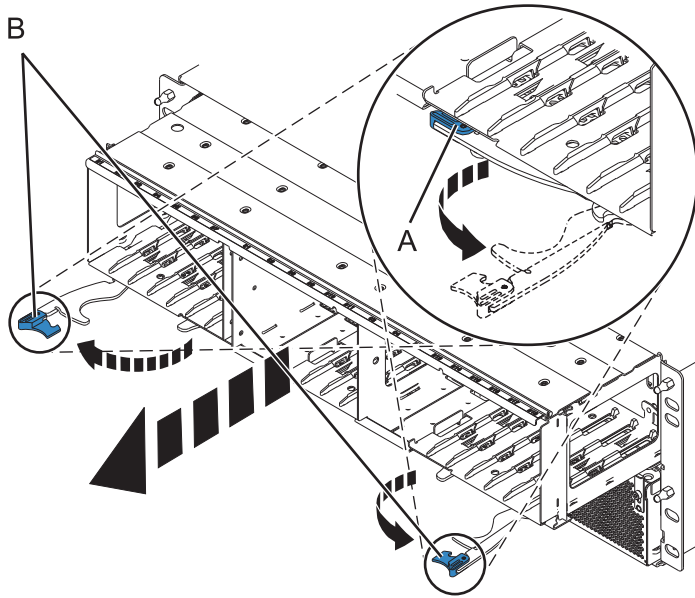
Figure 142. Removing the backplane from the enclosure

6. Disconnect both the offline converter assembly (OCA) power cords by performing the following steps:

   a. Slide the power cord holders **(A)** to the left, located on the front of both the OCAs.

   b. Label and disconnect both the OCA power cords **(B)** from each OCA.
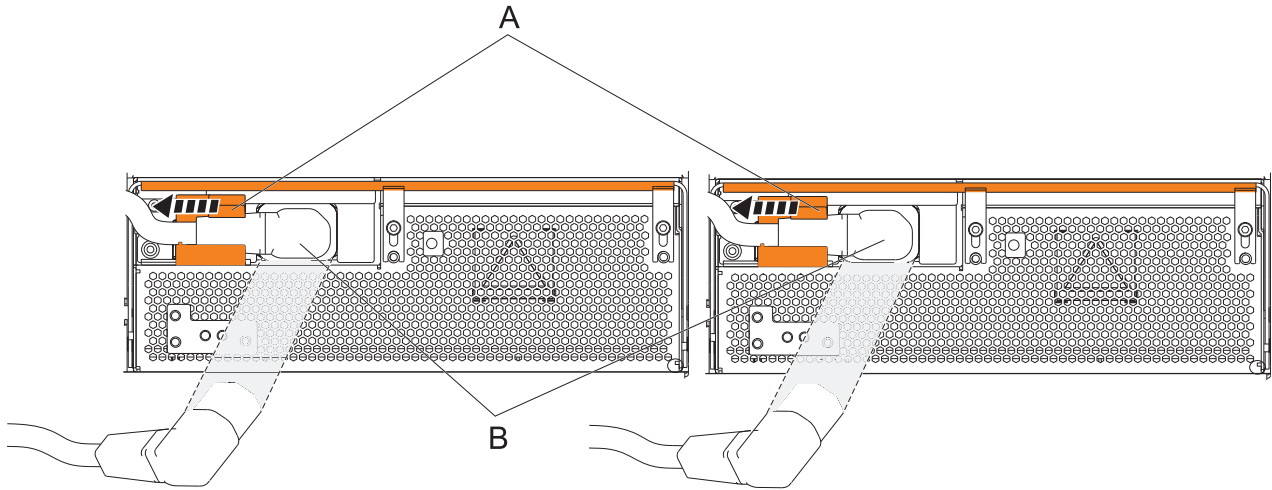
Figure 143. Disconnecting the OCA power cords

7. Remove the offline converter assemblies by performing the following steps:
   a. Pull the OCA handle **(A)** all the way down in the direction shown to unseat the OCA.
   b. Hold both sides of the OCA and pull it out of the enclosure.

   Note: Use both the hands to support the OCA as you pull it out of the enclosure.
   c. Repeat these steps to remove both OCAs.
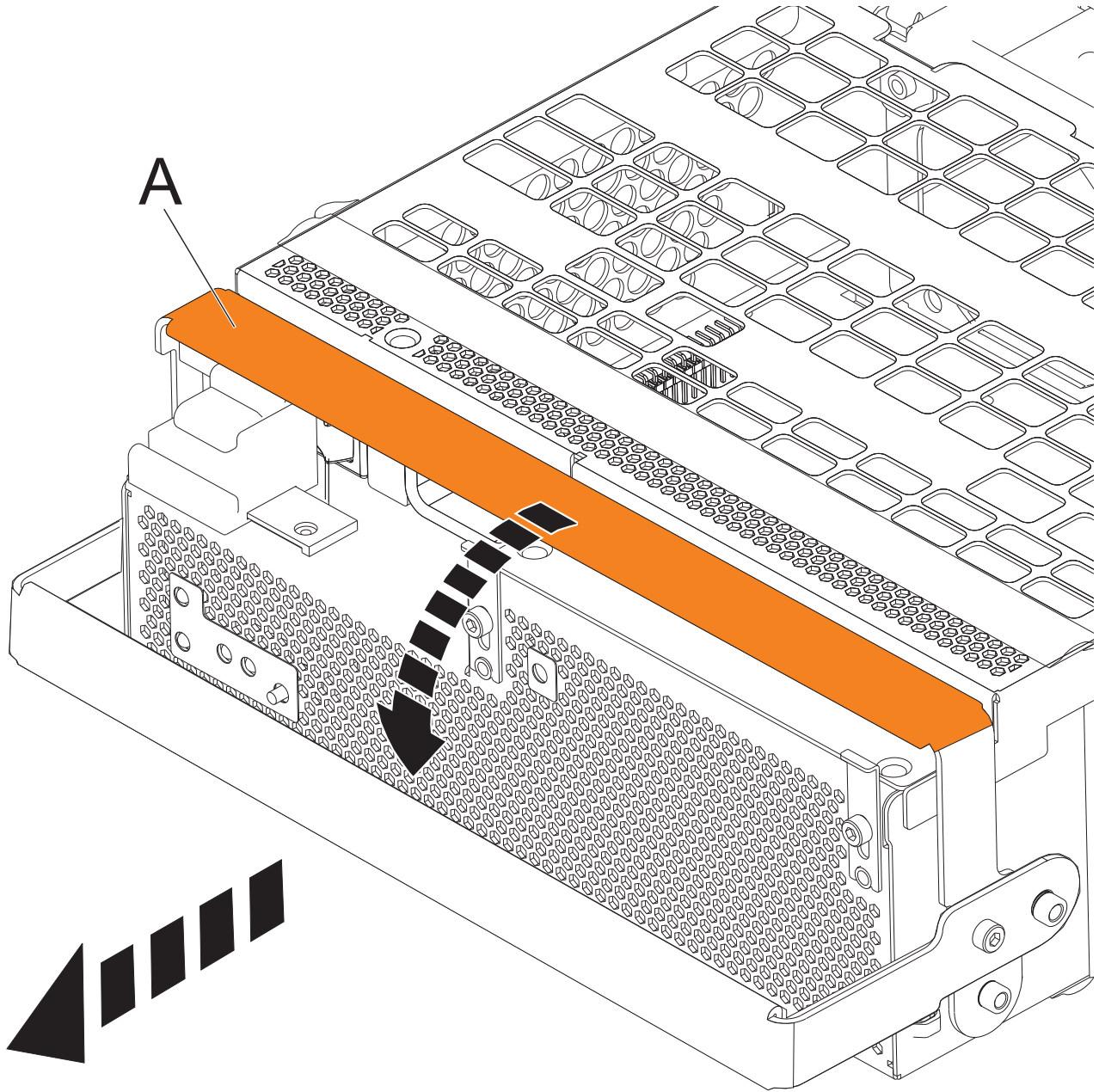
Figure 144. Remove the offline converter assemblies

8. Remove the enclosure management controller by performing 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.
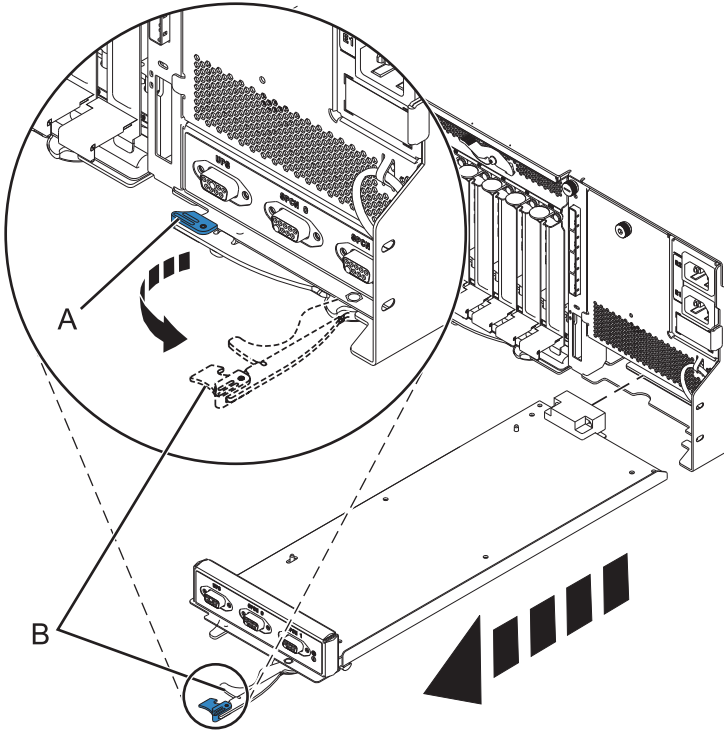
Figure 145. Remove the enclosure management controller

9. Remove the power cord plate by turning the thumbscrew **(A)** and pulling the plate away from the system, as shown in Figure 146.
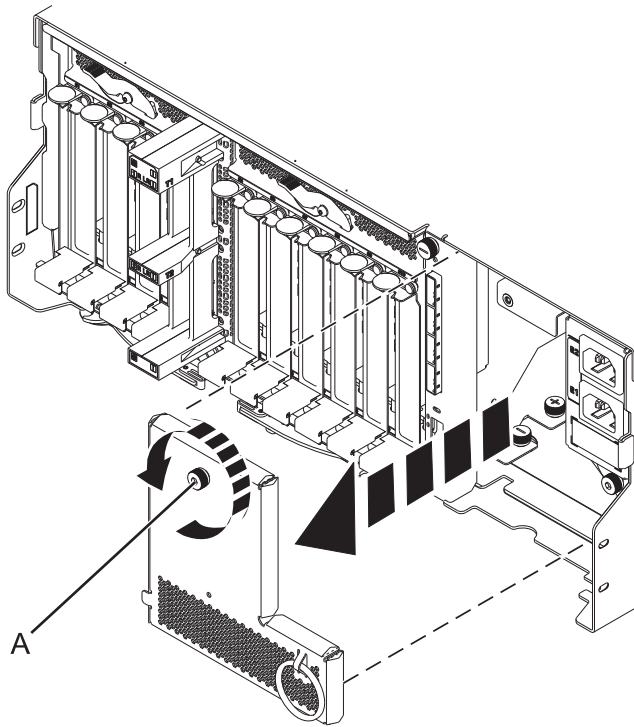
Figure 146. Removing the power cord plate

10. Disconnect the cables from the back of the I/O system board.

11. Squeeze the release latches **(A)** and pull the levers **(B)** out away from the system, as shown in Figure 147.
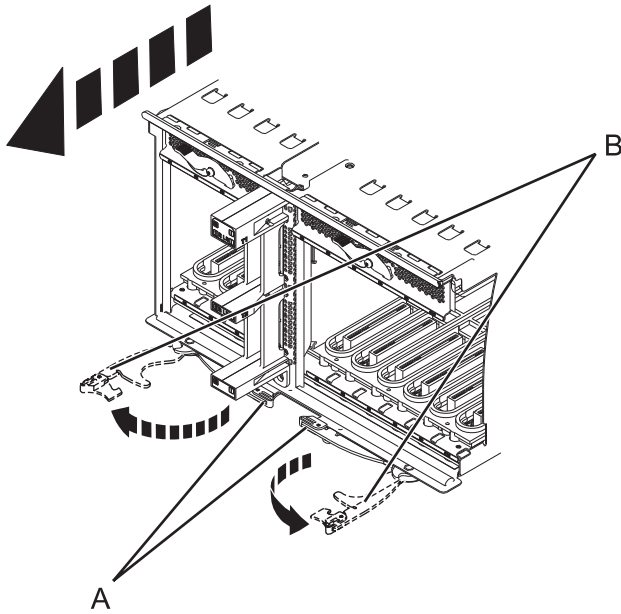
Figure 147. Removing the I/O system board

12. Slide the system board out of the system.
13. 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.
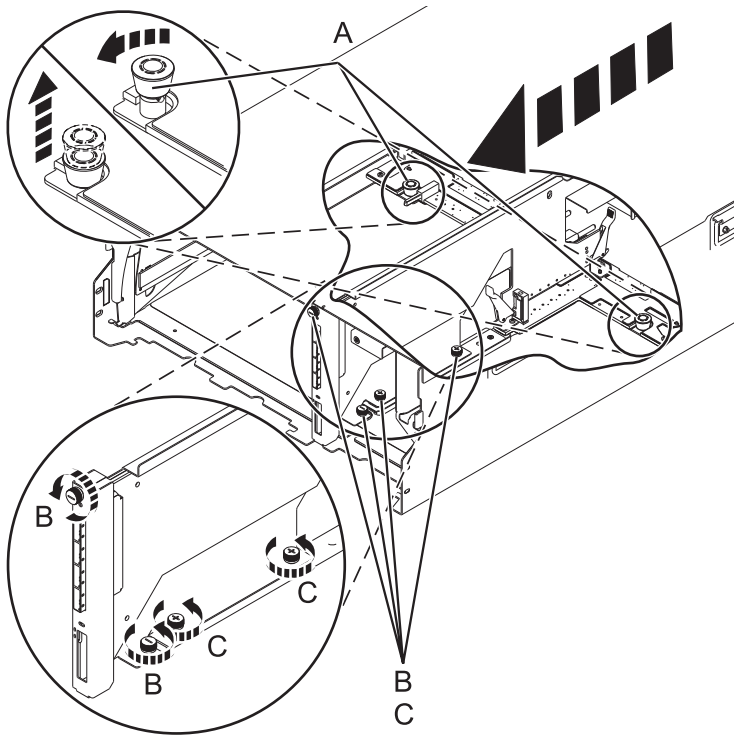
Figure 148. Removing the SAS conduit card and midplane

14. Push the handles **(A)** on the conduit card down to disengage the card from the midplane, and remove the card.
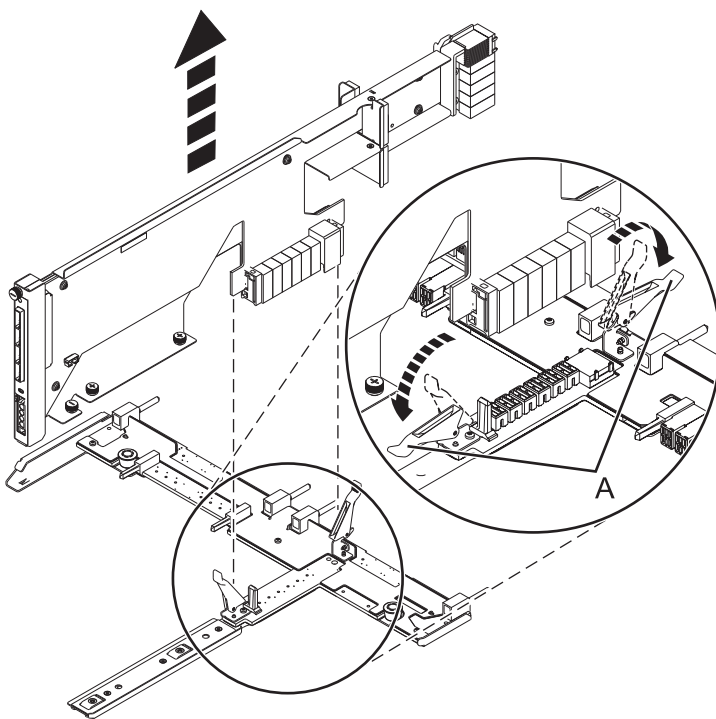
Figure 149. Removing the SAS conduit card from the midplane

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 177.

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

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.
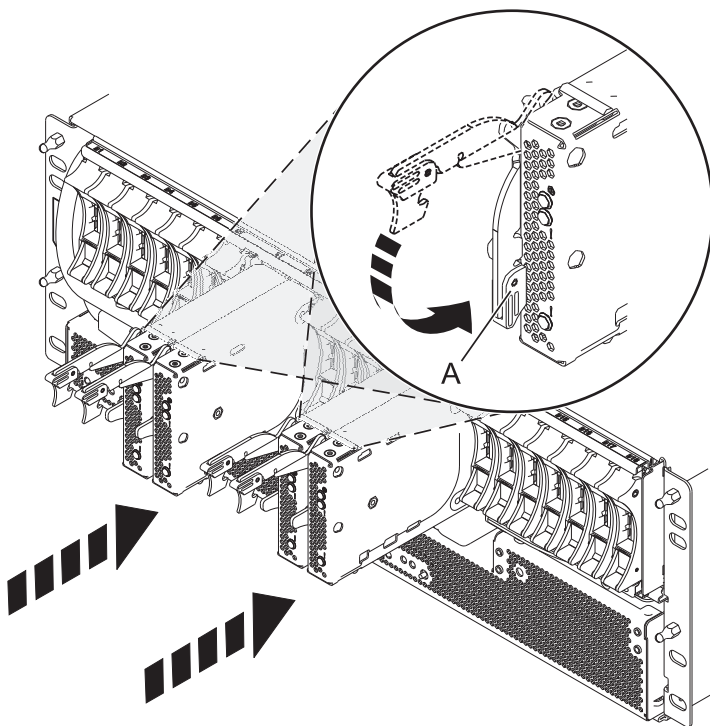
Figure 150. Installing the SAS expander card

3. Start the system. For instructions see, "Starting the system or logical partition" on page 183.
4. Verify the presence of the newly installed card. For instructions see, Verifying the installed part.

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.

1. Perform the prerequisite tasks as described in "Before you begin" on page 177.
2. Identify the card you are going to remove. For instructions see, "Identifying a part" on page 179.
3. Lift the handle **(A)** and pull the card out of the system, as shown in the following figure.
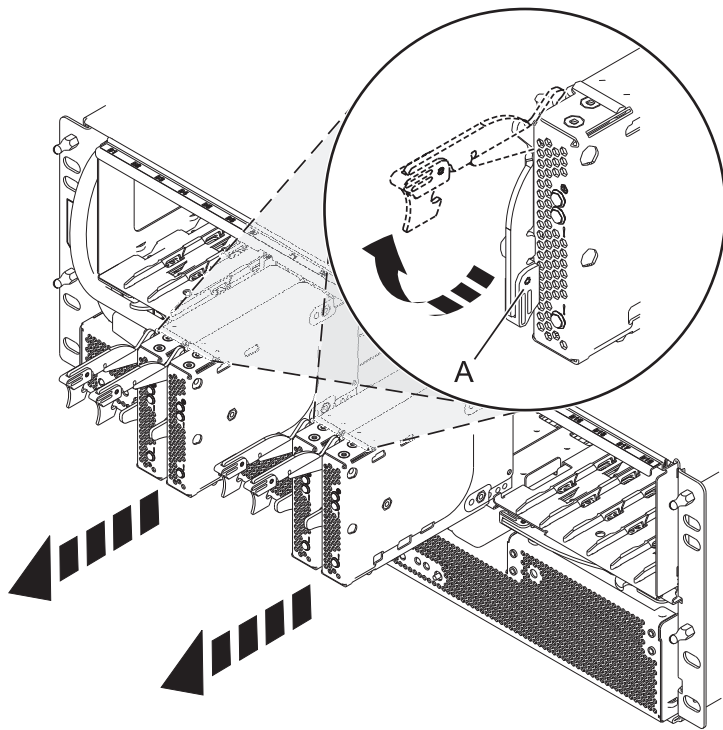
Figure 151. Removing the SAS expander card.

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 part

Use these instructions to learn how to identify the location of a failed part, the location of a part to be removed, or the location to install a new 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 the location of a part that you are removing, servicing, or installing.

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.

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 servers

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 servers

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 servers

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 an HMC or an SDMC

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 or an IBM Systems Director Management Console.

To start a system that is not managed by a Hardware Management Console (HMC) or Systems Director Management Console (SDMC), 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.
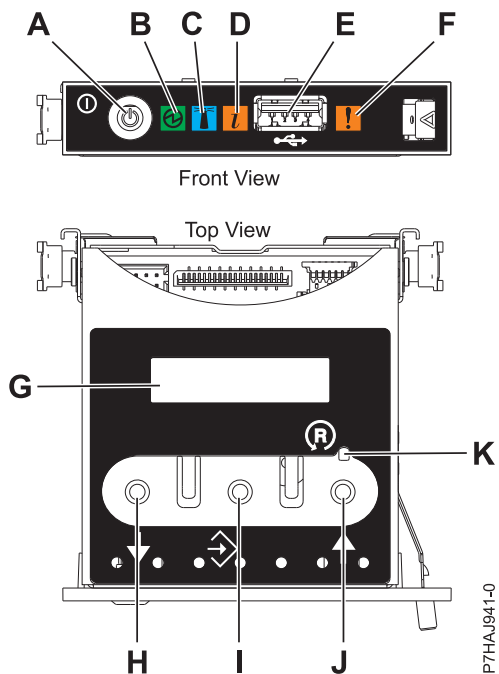
Figure 152. Control panel

- **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.

184   Disk drives

- 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 an HMC or an SDMC

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)
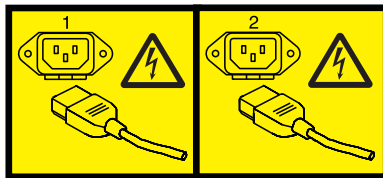
or
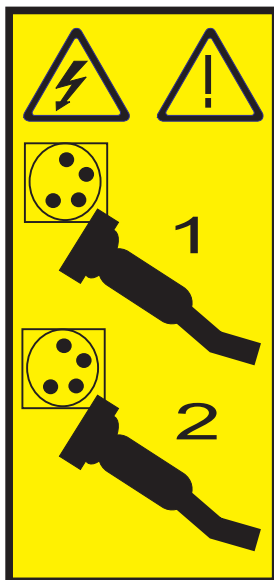
Stopping a system by using the Hardware Management Console

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.
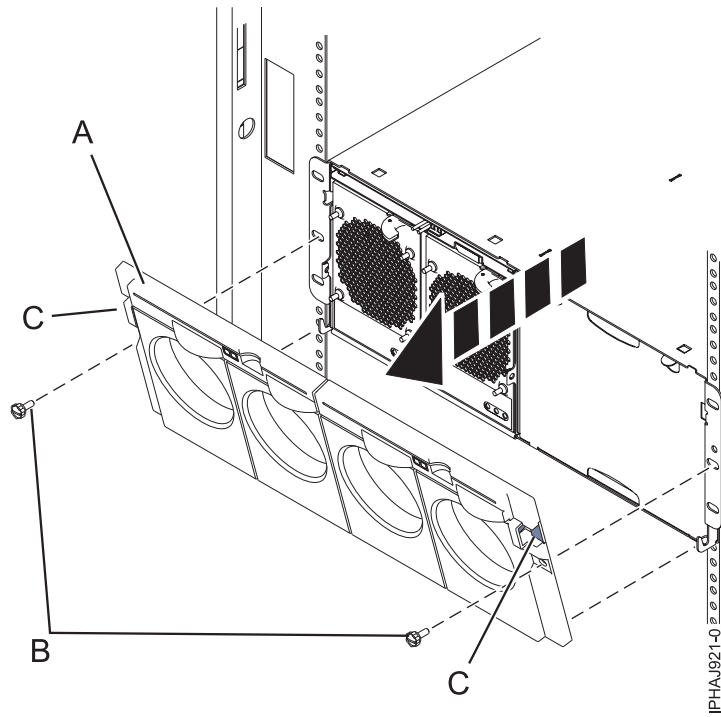
Figure 153. Remove the front cover for model 7314-G30 or 5796

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 154. 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.
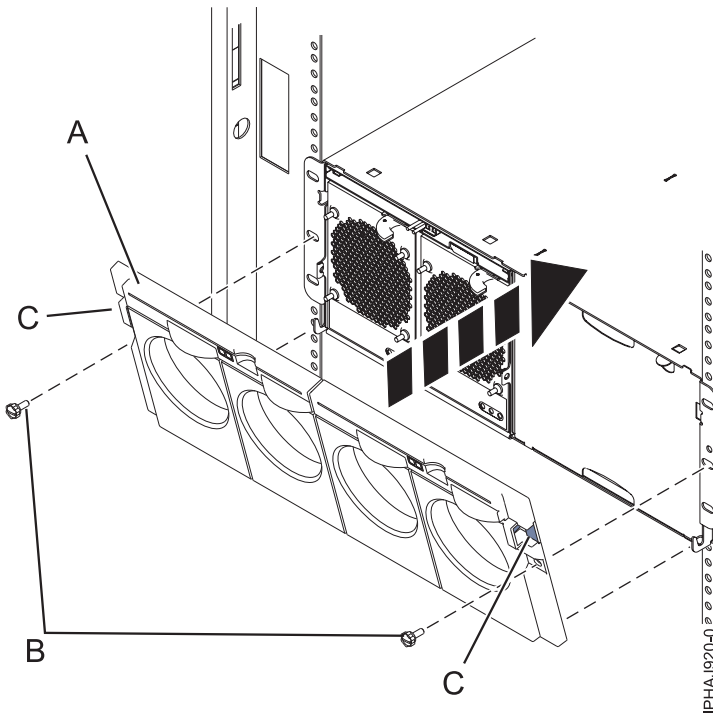4. Replace the two thumbscrews **(B)** into the slots on the left and right of the front cover.

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 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.
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.
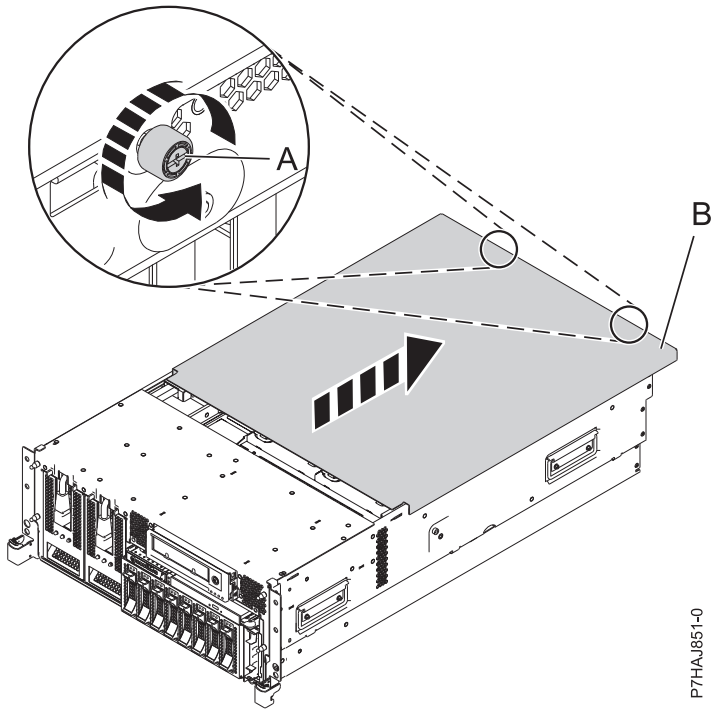
Figure 155. Removing the service access cover

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.
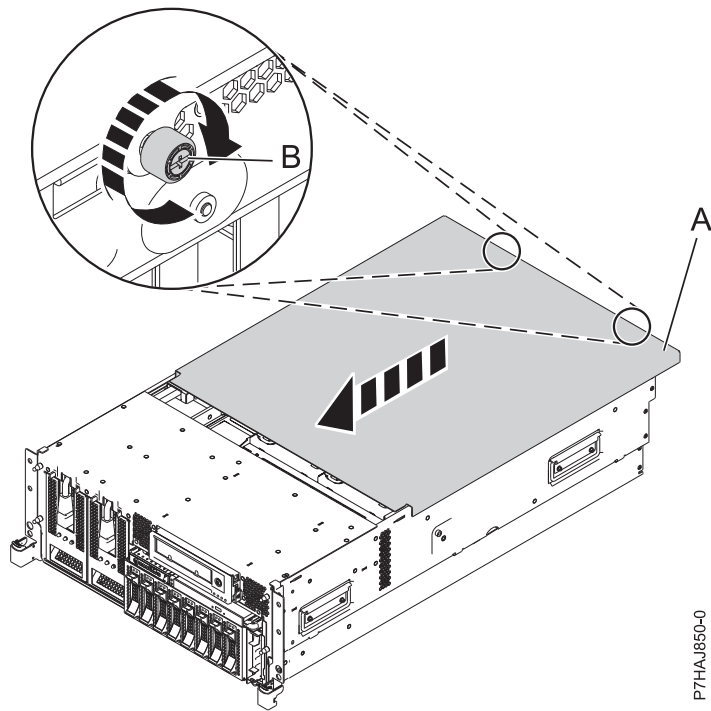
Figure 156. Installing the service access cover

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.
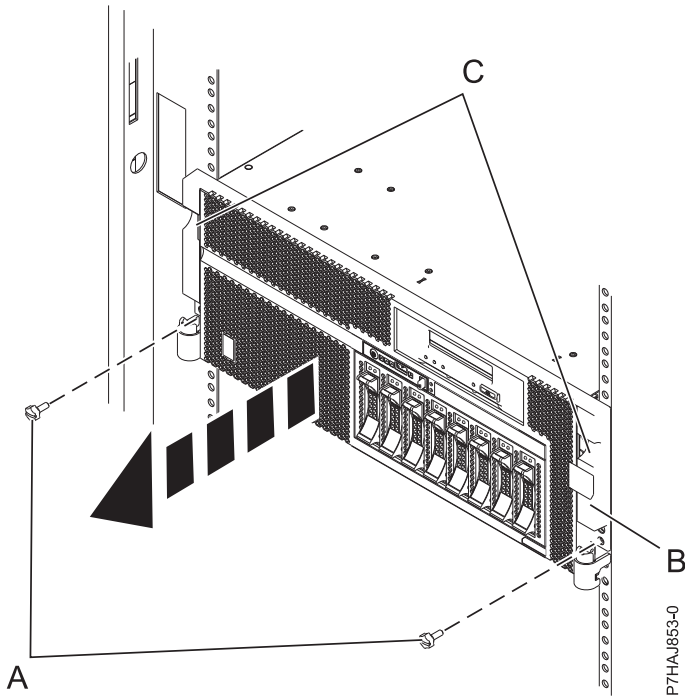
Figure 157. Removing the front cover

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)**.
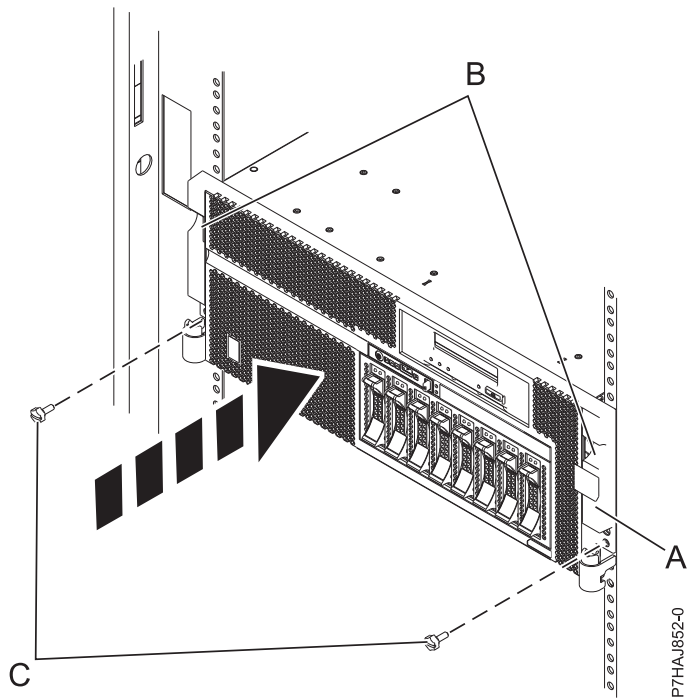
Figure 158. Installing the front cover

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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.

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Industry Canada Compliance Statement

This Class A digital apparatus complies with Canadian ICES-003.

Avis de conformité à la réglementation d'Industrie Canada

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European Community contact:
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Tele: +49 7032 15-2937
email: tjahn@de.ibm.com

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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

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在这种情况下,可能需要用户对其
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IBM Taiwan Contact Information:

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台北市松仁路7號3樓
電話：0800-016-888

Electromagnetic Interference (EMI) Statement - Korea

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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.
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Tel: 914-499-1900

Der verantwortliche Ansprechpartner des Herstellers in der EU ist:
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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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email: tjahn@de.ibm.com

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：
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

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Germany Compliance Statement

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

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email: tjahn@de.ibm.com

Generelle Informationen:

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

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