ESCALA Power7

Disk drives for the E1-700, E1-705, E3-700 or E3-705

ESCALA Power7

Disk drives for the E1-700, E1-705, E3-700 or E3-705

The ESCALA Power7 publications concern the following models:

- Bull Escala E5-700 (Power 750 / 8233-E8B)
- Bull Escala M6-700 (Power 770 / 9117-MMB)
- Bull Escala M6-705 (Power 770 / 9117-MMC)
- Bull Escala M7-700 (Power 780 / 9179-MHB)
- Bull Escala M7-705 (Power 780 / 9179-MHC)
- Bull Escala E1-700 (Power 710 / 8231-E2B)
- Bull Escala E1-705 (Power 710 / 8231-E1C)
- Bull Escala E2-700 / E2-700T (Power 720 / 8202-E4B)
- Bull Escala E2-705 / E2-705T (Power 720 / 8202-E4C)
- Bull Escala E3-700 (Power 730 / 8231-E2B)
- Bull Escala E3-705 (Power 730 / 8231-E2C)
- Bull Escala E4-700 / E4-700T (Power 740 / 8205-E6B)
- Bull Escala E4-705 (Power 740 / 8205-E6C)

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

Hardware

October 2011

Suggestions and criticisms concerning the form, content, and presentation of this book are invited. A form is provided at the end of this book for this purpose.

To order additional copies of this book or other Bull Technical Publications, you are invited to use the Ordering Form also provided at the end of this book.

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Contents

Safety notices

Safety notices may be printed throughout this guide:

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

World Trade safety information

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

German safety information

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

Laser safety information

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

Laser compliance

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

DANGER

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

Electrical voltage and current from power, telephone, and communication cables are hazardous. To avoid a shock hazard:
- **Connect power to this unit only with the IBM provided power cord. Do not use the IBM provided power cord for any other product.**
- **Do not open or service any power supply assembly.**
- **Do not connect or disconnect any cables or perform installation, maintenance, or reconfiguration of this product during an electrical storm.**
- **The product might be equipped with multiple power cords. To remove all hazardous voltages, disconnect all power cords.**
- **Connect all power cords to a properly wired and grounded electrical outlet. Ensure that the outlet supplies proper voltage and phase rotation according to the system rating plate.**
- **Connect any equipment that will be attached to this product to properly wired outlets.**
- **When possible, use one hand only to connect or disconnect signal cables.**
- **Never turn on any equipment when there is evidence of fire, water, or structural damage.**
- **Disconnect the attached power cords, telecommunications systems, networks, and modems before you open the device covers, unless instructed otherwise in the installation and configuration procedures.**
- **Connect and disconnect cables as described in the following procedures when installing, moving, or opening covers on this product or attached devices.**

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

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

  (D005)

DANGER

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

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

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

CAUTION

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

(R001)

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

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

(R002)

(L001)

(L002)

(L003)
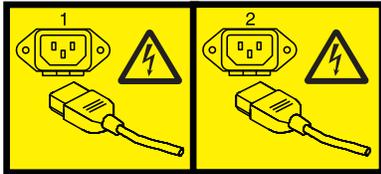
or

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

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

(C026)

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

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

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

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

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

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

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

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

The equipment is suitable for installation in the following:
- Network telecommunications facilities
- Locations where the NEC (National Electrical Code) applies

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

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

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

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

Disk drives

Learn about installing, removing, and replacing a disk drive for the 8231-E2B, 8231-E1C, or 8231-E2C.

What's new in Disk drives

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

October 2011

The following updates were made to the content:
- Added information for the 8231-E1C and 8231-E2C.

May 2011

The following updates were made to the content:
- Added information for installing a disk drive in the 5887 under the installing a disk drive section.
- Added information for Disk drive locations and concurrent maintenance lights for the 5887 disk drive enclosure unit.

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 in the 8231-E2B, 8231-E1C, or 8231-E2C

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.

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, adapter, and configuration details.

SSDs, 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.

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

Refer to the Solid-state drive rules for the IBM AIX®, IBM i, or Linux operating system for the server or partition where you want to install drives.

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 for the prerequisites, go to the website: IBM Prerequisite.

Table 1. Solid-state drive rules for the IBM AIX, IBM i, or Linux operating system

Machine type and model	Adapter	Mixing rules

5887	• FC 5805: PCIe 380 MB Cache Dual - x4 3Gb SAS RAID Adapter
	• FC 5901: PCIe Dual - x4 SAS Adapter
	• FC 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 serial-attached SCSI (SAS) ports are attached to SAS controllers, which can be a SAS Peripheral Component Interconnect-X (PCI-X) adapter, PCI Express (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.
		• The mixing of the Solid-state drives and hard disk drives (HDD) is as follows:
		  – SSDs and HDDs cannot be mixed in a logical group when configured as in mode 1.
		  – SSDs and HDDs can be mixed when configured as in mode 2: one set can be SSDs and the other set can be HDDs.
		  – SSDs and 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	• FC 5904: PCI-X DDR 1.5GB Cache SAS RAID Adapter • FC 5906 and FC 5908: PCI-X DDR 1.5 GB Cache SAS RAID Adapter (BSC) • FC 5903: PCIe 380 MB Cache Dual - x4 3 Gb SAS RAID Adapter	• SSDs and hard disk drives can be mixed in this drive enclosure. • A maximum of 24 drives are supported in this expansion unit. • SSDs and HDDs 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, 8231-E1C, or 8231-E2C	• FC 2053: 3 Gbps SAS RAID Controller with 4X SSD Sockets • FC 5278: SAS Controller	• SSD and HDD can never be mixed in the same RAID array or mirroring group. • SSDs and HDDs cannot split the disks. • SSDs and HDDs can be connected to the 5886 from the external SAS port.

Table 1. Solid-state drive rules for the IBM AIX, IBM i, or Linux operating system (continued)

Machine type and model	Adapter	Mixing rules
8202-E4B, 8202-E4C, 8205-E6B, or 8205-E6C	• FC 5631: Split disks Enablement adapter	• SSD and HDD can never be mixed in the same RAID array or mirroring group. • SSDs and HDDs can be connected to the 5886 from the external SAS port. • 5631 can be used to split disks
8233-E8B and 8236-E8C	• FC 5679: SAS RAID Enablement: internal adapter • FC 5904: PCI-X DDR 1.5GB Cache SAS RAID Adapter • FC 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, 9117-MMC, 9179-MHB, or 9179-MHC	• FC 5662: Disk/Media Backplane • FC 5662: 175 MB Cache RAID - Dual IOA Enablement Card • FC 5903: PCIe 380 MB Cache Dual - x4 3 Gb SAS RAID Adapter	• SSD and HDD cannot be mixed in the same RAID array or mirroring group. • SSD and HDD can be mixed in the system disk-drive backplane. **Remember:** You cannot mix SSD and HDD drive types within a parity set. If you are mixing SSD and HDD in a system, ensure that you have enough of each drive type to manage your protection scheme.

Table 1. Solid-state drive rules for the IBM AIX, IBM i, or Linux operating system (continued)

Machine type and model	Adapter	Mixing rules
5802	FC 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.

Installing a disk drive or solid-state drive in the 8231-E2B, 8231-E1C, or 8231-E2C with the AIX 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 power of the AIX operating system or logical partition that controls the disk drive location is turned on.

If you are servicing a failing part, see the service procedures for "Replacing a disk drive in the 8231-E2B, 8231-E1C, or 8231-E2C with the AIX system or logical partition power turned on" on page 61. 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, go to Fix Central to download it, and install it before continuing.

If you are installing solid-state drives (SSD), 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: This procedure is a complex set of steps that must be performed precisely as instructed to avoid potential data loss or system damage. Alternatively, you can use the procedure for installing a disk drive or solid-state drive with the power off, 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 in the 8231-E2B, 8231-E1C, or 8231-E2C with the system or logical partition power turned off" on page 31.

Attention:
- Attach a wrist strap to an unpainted metal 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 metal surface of the system for a minimum of 5 seconds.

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

Complete the following steps for preparing the system before installing a disk drive.

1. Perform prerequisite tasks. For instructions, see Before you begin.
2. If applicable, remove the system unit door, remove the expansion unit door, or open the rack.
3. Determine the next available disk drive position in your system or expansion unit. For information, see "Disk drive locations and service indicators for the 8231-E2B, 8231-E1C, or 8231-E2C system" on page 97.

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

Installing a disk drive in an 8231-E2B, 8231-E1C, or 8231-E2C

Complete the following steps to install a disk drive in the system or an expansion unit.

1. Use the service indicator light-emitting diodes (LEDs) to help identify the part. For information, see Identifying a part.
2. Use the location information that you recorded while removing the disk drives to install or replace the disk drive to the correct location.
3. Find the package that contains the new disk drive.
   Attention: Disk drives are fragile. Handle with care.
4. Remove the disk drive from the static-protective package. Record the serial number (use the last four digits) of the disk drive.
5. If the slot you want to use contains a disk drive filler, remove the disk drive filler from the slot. For instructions, see "Removing a disk drive filler from the 8231-E2B, 8231-E1C, or 8231-E2C system" on page 89.
6. If the disk drive you are installing does not have a bezel preinstalled, then perform the tasks to install a bezel on the disk drive, then continue with this procedure from step 8. For instructions to install a bezel, see "Installing a disk drive bezel in a disk drive or filler" on page 94.
7. If the disk drive you are installing has a bezel preinstalled, then go to step 8.
8. 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.
9. Hold the disk drive by the top and bottom edges as you position the drive, and insert it into the system or the 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 push the disk drive handle (A) in until it locks, as shown in Figure 1 on page 11. The service indicator on the disk drive turns on.

    Important: When installing a disk drive ensure that the disk drive is fully seated and is all the way into the system.

    Note: The light stops flashing and remains on when you have installed the disk drive properly.
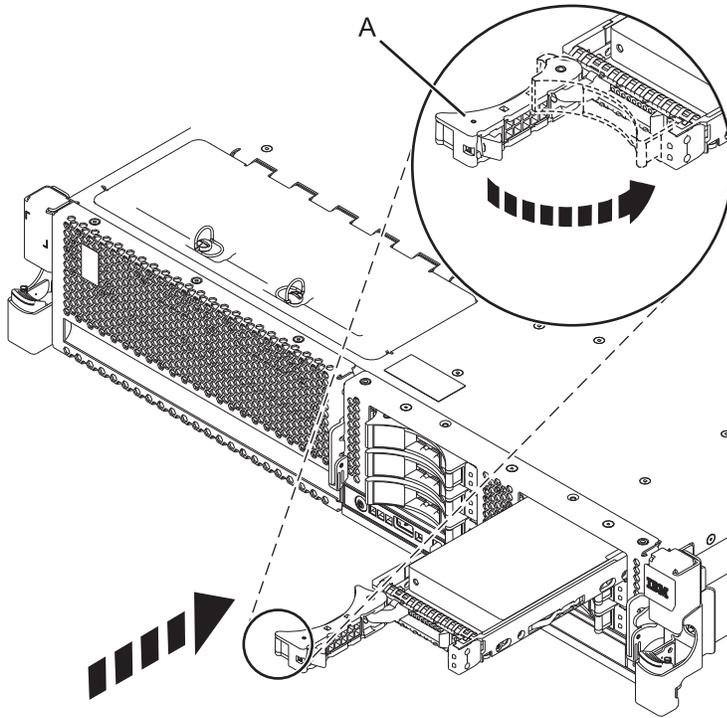
Figure 1. Installing the disk drive in the 8231-E2B, 8231-E1C, or 8231-E2C

11. If you are installing more than one disk drive, perform all the steps in this procedure until all disk drives are installed.

Installing a disk drive in the 5887 disk-drive expansion unit

Perform the following steps to install a disk drive in the 5887 disk-drive expansion unit.

1. With the handle in the unlocked position, see Figure 2 on page 12, 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.

   Important: When installing a disk drive ensure that the disk drive is fully seated and is all the way into the system.

3. Rotate the handle to the locked position.
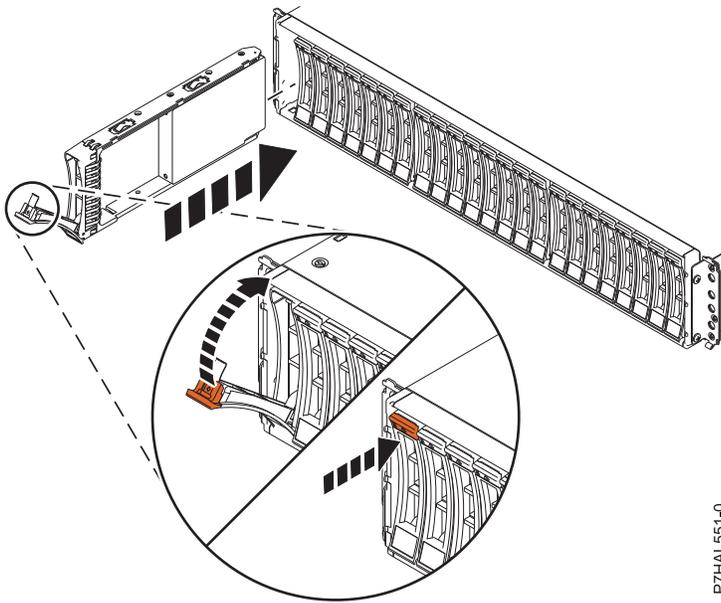
Figure 2. Installing the disk drive in the 5887 expansion unit

Completing the disk drive installation by using the HSM

Perform the following steps in the Hardware Service Manager (HSM):

1. Press Enter.
2. Exit to the command line.
3. If you are installing more than one disk drive, repeat this procedure until all disk drives are installed.
4. Cancel to get to the SCSI and SCSI RAID Hot Plug Manager menu.
5. Select **Configure Added/Replaced Devices**.

Completing the procedure

1. Verify the installed part:
   - If you replaced the part because of a failure, verify the installed part. For instructions, see Verifying a repair.
   - If you installed the part for any other reason, verify the installed part. For instructions, see Verifying the installed part.
2. To configure the newly installed disk drive, see the procedure for the operating system or logical partition that controls the disk drive:
   - Preparing a disk drive for use in an AIX system or logical partition.
   - Preparing a disk drive for use in a Linux system or logical partition
   - Configuring a disk drive in an IBM i system or logical partition.
3. To rebuild the data on the replacement disk drive, see the procedure for the operating system or logical partition that controls the disk drive:
   - Rebuilding data on a replacement drive using AIX.
   - Rebuilding data on a replacement drive using Linux.
   - Rebuilding data on a replacement drive using IBM i.

Installing a disk-drive or solid-state drive in the 8231-E2B, 8231-E1C, or 8231-E2C 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 power to the Linux operating system or logical partition that controls the disk drive location is turned on. This procedure uses the Linux kernel 2.6.

Attention: If you are servicing a failing part, see the service procedures for "Replacing a disk drive using Linux kernel 2.6, with the Linux 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, go to Fix Central to download it, and install it before continuing.

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

Attention: This procedure is a complex set of steps that must be performed precisely as instructed to avoid potential data loss or system damage. Alternatively, you can use the procedure for installing a disk drive or solid-state drive with the power off, 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 in the 8231-E2B, 8231-E1C, or 8231-E2C with the system or logical partition power turned off" on page 31.

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

Complete the following steps for preparing the system before installing a disk drive.

1. Perform prerequisite tasks. For instructions, see Before you begin.

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

3. Determine the next available disk drive position in your system or expansion unit. For information, see "Disk drive locations and service indicators for the 8231-E2B, 8231-E1C, or 8231-E2C system" on page 97.

   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.

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

Preparing to install a disk drive by using the HSM

Perform the following steps to install a disk drive by using the Hardware Service Manager (HSM):

1. Log in as root user.
2. Type `lsslot` on the command line of the Linux session and then 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 3. 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
```
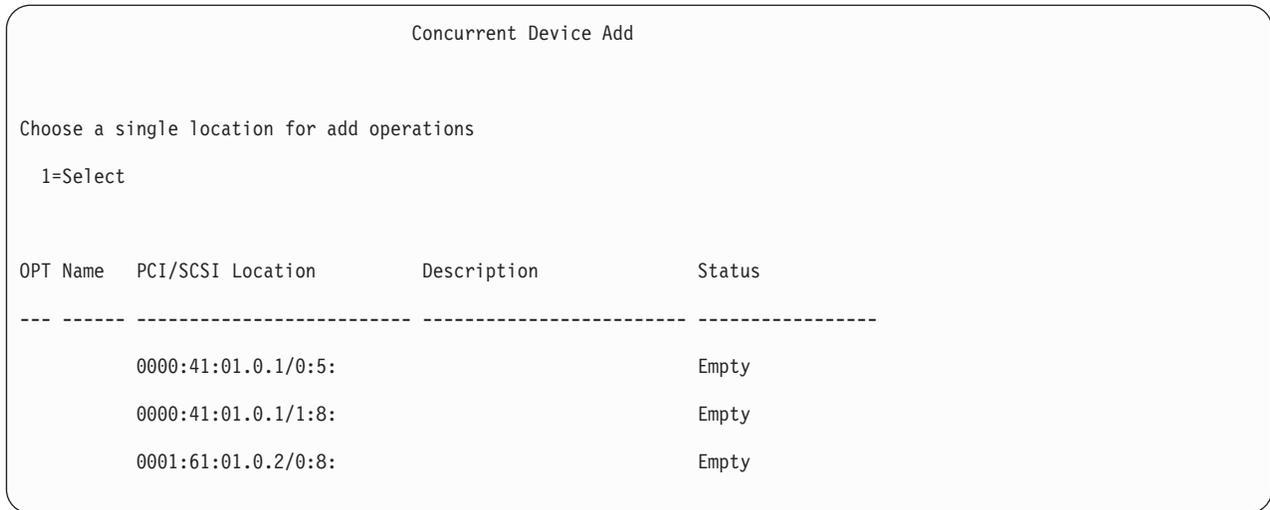
Figure 4. Example Concurrent Device Remove display

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 service indicator indicates the slot where the disk drive can be installed.

Installing a disk drive in an 8231-E2B, 8231-E1C, or 8231-E2C

Complete the following steps to install a disk drive in the system or an expansion unit.

1. Use the service indicator light-emitting diodes (LEDs) to help identify the part. For information, see Identifying a part.
2. Use the location information that you recorded while removing the disk drives to install or replace the disk drive to the correct location.
3. Find the package that contains the new disk drive.

   Attention: Disk drives are fragile. Handle with care.
4. Remove the disk drive from the static-protective package. Record the serial number (use the last four digits) of the disk drive.
5. If the slot you want to use contains a disk drive filler, remove the disk drive filler from the slot. For instructions, see "Removing a disk drive filler from the 8231-E2B, 8231-E1C, or 8231-E2C system" on page 89.
6. If the disk drive you are installing does not have a bezel preinstalled, then perform the tasks to install a bezel on the disk drive, then continue with this procedure from step 8. For instructions to install a bezel, see "Installing a disk drive bezel in a disk drive or filler" on page 94.
7. If the disk drive you are installing has a bezel preinstalled, then go to step 8.
8. 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.
9. Hold the disk drive by the top and bottom edges as you position the drive, and insert it into the system or the 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 push the disk drive handle **(A)** in until it locks, as shown in Figure 5 on page 17. The service indicator on the disk drive turns on.

    Important: When installing a disk drive ensure that the disk drive is fully seated and is all the way into the system.

    Note: The light stops flashing and remains on when you have installed the disk drive properly.
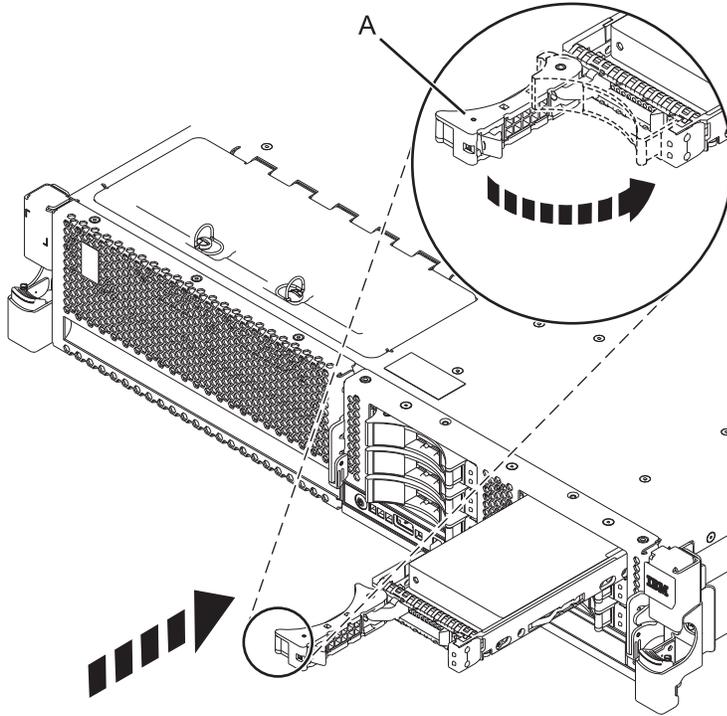
Figure 5. Installing the disk drive in the 8231-E2B, 8231-E1C, or 8231-E2C

11. If you are installing more than one disk drive, perform all the steps in this procedure until all disk drives are installed.

Installing a disk drive in the 5887 disk-drive expansion unit

Perform the following steps to install a disk drive in the 5887 disk-drive expansion unit.

1. With the handle in the unlocked position, see Figure 6 on page 18, 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.

   Important: When installing a disk drive ensure that the disk drive is fully seated and is all the way into the system.

3. Rotate the handle to the locked position.
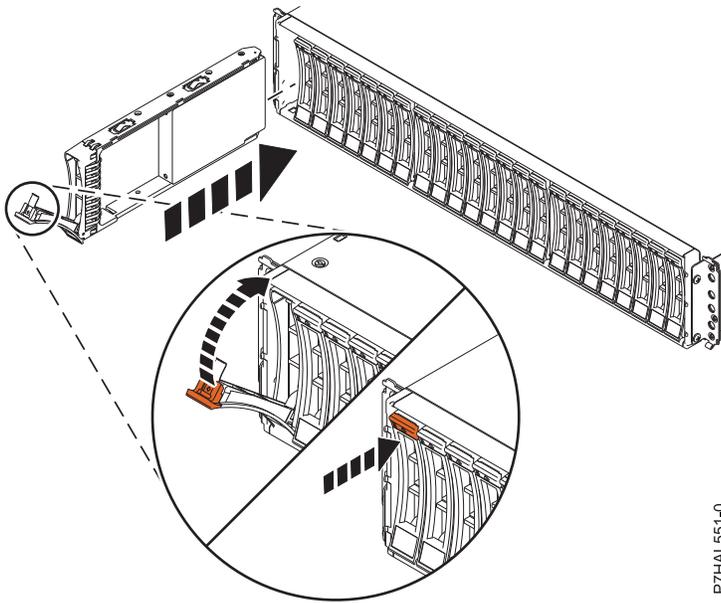
Figure 6. Installing the disk drive in the 5887 expansion unit

Verifying that the new disk drive is operational

Do the following to confirm if you have installed the disk drive correctly:

- Press Enter on the Verify Device Concurrent Add display to verify the location.
- Press Enter. The service indicator stops flashing and remains on when you have installed the disk drive correctly.

Perform the following steps to verify that the new disk drive is operational:

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 7. Example Display Hardware Status

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

Completing the procedure

1. Verify the installed part:
   - If you replaced the part because of a failure, verify the installed part. For instructions, see Verifying a repair.
   - If you installed the part for any other reason, verify the installed part. For instructions, see Verifying the installed part.
2. To configure the newly installed disk drive, see the procedure for the operating system or logical partition that controls the disk drive:
   - Preparing a disk drive for use in an AIX system or logical partition.
   - Preparing a disk drive for use in a Linux system or logical partition
   - Configuring a disk drive in an IBM i system or logical partition.
3. To rebuild the data on the replacement disk drive, see the procedure for the operating system or logical partition that controls the disk drive:

- Rebuilding data on a replacement drive using AIX.
- Rebuilding data on a replacement drive using Linux.
- Rebuilding data on a replacement drive using IBM i.

Installing a disk-drive or solid-state drive in the 8231-E2B, 8231-E1C, or 8231-E2C 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 power to the Virtual I/O Server operating system or logical partition that controls the disk-drive location is turned on.

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, go to Fix Central to download it, and install it before continuing.

Attention: This procedure is a complex set of steps that must be performed precisely as instructed to avoid potential data loss or system damage. Alternatively, you can use the procedure for installing a disk drive or solid-state drive with the power off, 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 in the 8231-E2B, 8231-E1C, or 8231-E2C with the system or logical partition power turned off" on page 31.

DANGER

> **When working on or around the system, observe the following precautions:**
>
> **Electrical voltage and current from power, telephone, and communication cables are hazardous. To avoid a shock hazard:**
> - **Connect power to this unit only with the IBM provided power cord. Do not use the IBM provided power cord for any other product.**
> - **Do not open or service any power supply assembly.**
> - **Do not connect or disconnect any cables or perform installation, maintenance, or reconfiguration of this product during an electrical storm.**
> - **The product might be equipped with multiple power cords. To remove all hazardous voltages, disconnect all power cords.**
> - **Connect all power cords to a properly wired and grounded electrical outlet. Ensure that the outlet supplies proper voltage and phase rotation according to the system rating plate.**
> - **Connect any equipment that will be attached to this product to properly wired outlets.**
> - **When possible, use one hand only to connect or disconnect signal cables.**
> - **Never turn on any equipment when there is evidence of fire, water, or structural damage.**
> - **Disconnect the attached power cords, telecommunications systems, networks, and modems before you open the device covers, unless instructed otherwise in the installation and configuration procedures.**
> - **Connect and disconnect cables as described in the following procedures when installing, moving, or opening covers on this product or attached devices.**
>
> **To Disconnect:**
> 1. **Turn off everything (unless instructed otherwise).**
> 2. **Remove the power cords from the outlets.**
> 3. **Remove the signal cables from the connectors.**
> 4. **Remove all cables from the devices**
>
> **To Connect:**
> 1. **Turn off everything (unless instructed otherwise).**
> 2. **Attach all cables to the devices.**
> 3. **Attach the signal cables to the connectors.**
> 4. **Attach the power cords to the outlets.**
> 5. **Turn on the devices.**
>
> **(D005)**

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

Preparing the system

Complete the following steps for preparing the system before installing a disk drive.

1. Perform prerequisite tasks. For instructions, see Before you begin.

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

3. Determine the next available disk drive position in your system or expansion unit. For information, see "Disk drive locations and service indicators for the 8231-E2B, 8231-E1C, or 8231-E2C system" on page 97.

   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.

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

Preparing to install a disk drive by using the HSM

Complete the following steps by using the Hardware Service Manager (HSM) before installing a 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.
9. Do not press Enter yet, first complete installing the disk drive.

   Important: When you press Enter, after a one minute delay, the disk drive slot enters the Identify state and the service indicator 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. You can then press Enter on the console.

Installing a disk drive in an 8231-E2B, 8231-E1C, or 8231-E2C

Complete the following steps to install a disk drive in the system or an expansion unit.

1. Use the service indicator light-emitting diodes (LEDs) to help identify the part. For information, see Identifying a part.
2. Use the location information that you recorded while removing the disk drives to install or replace the disk drive to the correct location.
3. Find the package that contains the new disk drive.

   Attention: Disk drives are fragile. Handle with care.
4. Remove the disk drive from the static-protective package. Record the serial number (use the last four digits) of the disk drive.
5. If the slot you want to use contains a disk drive filler, remove the disk drive filler from the slot. For instructions, see "Removing a disk drive filler from the 8231-E2B, 8231-E1C, or 8231-E2C system" on page 89.
6. If the disk drive you are installing does not have a bezel preinstalled, then perform the tasks to install a bezel on the disk drive, then continue with this procedure from step 8. For instructions to install a bezel, see "Installing a disk drive bezel in a disk drive or filler" on page 94.
7. If the disk drive you are installing has a bezel preinstalled, then go to step 8.
8. 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.
9. Hold the disk drive by the top and bottom edges as you position the drive, and insert it into the system or the 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 push the disk drive handle **(A)** in until it locks, as shown in Figure 8 on page 23. The service indicator on the disk drive turns on.

    Important: When installing a disk drive ensure that the disk drive is fully seated and is all the way into the system.

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

Figure 8. Installing the disk drive in the 8231-E2B, 8231-E1C, or 8231-E2C

11. If you are installing more than one disk drive, perform all the steps in this procedure until all disk drives are installed.

Installing a disk drive in the 5887 disk-drive expansion unit

Perform the following steps to install a disk drive in the 5887 disk-drive expansion unit.

1. With the handle in the unlocked position, see Figure 9 on page 24, 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.

   Important: When installing a disk drive ensure that the disk drive is fully seated and is all the way into the system.

3. Rotate the handle to the locked position.

Figure 9. Installing the disk drive in the 5887 expansion unit

Completing the disk drive installation by using the HSM

Perform the following steps in the Hardware Service Manager (HSM) after you have installed the disk drive:

1. Cancel to get to the SCSI and SCSI RAID Hot Plug Manager menu.
2. Select **Configure Added/Replaced Devices**.
3. Exit to the command line.

Completing the procedure

1. Verify the installed part:
   - If you replaced the part because of a failure, verify the installed part. For instructions, see Verifying a repair.
   - If you installed the part for any other reason, verify the installed part. For instructions, see Verifying the installed part.
2. To configure the newly installed disk drive, see the procedure for the operating system or logical partition that controls the disk drive:
   - Preparing a disk drive for use in an AIX system or logical partition.
   - Preparing a disk drive for use in a Linux system or logical partition
   - Configuring a disk drive in an IBM i system or logical partition.
3. To rebuild the data on the replacement disk drive, see the procedure for the operating system or logical partition that controls the disk drive:
   - Rebuilding data on a replacement drive using AIX.
   - Rebuilding data on a replacement drive using Linux.
   - Rebuilding data on a replacement drive using IBM i.

Installing a disk drive or solid-state drive in the 8231-E2B, 8231-E1C, or 8231-E2C 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 power to the IBM i operating system or logical partition that controls the disk drive location is turned on.

If you are servicing a failing part, see the service procedures for "Replacing a disk drive in the 8231-E2B, 8231-E1C, or 8231-E2C with the IBM i system or logical partition power turned on" on page 69. This procedure is intended for installing a new or upgraded disk drive.

Attention: This procedure is a complex set of steps that must be performed precisely as instructed to avoid potential data loss or system damage. Alternatively, you can use the procedure for installing a disk drive or solid-state drive with the power off, 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 in the 8231-E2B, 8231-E1C, or 8231-E2C with the system or logical partition power turned off" on page 31.

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, go to Fix Central to download it, and install it before continuing.

If you are installing solid-state drives (SSD), 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)

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

Complete the following steps for preparing the system before installing a disk drive.

1. Perform prerequisite tasks. For instructions, see Before you begin.
2. If applicable, remove the system unit door, remove the expansion unit door, or open the rack.
3. Determine the next available disk drive position in your system or expansion unit. For information, see "Disk drive locations and service indicators for the 8231-E2B, 8231-E1C, or 8231-E2C system" on page 97.

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

Preparing to install a disk drive by using the HSM

Perform the following steps to install a disk drive by using the Hardware Service Manager (HSM):

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

   a. 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.

   b. 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 service indicators" on page 97.

   c. 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 Figure 10.
   In the example, U5074.001.AAAXXXX-DB3-D32, you would install a disk drive in the expansion unit

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

Figure 10. Example of a system or expansion unit label

   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, do not remove the disk drive filler yet.

8. Select **Device Concurrent Maintenance** from the Hardware Service Manager display, and then 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
```
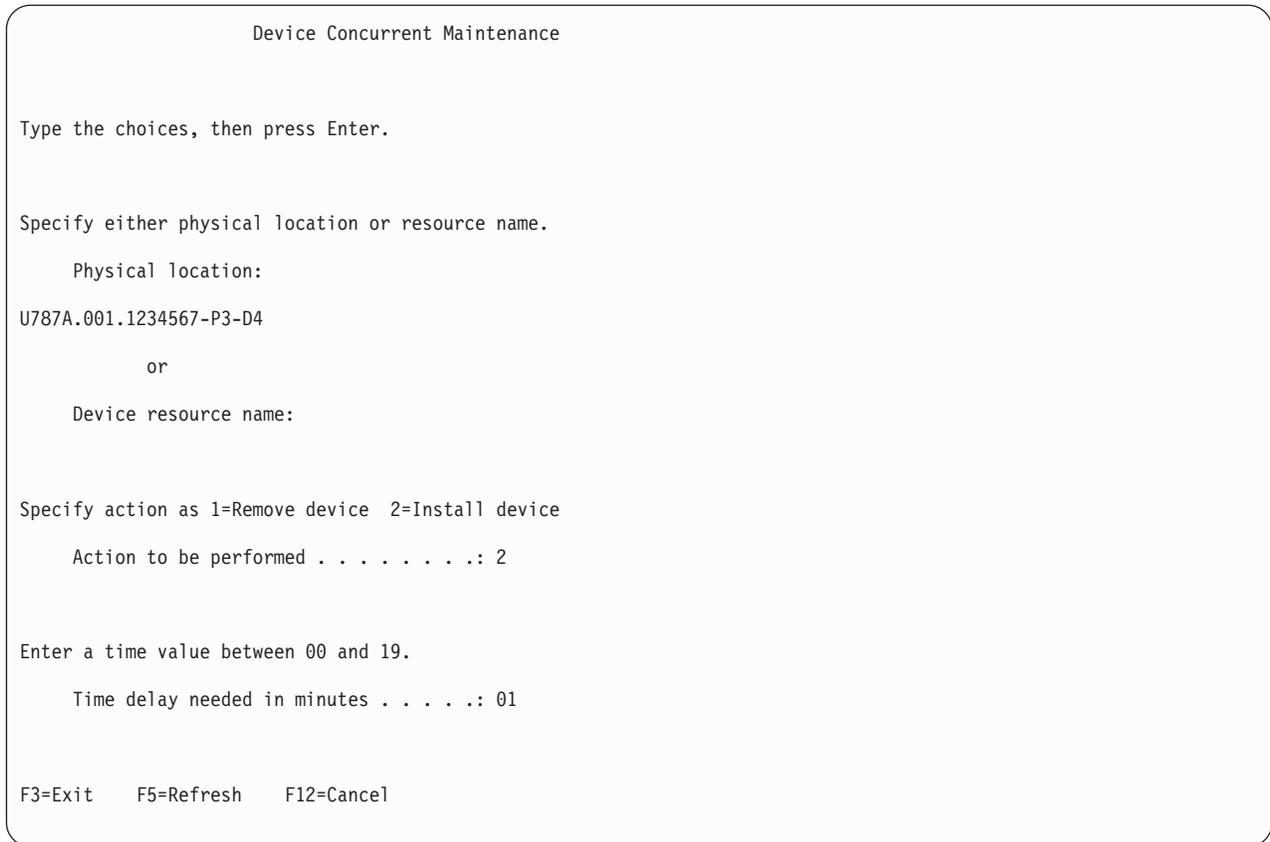
Figure 11. Example Device Concurrent Maintenance display

9. In the **Specify either physical location or resource name** field, type the physical location that you had previously recorded in this procedure.
10. Select option **2** (Install device) for the Action to be performed.
11. Set the time delay for one minute - 01.
12. Do not press Enter yet, first complete installing the disk drive.

   Important: When you press Enter, after a one minute delay, the disk drive slot enters the Identify state and the service indicator 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. You can then press Enter on the console.

Installing a disk drive in an 8231-E2B, 8231-E1C, or 8231-E2C

Complete the following steps to install a disk drive in the system or an expansion unit.
1. Use the service indicator light-emitting diodes (LEDs) to help identify the part. For information, see Identifying a part.
2. Use the location information that you recorded while removing the disk drives to install or replace the disk drive to the correct location.
3. Find the package that contains the new disk drive.
   Attention: Disk drives are fragile. Handle with care.
4. Remove the disk drive from the static-protective package. Record the serial number (use the last four digits) of the disk drive.
5. If the slot you want to use contains a disk drive filler, remove the disk drive filler from the slot. For instructions, see "Removing a disk drive filler from the 8231-E2B, 8231-E1C, or 8231-E2C system" on page 89.

6. If the disk drive you are installing does not have a bezel preinstalled, then perform the tasks to install a bezel on the disk drive, then continue with this procedure from step 8. For instructions to install a bezel, see "Installing a disk drive bezel in a disk drive or filler" on page 94.

7. If the disk drive you are installing has a bezel preinstalled, then go to step 8.

8. 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.

9. Hold the disk drive by the top and bottom edges as you position the drive, and insert it into the system or the 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 push the disk drive handle **(A)** in until it locks, as shown in Figure 12. The service indicator on the disk drive turns on.

   Important: When installing a disk drive ensure that the disk drive is fully seated and is all the way into the system.

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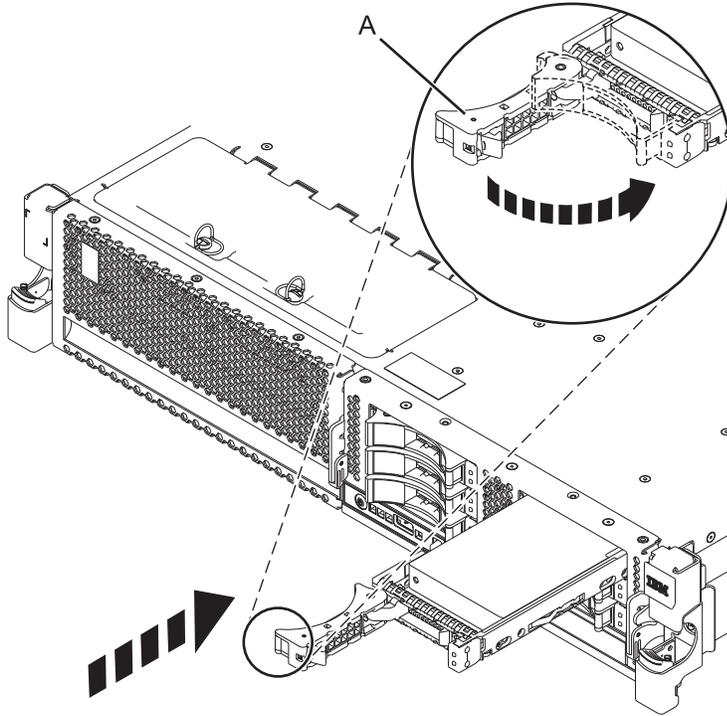

Figure 12. Installing the disk drive in the 8231-E2B, 8231-E1C, or 8231-E2C

11. If you are installing more than one disk drive, perform all the steps in this procedure until all disk drives are installed.
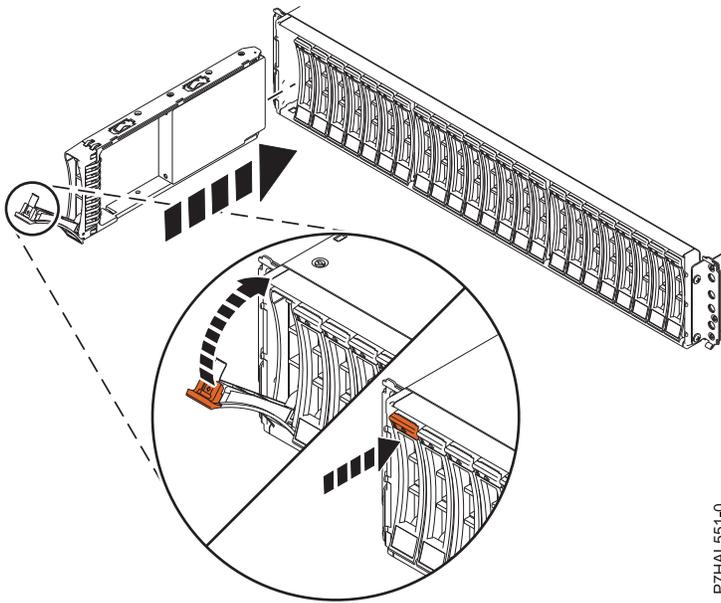
Installing a disk drive in the 5887 disk-drive expansion unit

Perform the following steps to install a disk drive in the 5887 disk-drive expansion unit.

1. With the handle in the unlocked position, see Figure 13 on page 30, 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.

Important: When installing a disk drive ensure that the disk drive is fully seated and is all the way into the system.

3. Rotate the handle to the locked position.
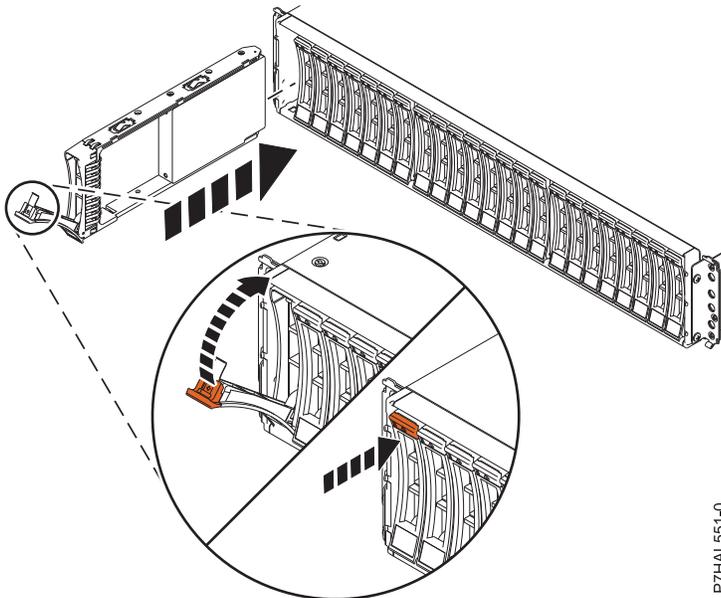
Figure 13. Installing the disk drive in the 5887 expansion unit

Completing the disk drive installation by using the HSM

1. Return to the console and wait until the Concurrent Maintenance Results display is shown, then press Enter.
2. When the Hardware Service Manager display is shown, press F12 twice and then press Enter.

Completing the procedure

1. Verify the installed part:
   - If you replaced the part because of a failure, verify the installed part. For instructions, see Verifying a repair.
   - If you installed the part for any other reason, verify the installed part. For instructions, see Verifying the installed part.
2. To configure the newly installed disk drive, see the procedure for the operating system or logical partition that controls the disk drive:
   - Preparing a disk drive for use in an AIX system or logical partition.
   - Preparing a disk drive for use in a Linux system or logical partition
   - Configuring a disk drive in an IBM i system or logical partition.
3. To rebuild the data on the replacement disk drive, see the procedure for the operating system or logical partition that controls the disk drive:
   - Rebuilding data on a replacement drive using AIX.
   - Rebuilding data on a replacement drive using Linux.
   - Rebuilding data on a replacement drive using IBM i.

Installing a disk drive or solid-state drive in the 8231-E2B, 8231-E1C, or 8231-E2C 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.

If you are servicing a failing part, see the service procedures for "Replacing a disk drive in the 8231-E2B, 8231-E1C, or 8231-E2C with the system or logical partition power turned off" on page 77. 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, go to Fix Central to download it, and install it before continuing.

If you are installing solid-state drives (SSD), 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

Complete the following steps for preparing the system before installing a disk drive.

1. Perform prerequisite tasks. For instructions, see Before you begin.

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

3. Determine the next available disk drive position in your system or expansion unit. For information, see "Disk drive locations and service indicators for the 8231-E2B, 8231-E1C, or 8231-E2C system" on page 97.

   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.

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

5. Stop the system. For instructions, see Stopping the system or logical partition.

6. Place the system into the service position. For instructions, see Placing a rack-mounted 8231-E2B, 8231-E1C, or 8231-E2C system into the service position.
7. Remove the service access cover. For instructions, see Removing the service access cover from a rack-mounted 8231-E2B, 8231-E1C, or 8231-E2C system.
8. Disconnect the power source from the system by unplugging the system. For instructions, see Disconnecting the power cords.

   Note: This system can be equipped with a second power supply. Disconnect it before continuing with this procedure. Ensure that the power source to the system has been disconnected.
   (L003)
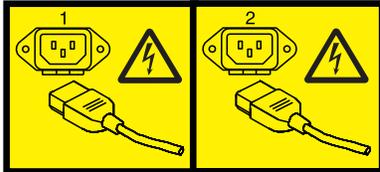
   or

9. Attach the wrist strap.
   Attention:
   - Attach a wrist strap to an unpainted metal 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 metal surface of the system for a minimum of 5 seconds.

Installing a disk drive in an 8231-E2B, 8231-E1C, or 8231-E2C

Complete the following steps to install a disk drive in the system or an expansion unit.
1. Use the service indicator light-emitting diodes (LEDs) to help identify the part. For information, see Identifying a part.

2. Use the location information that you recorded while removing the disk drives to install or replace the internal disk drives to the correct locations.

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

   Attention: Disk drives are fragile. Handle with care.

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

5. If the slot you want to use contains a disk drive filler, remove the disk drive filler from the slot. For instructions, see "Removing a disk drive filler from the 8231-E2B, 8231-E1C, or 8231-E2C system" on page 89.

6. If the disk drive you are installing does not have a bezel preinstalled, then perform the tasks to install a bezel on the disk drive, then continue with this procedure from step 7. For instructions to install a bezel, see "Installing a disk drive bezel in a disk drive or filler" on page 94.

7. 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.

8. Hold the disk drive by the top and bottom edges as you position the drive, and insert it into the system or the expansion unit. Do not hold the disk drive by the handle.

9. Slide the disk drive all the way into the system or expansion unit, and push the disk drive handle **(A)** in until it locks, as shown in Figure 14.

   Important: When installing a disk drive ensure that the disk drive is fully seated and is all the way into the system.
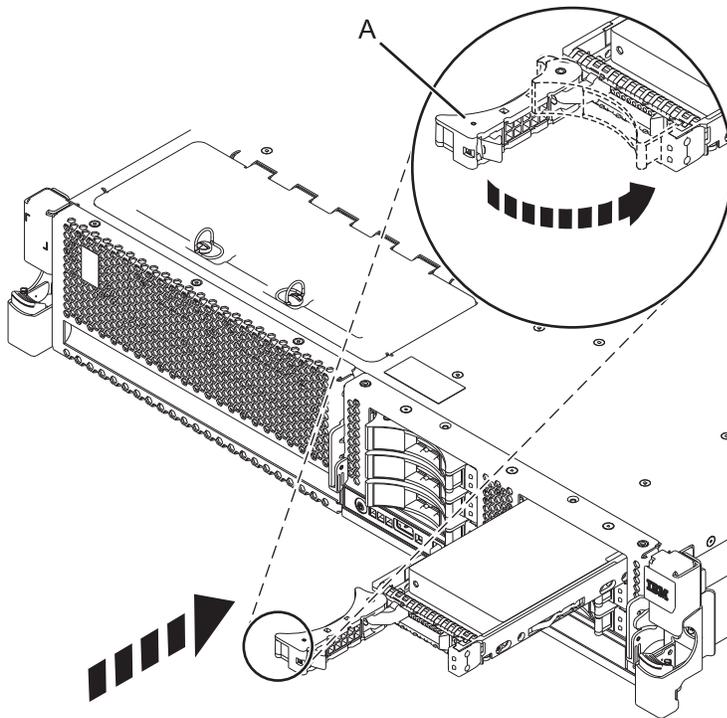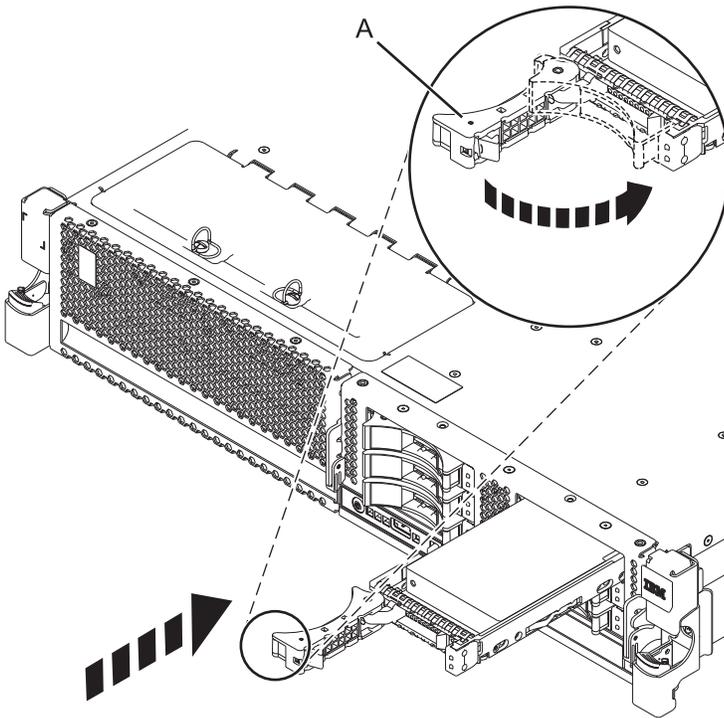

Figure 14. Installing the disk drive into the 8231-E2B, 8231-E1C, or 8231-E2C

10. If you are installing more than one disk drive, perform all the steps in this procedure until all disk drives are installed.

Installing a disk drive in the 5887 disk-drive expansion unit

Perform the following steps to install a disk drive in the 5887 disk-drive expansion unit.

1. With the handle in the unlocked position, see Figure 15, 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.

   Important: When installing a disk drive ensure that the disk drive is fully seated and is all the way into the system.

3. Rotate the handle to the locked position.
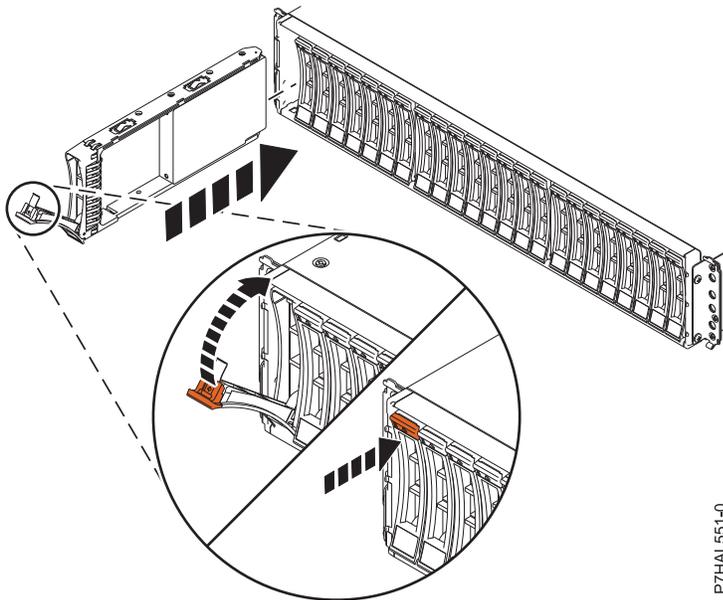
Figure 15. Installing the disk drive in the 5887 expansion unit

Completing the procedure

1. Replace the service access cover. For instructions, see Installing the service access cover on a rack-mounted 8231-E2B, 8231-E1C, or 8231-E2C system.

2. Connect the power cords to the system. For instructions, see Connecting the power cords to the 8231-E2B, 8231-E1C, or 8231-E2C.

3. Place the system in the operating position. For instructions, see Placing the rack-mounted 8231-E2B, 8231-E1C, or 8231-E2C system into the operating position.

4. Start the system or logical partition. For instructions, see Starting the system or logical partition.

5. Verify the installed part:
   - If you replaced the part because of a failure, verify the installed part. For instructions, see Verifying a repair.
   - If you installed the part for any other reason, verify the installed part. For instructions, see Verifying the installed part.

6. To configure the newly installed disk drive, see the procedure for the operating system or logical partition that controls the disk drive:
   - Preparing a disk drive for use in an AIX system or logical partition.
   - Preparing a disk drive for use in a Linux system or logical partition
   - Configuring a disk drive in an IBM i system or logical partition.

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

Removing a disk drive or solid-state drive from the 8231-E2B, 8231-E1C, or 8231-E2C

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 or turned off.

Removing a disk drive from the 8231-E2B, 8231-E1C, or 8231-E2C with the AIX system or logical partition power turned on

Learn to remove 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.

If you are installing a new or upgraded disk drive, see "Installing a disk drive or solid-state drive in the 8231-E2B, 8231-E1C, or 8231-E2C with the AIX system or logical partition power turned on" on page 8. If you are removing a disk drive as part of a service procedure, continue to use the following procedure.

Attention: This procedure is a complex set of steps that must be performed exactly to avoid potential data loss or system damage. Alternatively, you can use the procedure, which is a simpler task that involves less risk of data loss or system damage. If the system or logical partition that controls the disk drive you are replacing is at the AIX command line, you can use this powered-on procedure.

If the disk drive that you are removing is in the root volume group (rootvg) and it is not protected by either Redundant Array of Independent Disks (RAID) or mirroring, or to use the powered-off procedure, go to "Removing a disk drive from the 8231-E2B, 8231-E1C, or 8231-E2C with the system or logical partition power turned off" on page 56.

To replace a Just a Bunch of Disks (JBOD) disk drive that is attached to any SCSI or SCSI RAID adapter, see the procedure in "Removing a SCSI disk drive from the 8231-E2B, 8231-E1C, or 8231-E2C" on page 55.

DANGER

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

Electrical voltage and current from power, telephone, and communication cables are hazardous. To avoid a shock hazard:
- Connect power to this unit only with the IBM provided power cord. Do not use the IBM provided power cord for any other product.
- Do not open or service any power supply assembly.
- Do not connect or disconnect any cables or perform installation, maintenance, or reconfiguration of this product during an electrical storm.
- The product might be equipped with multiple power cords. To remove all hazardous voltages, disconnect all power cords.
- Connect all power cords to a properly wired and grounded electrical outlet. Ensure that the outlet supplies proper voltage and phase rotation according to the system rating plate.
- Connect any equipment that will be attached to this product to properly wired outlets.
- When possible, use one hand only to connect or disconnect signal cables.
- Never turn on any equipment when there is evidence of fire, water, or structural damage.
- Disconnect the attached power cords, telecommunications systems, networks, and modems before you open the device covers, unless instructed otherwise in the installation and configuration procedures.
- Connect and disconnect cables as described in the following procedures when installing, moving, or opening covers on this product or attached devices.

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

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

  (D005)

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

Preparing the system for removing a disk drive

1. Perform prerequisite tasks. For instructions, see Before you begin.
2. Prepare to remove the disk drive from the system or expansion unit. For instructions, see "Preparing to remove a disk drive from a system or expansion unit controlled by AIX" on page 105.
3. Place the system into the service position. For instructions, see Placing a rack-mounted 8231-E2B, 8231-E1C, or 8231-E2C system into the service position.
4. Remove the service access cover. For instructions, see Removing the service access cover from a rack-mounted 8231-E2B, 8231-E1C, or 8231-E2C system.
5. Use the service indicator light-emitting diodes (LEDs) to help identify the part. For information, see Identifying a part.

Preparing to remove a disk drive by using the HSM

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.

   Important: Ensure to follow the concurrent or nonconcurrent replacement procedures depending on the type of data protection enabled:
   - If the data protection is RAID, use the concurrent procedure.
   - If the data protection is mirrored (card to card) and the SSD is located in the 5802 or 5803 expansion unit, use the concurrent procedure.
   - If the data protection is mirrored (card to card) but the SSD is not located in the 5802 or 5803 expansion unit, use the nonconcurrent procedure.

2. Perform the following steps on the Hardware Service Manager (HSM)
3. Log in as root user.
4. At the command line, type `diag` and press Enter.
5. Press Enter to continue.
6. On the Function Selection display, select **Task Selection**.
7. Select **Hot Plug Task**.
8. 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 9.
   - If you have a RAID disk drive attached to a 2498 PCI SCSI RAID adapter, continue with step 9.
   - If you have a JBOD disk drive attached to any SCSI or SCSI RAID adapter, go to "Removing a SCSI disk drive from the 8231-E2B, 8231-E1C, or 8231-E2C" on page 55.
   - If you have RAID drives attached to any other adapter, see the *PCI-X SCSI RAID Controller Reference Guide for AIX*. This guide is available from the SCSI PCI Adapters web page.

9. Select **RAID Hot Plug Devices**.
10. On the Resource Selection List, select the adapter that is connected to the array that contains the disk drive you want to remove or replace. Press Enter.
11. Select **Commit**.
12. 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 .

13. Select the drive that you want to remove and press Enter. The service indicator 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 service indicators, go to "Disk drive locations and service indicators for the 8231-E2B, 8231-E1C, or 8231-E2C system" on page 97.

Removing the disk drive from the 8231-E2B, 8231-E1C, or 8231-E2C

1. Unlock the disk drive handle by squeezing it and pulling it out toward you, as shown in Figure 16 on page 40.

2. Press Enter and when the service indicator starts flashing, then squeeze and pull the handle of the disk drive out toward you before you remove the disk drive. If the handle is not all the way out, the disk drive cannot slide out of the system or expansion unit.

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

   Note: If you are removing a disk drive from the 5887 expansion unit, the service indicator is on (solid) and does not flash during this procedure.
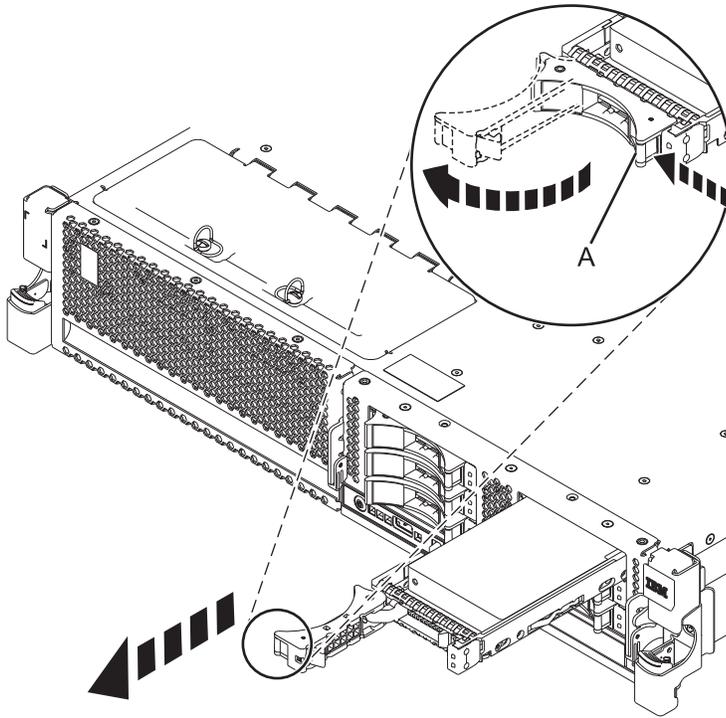
Figure 16. Removing a disk drive from the 8231-E2B, 8231-E1C, or 8231-E2C

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.

   Note: The service indicator stops flashing and remains off when the disk drive is removed.

4. If the removed disk drive has a bezel attached to it, you can remove the disk drive bezel. For instructions, see "Removing a disk drive bezel from a disk drive or filler" on page 93.

   Important: If the disk drive bezel does not have a thumbscrew then the bezel is not removable and the disk drive is a SAS disk drive. The replacement SAS disk drive comes with an preinstalled bezel.

• You can proceed to install a disk drive as a replacement to the failed disk drive, see "Replacing a disk drive or solid state drive in the 8231-E2B, 8231-E1C, or 8231-E2C" on page 61 and select the procedure for replacing a disk drive for your operating system.

• You can proceed to install a disk drive filler into the slot from where you removed the disk drive, see "Installing a disk drive filler in the 8231-E2B, 8231-E1C, or 8231-E2C system" on page 90 for the procedure.

Removing the disk drive from the 8231-E2B, 8231-E1C, or 8231-E2C using Linux kernel 2.6 with the Linux system or logical partition power turned on

Learn to remove 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. This procedure uses the Linux kernel 2.6.

If you are installing a new or upgraded disk drive, see "Installing a disk-drive or solid-state drive in the 8231-E2B, 8231-E1C, or 8231-E2C with the Linux system or logical partition power turned on" on page 13. If you are removing a disk drive as part of a service procedure, continue to use the following procedure.

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 in the 8231-E2B, 8231-E1C, or 8231-E2C with the system or logical partition power turned off" on page 77, 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

DANGER

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

Electrical voltage and current from power, telephone, and communication cables are hazardous. To avoid a shock hazard:
- Connect power to this unit only with the IBM provided power cord. Do not use the IBM provided power cord for any other product.
- Do not open or service any power supply assembly.
- Do not connect or disconnect any cables or perform installation, maintenance, or reconfiguration of this product during an electrical storm.
- The product might be equipped with multiple power cords. To remove all hazardous voltages, disconnect all power cords.
- Connect all power cords to a properly wired and grounded electrical outlet. Ensure that the outlet supplies proper voltage and phase rotation according to the system rating plate.
- Connect any equipment that will be attached to this product to properly wired outlets.
- When possible, use one hand only to connect or disconnect signal cables.
- Never turn on any equipment when there is evidence of fire, water, or structural damage.
- Disconnect the attached power cords, telecommunications systems, networks, and modems before you open the device covers, unless instructed otherwise in the installation and configuration procedures.
- Connect and disconnect cables as described in the following procedures when installing, moving, or opening covers on this product or attached devices.

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

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

  (D005)

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

Preparing the system

1. Perform prerequisite tasks. For instructions, see Before you begin.
2. Is the disk drive you are replacing in a redundant array of independent disk (RAID) Level 0 array or is the disk drive you are replacing in a failed RAID Level 5 or Level 10 array?
   - If yes, you must delete the disk array before removing or 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.

Preparing to remove the disk drive by using the HSM

Perform the following tasks to remove a disk drive by using the Hardware Service Manager (HSM):

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
```
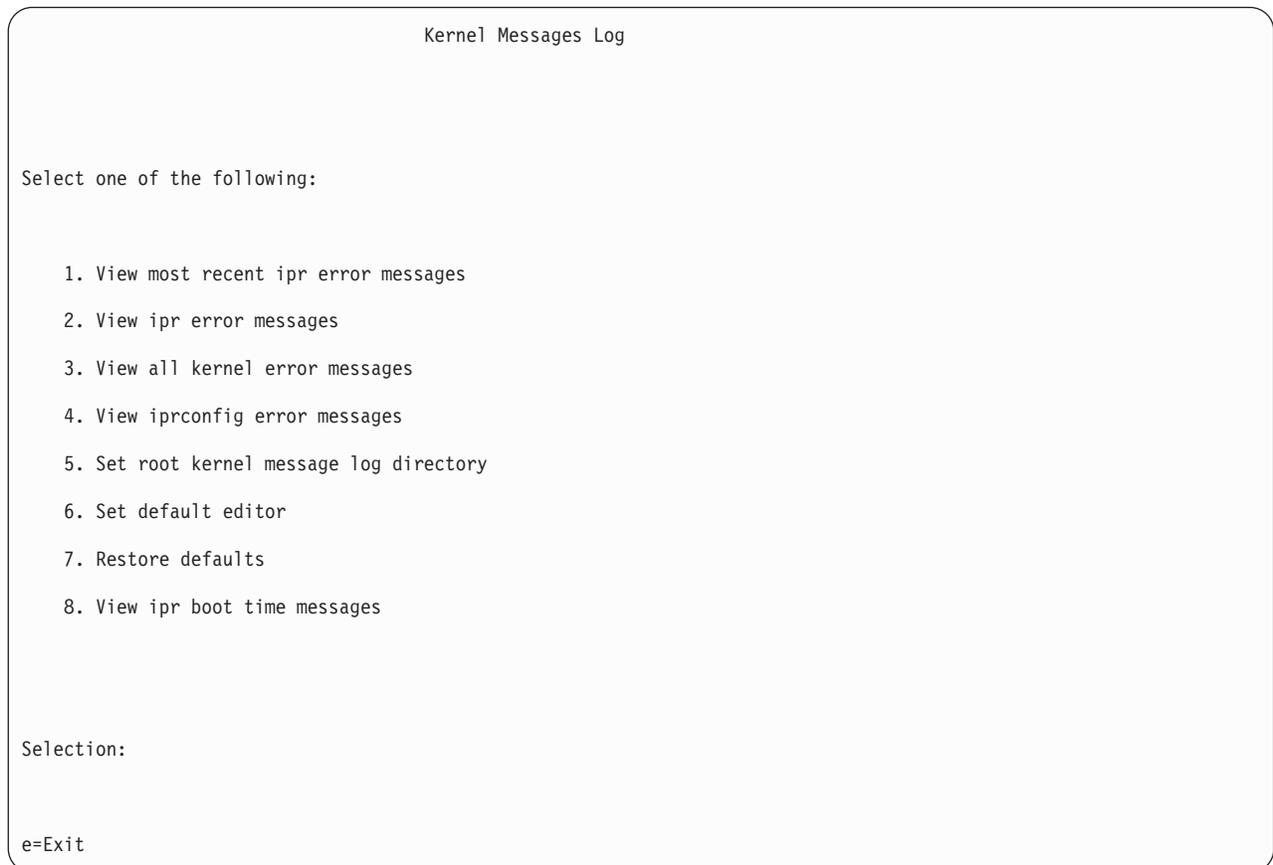
Figure 17. Kernel Messages Log

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 18. 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
```
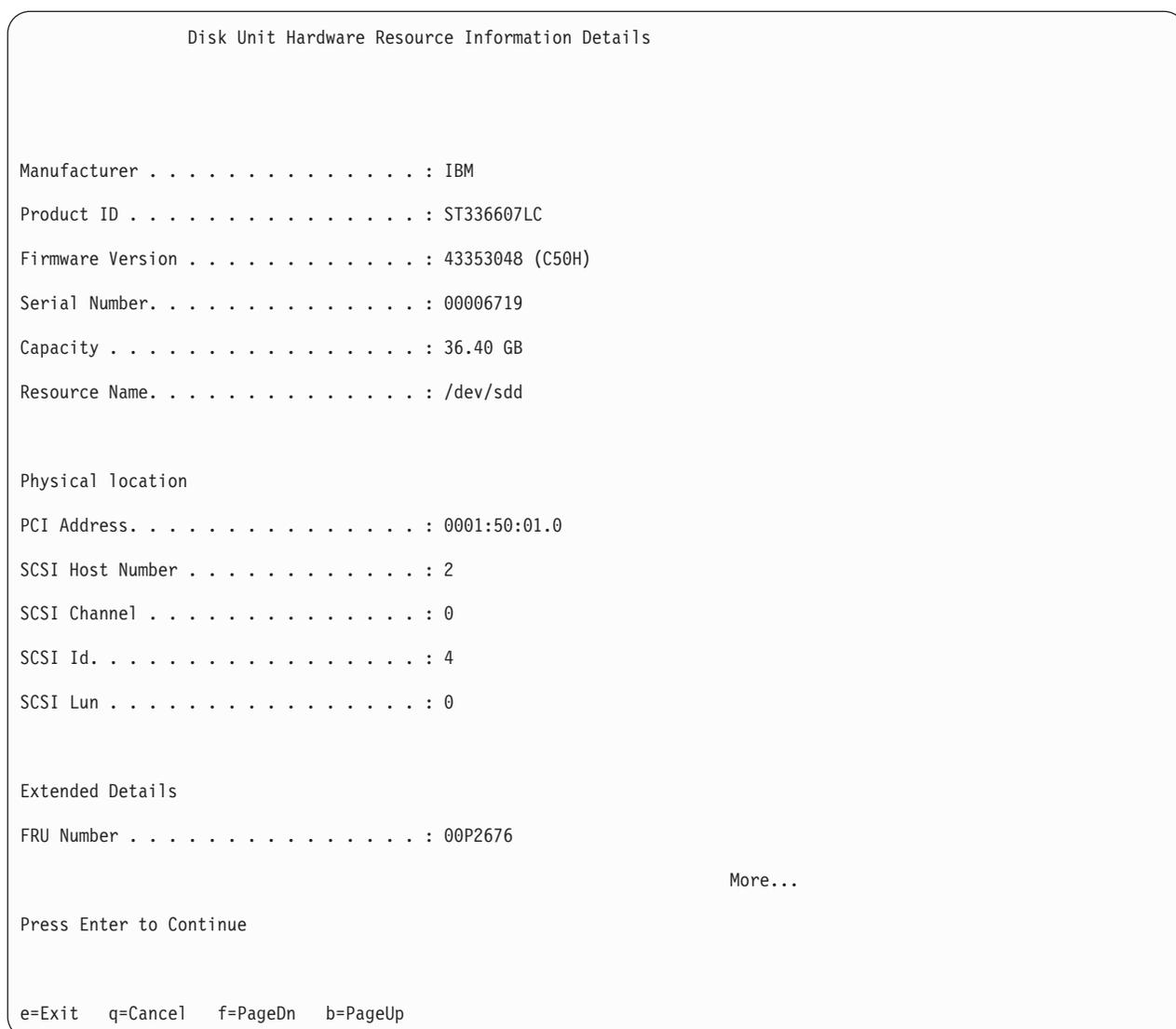
Figure 19. Example Disk Hardware Resource Information Details display

15. Record the physical location information.
16. Return to the IBM Power RAID Configuration Utility display.
17. 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:

    Important: Ensure that you follow the concurrent or nonconcurrent replacement procedure
    depending on the type of data protection enabled.
    a. If the data protection is RAID, use the concurrent procedure.
    b. If the data protection is mirrored (card to card) and the SSD is located in the 5802 or 5803
       expansion unit, use the concurrent procedure.
    c. If the data protection is mirrored (card to card) but the SSD is not located in the 5802 or 5803
       expansion unit, use the nonconcurrent procedure.
18. From the IBM Power RAID Configuration Utility display, select **Work with disk unit recovery**. Press
    Enter.

19. 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 20. Example Concurrent Device Remove display

20. Type option 1 (Select) next to the location for the disk drive you want to replace. Press Enter.
21. The Verify Device Concurrent Remove display is shown. The service indicator turns on for that disk drive slot. To view the locations of the service indicators, see "Disk drive locations and service indicators" on page 97.
22. 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.
23. The Device Concurrent Remove display is shown.
24. Complete the removing of the disk drive as detailed in this procedure and then press Enter on the IBM Power RAID Configuration Utility to indicate that you have removed the disk drive.

Removing the disk drive from the 8231-E2B, 8231-E1C, or 8231-E2C

1. Unlock the disk drive handle by squeezing it and pulling it out toward you, as shown in Figure 21 on page 47.
2. Press Enter and when the service indicator starts flashing, then squeeze and pull the handle of the disk drive out toward you before you remove the disk drive. If the handle is not all the way out, the disk drive cannot slide out of the system or expansion unit.

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

Note: If you are removing a disk drive from the 5887 expansion unit, the service indicator is on (solid) and does not flash during this procedure.
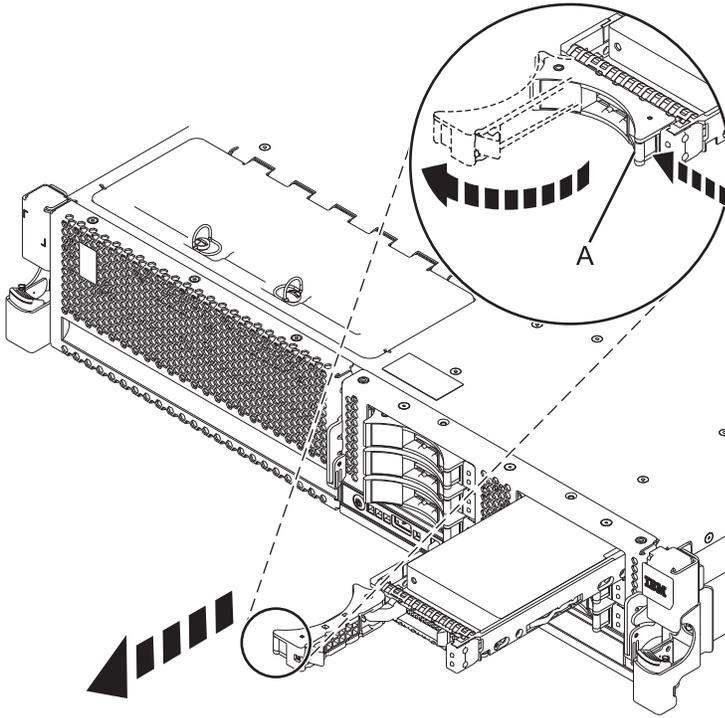
Figure 21. Removing a disk drive from the 8231-E2B, 8231-E1C, or 8231-E2C

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.

   Note: The service indicator stops flashing and remains off when the disk drive is removed.

4. If the removed disk drive has a bezel attached to it, you can remove the disk drive bezel. For instructions, see "Removing a disk drive bezel from a disk drive or filler" on page 93.

   Important: If the disk drive bezel does not have a thumbscrew then the bezel is not removable and the disk drive is a SAS disk drive. The replacement SAS disk drive comes with an preinstalled bezel.

- You can proceed to install a disk drive as a replacement to the failed disk drive, see "Replacing a disk drive or solid state drive in the 8231-E2B, 8231-E1C, or 8231-E2C" on page 61 and select the procedure for replacing a disk drive for your operating system.
- You can proceed to install a disk drive filler into the slot from where you removed the disk drive, see "Installing a disk drive filler in the 8231-E2B, 8231-E1C, or 8231-E2C system" on page 90 for the procedure.

Removing a disk drive from the 8231-E2B, 8231-E1C, or 8231-E2C or an 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 the power turned on to the IBM i operating system or a logical partition that controls the disk drive location.

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 in the 8231-E2B, 8231-E1C, or 8231-E2C with the IBM i system or logical partition power turned on" on page 25. 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 for removing a disk drive

1. See Preparing to remove a disk drive from a system or logical partition controlled by IBM i and follow the steps before you start the tasks in this procedure.

2. Before removing a disk drive, ensure to 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**

3. Locate the disk drive to be removed. See "Disk drive locations and service indicators" on page 97.

4. Stop the system. For instructions, see Stopping the system or logical partition.

Preparing to remove the disk drive by using the HSM

Perform the following steps to remove a disk drive by using the Hardware Service Manager (HSM):

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.

   Important: Ensure to follow the concurrent or nonconcurrent replacement procedures depending on the type of data protection enabled:

   • If the data protection is RAID, use the concurrent procedure.

   • If the data protection is mirrored (card to card) and the SSD is located in the 5802 or 5803 expansion unit, use the concurrent procedure.

   • If the data protection is mirrored (card to card) but the SSD is not located in the 5802 or 5803 expansion unit, use the nonconcurrent procedure.

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.

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 4

      • 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.

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 displays the disk drive location on the concurrent maintenance display. Go to step 9 on page 50

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 22. Example Device Concurrent Maintenance display

8. If the physical location does not show in the Device Concurrent Maintenance display, type the physical location where you are replacing the disk drive as shown in the following example:

   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 is 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 23. 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 service indicators" on page 97.

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 service indicator that corresponds to the position of the disk drive that you are replacing. You can view the locations of the service indicators for the system you are replacing the disk drive shown in "Disk drive locations and service indicators" on page 97.

    Proceed to remove the disk drive.

Removing the disk drive from the 8231-E2B, 8231-E1C, or 8231-E2C

1. Unlock the disk drive handle by squeezing it and pulling it out toward you, as shown in Figure 24.
2. Press Enter and when the service indicator starts flashing, then squeeze and pull the handle of the disk drive out toward you before you remove the disk drive. If the handle is not all the way out, the disk drive cannot slide out of the system or expansion unit.

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

    Note: If you are removing a disk drive from the 5887 expansion unit, the service indicator is on (solid) and does not flash during this procedure.

Figure 24. Removing a disk drive from the 8231-E2B, 8231-E1C, or 8231-E2C

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.

    Note: The service indicator stops flashing and remains off when the disk drive is removed.
4. If the removed disk drive has a bezel attached to it, you can remove the disk drive bezel. For instructions, see "Removing a disk drive bezel from a disk drive or filler" on page 93.

Important: If the disk drive bezel does not have a thumbscrew then the bezel is not removable and the disk drive is a SAS disk drive. The replacement SAS disk drive comes with an preinstalled bezel.

- You can proceed to install a disk drive as a replacement to the failed disk drive, see "Replacing a disk drive or solid state drive in the 8231-E2B, 8231-E1C, or 8231-E2C" on page 61 and select the procedure for replacing a disk drive for your operating system.
- You can proceed to install a disk drive filler into the slot from where you removed the disk drive, see "Installing a disk drive filler in the 8231-E2B, 8231-E1C, or 8231-E2C system" on page 90 for the procedure.

Removing a disk drive using hot-spare in an IBM i system or logical partition from the 8231-E2B, 8231-E1C, or 8231-E2C

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.

Preparing the system

1. Perform prerequisite tasks. For instructions, see 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

Preparing to remove a disk drive by using the HSM

Perform the following tasks to remove a disk drive by using the Hardware Service Manager (HSM):

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 in the 8231-E2B, 8231-E1C, or 8231-E2C with the IBM i system or logical partition power turned on" on page 69.
   - 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 on page 53.
   - 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.
   - Yes: Go to step 11 on page 53.

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 54.

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.
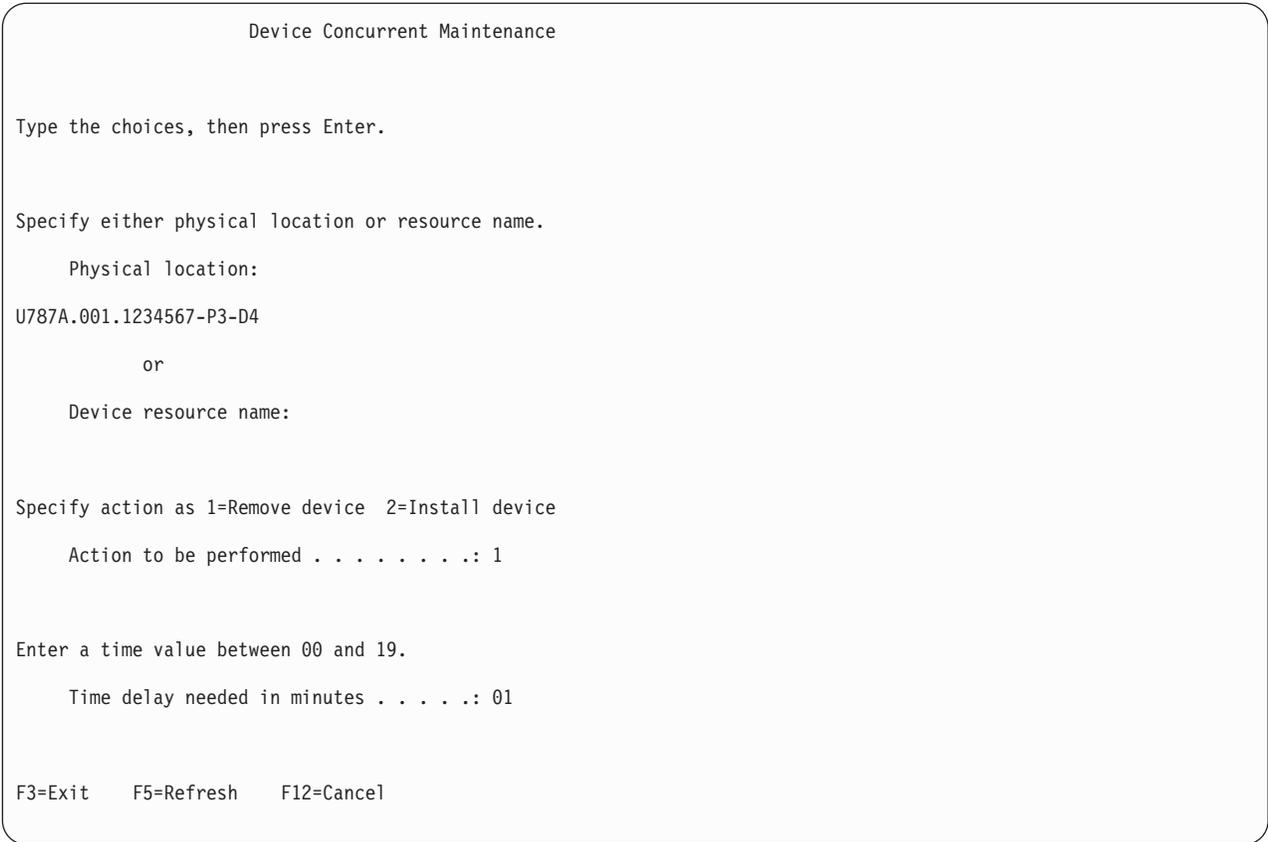
```
                  Device Concurrent Maintenance


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
```
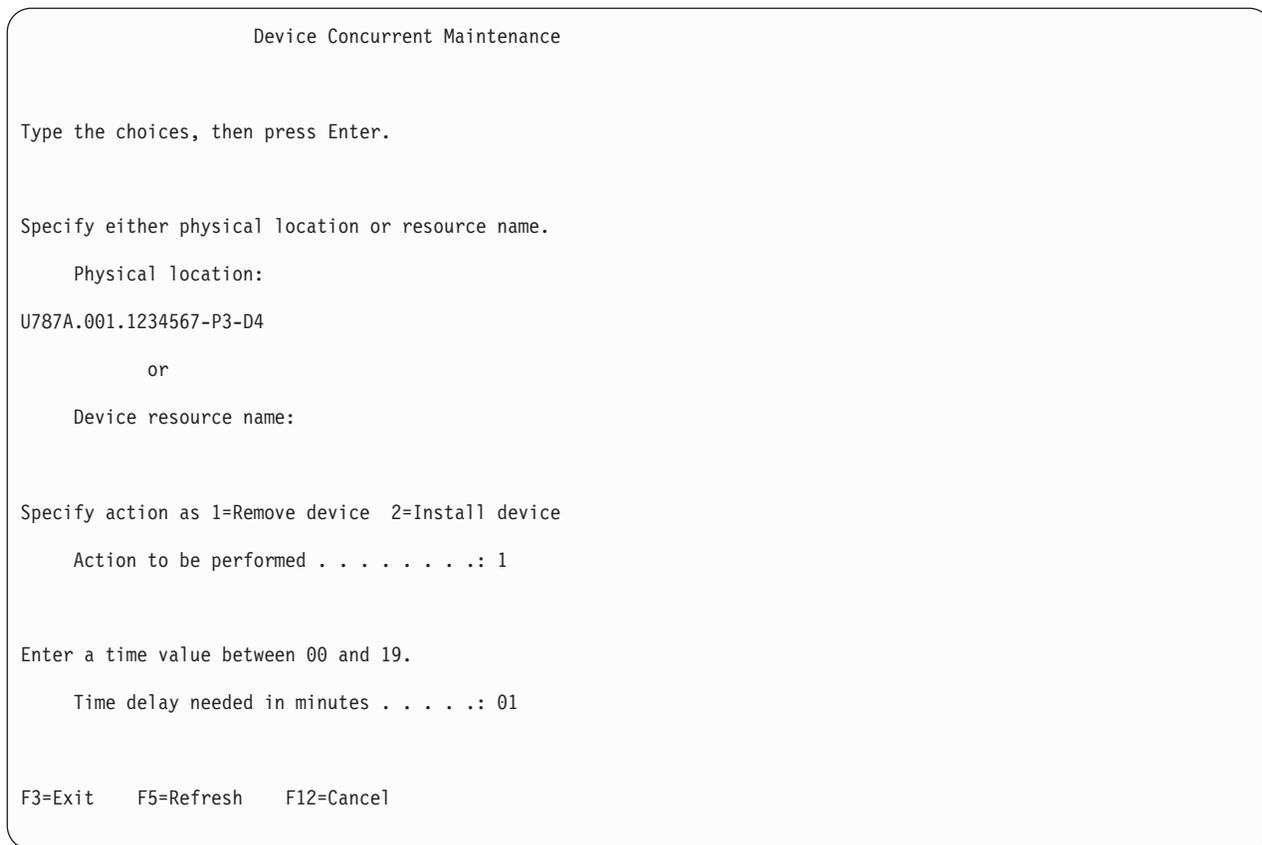
Figure 25. Example Device Concurrent Maintenance display

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 25.

   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 26. 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 service indicators" on page 97.

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

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

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

   Important: Do not press Enter at this time.

   Continue to remove the disk drive from your system of expansion unit.

Removing the disk drive from the 8231-E2B, 8231-E1C, or 8231-E2C

1. Unlock the disk drive handle by squeezing it and pulling it out toward you, as shown in Figure 27.

2. Squeeze and pull the handle of the disk drive out toward you before you remove the disk drive. If the handle is not all the way out, the disk drive cannot slide out of the system or expansion unit.
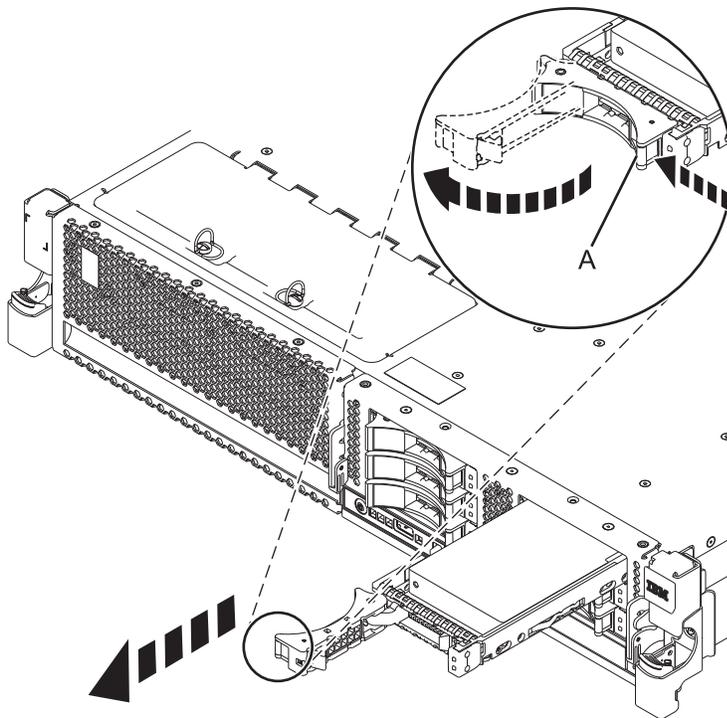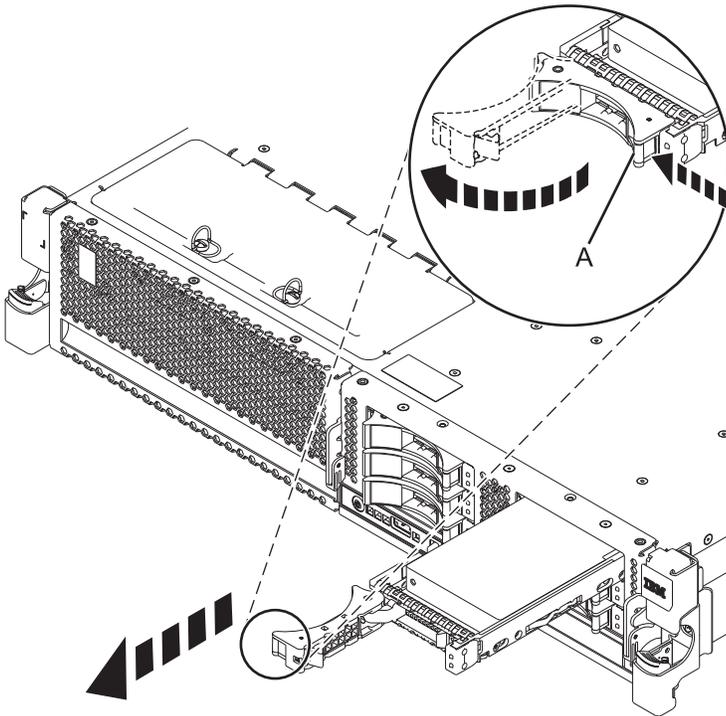

Figure 27. Removing a disk drive from the 8231-E2B, 8231-E1C, or 8231-E2C

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 the removed disk drive has a bezel attached to it, you can remove the disk drive bezel. For instructions, see "Removing a disk drive bezel from a disk drive or filler" on page 93.

   Important: If the disk drive bezel does not have a thumbscrew then the bezel is not removable and the disk drive is a SAS disk drive. The replacement SAS disk drive comes with an preinstalled bezel.

- You can proceed to install a disk drive as a replacement to the failed disk drive. For instructions, see "Replacing a disk drive or solid state drive in the 8231-E2B, 8231-E1C, or 8231-E2C" on page 61.

- You can proceed to install a disk drive filler into the slot from where you removed the disk drive. For instructions, see "Installing a disk drive filler in the 8231-E2B, 8231-E1C, or 8231-E2C system" on page 90.

Removing a SCSI disk drive from the 8231-E2B, 8231-E1C, or 8231-E2C

Learn how to remove a Small Computer System Interface (SCSI) disk drive from a system or an expansion unit.

Preparing to remove the SCSI disk drive by using the HSM

Perform the following tasks by using the Hardware Service Manager (HSM):
1. Log in as root user on the Hardware Service Manager (HSM).
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 service indicator. To view the locations of the service indicator, see "Disk drive locations and service indicators" on page 97.
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 service indicator for the slot begins to flash rapidly.

Removing the disk drive from the 8231-E2B, 8231-E1C, or 8231-E2C

1. Unlock the disk drive handle by squeezing it and pulling it out toward you, as shown in Figure 28 on page 56.
2. Press Enter and when the service indicator starts flashing, then squeeze and pull the handle of the disk drive out toward you before you remove the disk drive. If the handle is not all the way out, the disk drive cannot slide out of the system or expansion unit.

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

   Note: If you are removing a disk drive from the 5887 expansion unit, the service indicator is on (solid) and does not flash during this procedure.
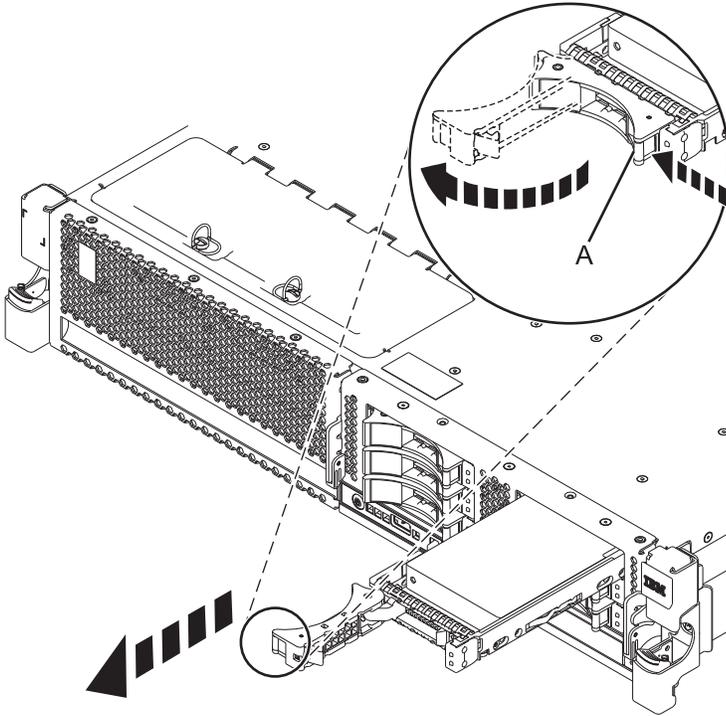
Figure 28. Removing a disk drive from the 8231-E2B, 8231-E1C, or 8231-E2C

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.

   Note: The service indicator stops flashing and remains off when the disk drive is removed.

4. If the removed disk drive has a bezel attached to it, you can remove the disk drive bezel. For instructions, see "Removing a disk drive bezel from a disk drive or filler" on page 93.

   Important: If the disk drive bezel does not have a thumbscrew then the bezel is not removable and the disk drive is a SAS disk drive. The replacement SAS disk drive comes with an preinstalled bezel.

- You can proceed to install a disk drive as a replacement to the failed disk drive, see "Replacing a disk drive or solid state drive in the 8231-E2B, 8231-E1C, or 8231-E2C" on page 61 and select the procedure for replacing a disk drive for your operating system.
- You can proceed to install a disk drive filler into the slot from where you removed the disk drive, see "Installing a disk drive filler in the 8231-E2B, 8231-E1C, or 8231-E2C system" on page 90 for the procedure.

Removing a disk drive from the 8231-E2B, 8231-E1C, or 8231-E2C with the system or logical partition power turned off

Learn to remove 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 with the power turned off, see "Installing a disk drive or solid-state drive in the 8231-E2B, 8231-E1C, or 8231-E2C with the system or logical partition power turned off" on page 31. 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. For instructions, see 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 is not powered on, go to step 6 on page 58.
3. Identify the disk drive to be removed and record the location information. For information, see Identifying a 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 105.
   - 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 116.

- 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. For instructions, see Stopping the system or logical partition.

6. If you stopped the logical partition, do not disconnect the power source.

7. Place the system into the service position. For instructions, see Placing a rack-mounted 8231-E2B, 8231-E1C, or 8231-E2C system into the service position.

8. Remove the service access cover. For instructions, see Removing the service access cover from a rack-mounted 8231-E2B, 8231-E1C, or 8231-E2C system.

9. Disconnect the power source from the system by unplugging the system. For instructions, see Disconnecting the power cords.

   Note: This system can be equipped with a second power supply. Disconnect it before continuing with this procedure. Ensure that the power source to the system has been disconnected.

   (L003)
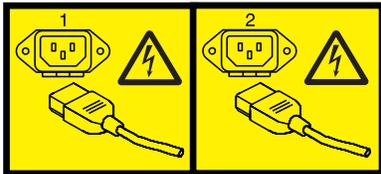
   or

10. Attach the wrist strap.

Attention:

- Attach a wrist strap to an unpainted metal 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 metal surface of the system for a minimum of 5 seconds.

Removing the disk drive from the 8231-E2B, 8231-E1C, or 8231-E2C

1. Unlock the disk drive handle by squeezing it and pulling it out toward you, as shown in Figure 29.
2. Squeeze and pull the handle of the disk drive out toward you before you remove the disk drive. If the handle is not all the way out, the disk drive cannot slide out of the system or expansion unit.
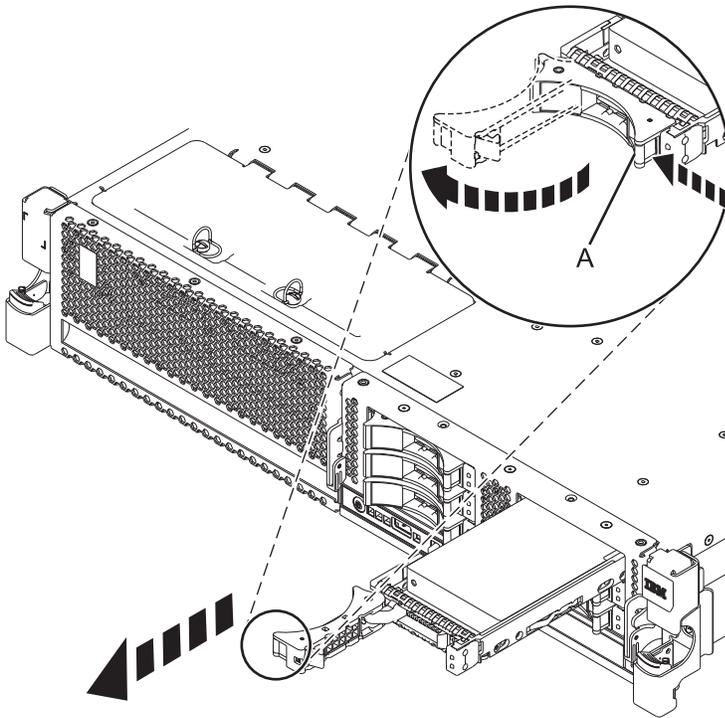
Figure 29. Removing a disk drive from the 8231-E2B, 8231-E1C, or 8231-E2C

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 the removed disk drive has a bezel attached to it, you can remove the disk drive bezel. For instructions, see "Removing a disk drive bezel from a disk drive or filler" on page 93.

   Important: If the disk drive bezel does not have a thumbscrew then the bezel is not removable and the disk drive is a SAS disk drive. The replacement SAS disk drive comes with an preinstalled bezel.

- You can proceed to install a disk drive as a replacement to the failed disk drive. For instructions, see "Replacing a disk drive or solid state drive in the 8231-E2B, 8231-E1C, or 8231-E2C" on page 61.

- You can proceed to install a disk drive filler into the slot from where you removed the disk drive. For instructions, see "Installing a disk drive filler in the 8231-E2B, 8231-E1C, or 8231-E2C system" on page 90.

Replacing a disk drive or solid state drive in the 8231-E2B, 8231-E1C, or 8231-E2C

Learn how to replace a Small Computer System Interface (SCSI) or serial-attached SCSI (SAS) disk drive in the server or expansion unit.

Note: These instructions 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.

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, IBM i 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 powered-off procedure.

Replacing a disk drive in the 8231-E2B, 8231-E1C, or 8231-E2C 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 to the AIX operating system or logical partition that controls the disk drive location is turned on.

To complete this procedure, you must have already completed the removal procedure. For the removal procedure instructions, see "Removing a disk drive from the 8231-E2B, 8231-E1C, or 8231-E2C with the AIX system or logical partition power turned on" on page 37. If you are installing a new or upgraded disk drive, see "Installing a disk drive or solid-state drive in the 8231-E2B, 8231-E1C, or 8231-E2C with the AIX system or logical partition power turned on" on page 8. If you are replacing 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: This procedure is a complex set of steps that must be performed exactly to avoid potential data loss or system damage. Alternatively, you can use the 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 powered-off procedure, go to "Replacing a disk drive in the 8231-E2B, 8231-E1C, or 8231-E2C with the system or logical partition power turned off" on page 77.

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. 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 105.

3. Place the system into the service position, as described in Placing a rack-mounted model into the service position.
4. Remove the service access cover, as described in Removing the service access cover from a rack-mounted model.

Replacing a disk drive in the 8231-E2B, 8231-E1C, or 8231-E2C

1. Use the service indicator light-emitting diodes (LEDs) to help identify the part. For information, see Identifying a part.
2. Use the location information that you recorded while removing the disk drives to install or replace the internal disk drives to the correct locations.
3. Find the package that contains the new disk drive.

   Attention: Disk drives are fragile. Handle with care.
4. Remove the disk drive from the static-protective package.
5. If the slot you want to use contains a disk drive filler, remove the disk drive filler from the slot. For instructions, see "Removing a disk drive filler from the 8231-E2B, 8231-E1C, or 8231-E2C system" on page 89.
6. If the disk drive you are installing does not have a bezel preinstalled, then perform the tasks to install a bezel on the disk drive, then continue with this procedure from step 7. For instructions to install a bezel, see "Installing a disk drive bezel in a disk drive or filler" on page 94.
7. 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.
8. Hold the disk drive by the top and bottom edges as you position the drive, and insert it into the system or the expansion unit. Do not hold the disk drive by the handle.
9. Slide the disk drive halfway into the system or expansion unit.
10. Press Enter on the console.
11. When the service indicator starts flashing, slide the disk drive all the way into the system or expansion unit, and push the disk drive handle **(A)** in until it locks, as shown in Figure 30 on page 64.

    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.
    - The light stops flashing and remains on when you have installed the disk drive properly.
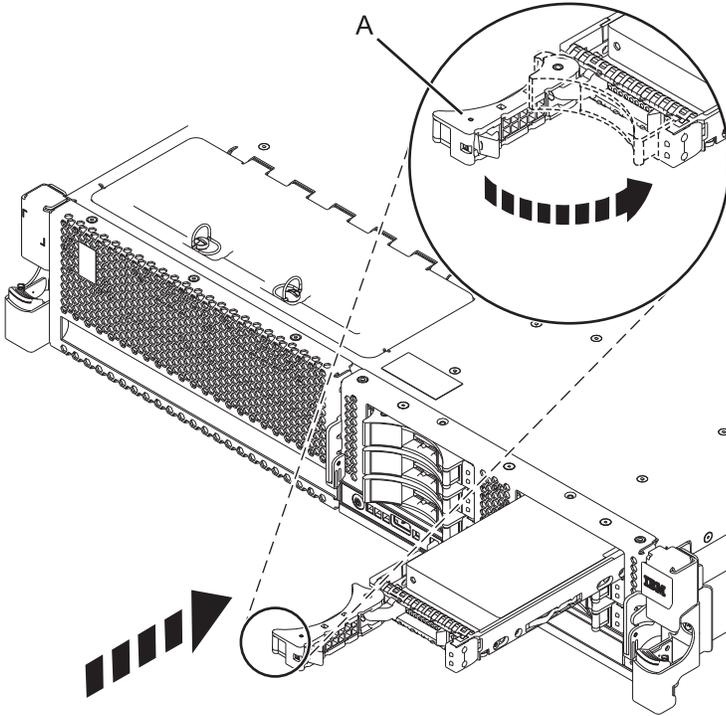
Figure 30. Installing a disk drive in the 8231-E2B, 8231-E1C, or 8231-E2C

Completing the disk drive replace by using the HSM

Perform the following tasks by using the Hardware Service Manager (HSM):

1. Perform the following steps using the HSM after you have replaced the disk drive:
2. Press Enter. The disk drive slot exits the Remove state and enters the Normal state.
3. Exit to the RAID Hot-Plug Devices menu. Press F3 to return.
4. Exit to the Task selection display.
5. Select **Log Repair Action**.
6. Select the disk drive that you replaced and then press Enter.
7. Select **Commit** after you have made your selection and then press Enter.
8. Exit to the command line.

Completing the procedure

1. Verify the installed part:
   - If you replaced the part because of a failure, verify the installed part. For instructions, see Verifying a repair.
   - If you installed the part for any other reason, verify the installed part. For instructions, see Verifying the installed part.
2. To configure the newly installed disk drive, see the procedure for the operating system or logical partition that controls the disk drive:
   - Preparing a disk drive for use in an AIX system or logical partition.
   - Preparing a disk drive for use in a Linux system or logical partition
   - Configuring a disk drive in an IBM i system or logical partition.

3. To rebuild the data on the replacement disk drive, see the procedure for the operating system or logical partition that controls the disk drive:
   - Rebuilding data on a replacement drive using AIX.
   - Rebuilding data on a replacement drive using Linux.
   - Rebuilding data on a replacement drive using IBM i.

Replacing a disk drive using Linux kernel 2.6, 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 to the Linux operating system or logical partition that controls the disk drive location is turned on. This procedure uses the Linux kernel 2.6.

You must have removed the failed disk drive before you attempt to replace it. For the procedure to remove a disk drive using Linux kernel 2.6, see "Removing the disk drive from the 8231-E2B, 8231-E1C, or 8231-E2C using Linux kernel 2.6 with the Linux system or logical partition power turned on" on page 41. If you are installing a new or upgraded disk drive, see "Installing a disk-drive or solid-state drive in the 8231-E2B, 8231-E1C, or 8231-E2C with the Linux system or logical partition power turned on" on page 13. If you are replacing a disk drive as part of a service procedure, continue to use the following procedure.

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 in the 8231-E2B, 8231-E1C, or 8231-E2C with the system or logical partition power turned off" on page 77 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 powered-on 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)

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 to replace a disk drive

1. Perform prerequisite tasks. For instructions, see Before you begin.
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.

Preparing to replace a disk drive by using the HSM

Perform the following steps to replace a disk drive by using the Hardware Service Manager (HSM):

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

2. 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 31. Example Concurrent Device Add display

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

   The Verify Device Concurrent Add display is shown.

4. Press Enter on the Verify Device Concurrent Add display. The Complete Device Concurrent Add display is shown.

   Proceed to install the replacement disk drive.

Replacing a disk drive in the 8231-E2B, 8231-E1C, or 8231-E2C

1. Use the service indicator light-emitting diodes (LEDs) to help identify the part. For information, see Identifying a part.

2. Use the location information that you recorded while removing the disk drives to install or replace the internal disk drives to the correct locations.

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

   Attention: Disk drives are fragile. Handle with care.

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

5. If the slot you want to use contains a disk drive filler, remove the disk drive filler from the slot. For instructions, see "Removing a disk drive filler from the 8231-E2B, 8231-E1C, or 8231-E2C system" on page 89.

6. If the disk drive you are installing does not have a bezel preinstalled, then perform the tasks to install a bezel on the disk drive, then continue with this procedure from step 7. For instructions to install a bezel, see "Installing a disk drive bezel in a disk drive or filler" on page 94.

7. 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.

8. Hold the disk drive by the top and bottom edges as you position the drive, and insert it into the system or the expansion unit. Do not hold the disk drive by the handle.

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

10. Press Enter on the console.
11. When the service indicator starts flashing, slide the disk drive all the way into the system or expansion unit, and push the disk drive handle **(A)** in until it locks, as shown in Figure 32.

    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.
    - The light stops flashing and remains on when you have installed the disk drive properly.
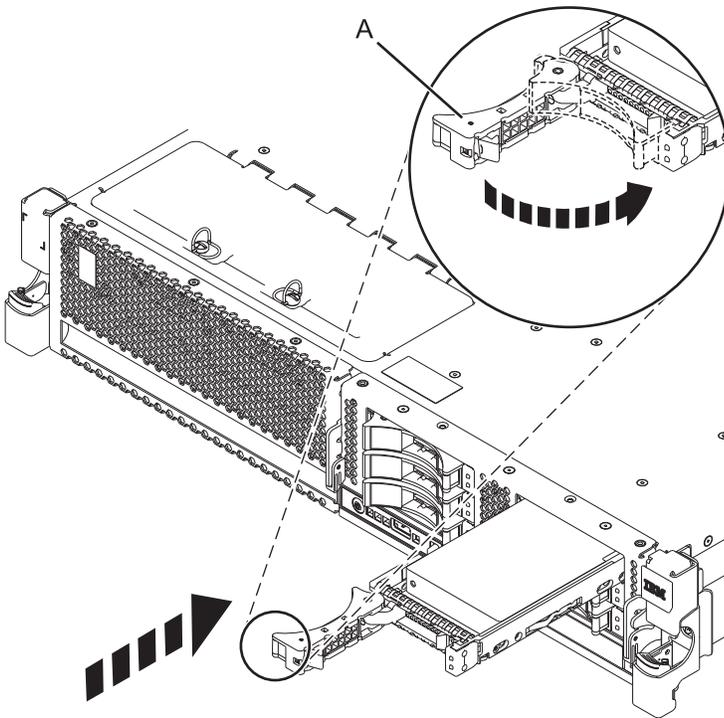
Figure 32. Installing a disk drive in the 8231-E2B, 8231-E1C, or 8231-E2C

Completing the disk drive replace by using the HSM

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

Completing the procedure

1. Verify the installed part:
    - If you replaced the part because of a failure, verify the installed part. For instructions, see Verifying a repair.
    - If you installed the part for any other reason, verify the installed part. For instructions, see Verifying the installed part.
2. To configure the newly installed disk drive, see the procedure for the operating system or logical partition that controls the disk drive:
    - Preparing a disk drive for use in an AIX system or logical partition.
    - Preparing a disk drive for use in a Linux system or logical partition
    - Configuring a disk drive in an IBM i system or logical partition.

3. To rebuild the data on the replacement disk drive, see the procedure for the operating system or logical partition that controls the disk drive:
   - Rebuilding data on a replacement drive using AIX.
   - Rebuilding data on a replacement drive using Linux.
   - Rebuilding data on a replacement drive using IBM i.

Replacing a disk drive in the 8231-E2B, 8231-E1C, or 8231-E2C with the IBM i system or logical partition power turned on

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

To complete this procedure you must have removed the disk drive. For the procedure to remove the disk drive, see "Removing a disk drive from the 8231-E2B, 8231-E1C, or 8231-E2C or an expansion unit controlled by IBM i" on page 47. If you are installing a new or upgraded disk drive, see "Installing a disk drive or solid-state drive in the 8231-E2B, 8231-E1C, or 8231-E2C with the IBM i system or logical partition power turned on" on page 25. If you are removing a disk drive as part of a service procedure, continue to use the following procedure.

Attention: The powered-on procedure is a complex set of steps that must be performed exactly to avoid potential data loss or system damage. Alternatively, you can use the powered-off procedure, which is a simpler task that involves less risk of data loss or system damage. For instructions, see "Replacing a disk drive in the 8231-E2B, 8231-E1C, or 8231-E2C with the system or logical partition power turned off" on page 77.

DANGER

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

Electrical voltage and current from power, telephone, and communication cables are hazardous. To avoid a shock hazard:
- Connect power to this unit only with the IBM provided power cord. Do not use the IBM provided power cord for any other product.
- Do not open or service any power supply assembly.
- Do not connect or disconnect any cables or perform installation, maintenance, or reconfiguration of this product during an electrical storm.
- The product might be equipped with multiple power cords. To remove all hazardous voltages, disconnect all power cords.
- Connect all power cords to a properly wired and grounded electrical outlet. Ensure that the outlet supplies proper voltage and phase rotation according to the system rating plate.
- Connect any equipment that will be attached to this product to properly wired outlets.
- When possible, use one hand only to connect or disconnect signal cables.
- Never turn on any equipment when there is evidence of fire, water, or structural damage.
- Disconnect the attached power cords, telecommunications systems, networks, and modems before you open the device covers, unless instructed otherwise in the installation and configuration procedures.
- Connect and disconnect cables as described in the following procedures when installing, moving, or opening covers on this product or attached devices.

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

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

  (D005)

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

Preparing to replace the disk drive

1. Return to the Hardware Service Manager (HSM) console and wait until the Concurrent Maintenance Results display is shown.
2. Press F12.
3. The physical locations you entered while removing the disk drive might still show on the display. If not, retype the physical location where you want to install 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.
4. Select option **2** (Install device) for the Action to be performed.
5. Set the time delay for one minute:01.

Important: Do not press Enter at this time.

Proceed to replace the disk drive.

Replacing a disk drive in the 8231-E2B, 8231-E1C, or 8231-E2C

1. Use the service indicator light-emitting diodes (LEDs) to help identify the part. For information, see Identifying a part.
2. Use the location information that you recorded while removing the disk drives to install or replace the internal disk drives to the correct locations.
3. Find the package that contains the new disk drive.

    Attention: Disk drives are fragile. Handle with care.
4. Remove the disk drive from the static-protective package.
5. If the slot you want to use contains a disk drive filler, remove the disk drive filler from the slot. For instructions, see "Removing a disk drive filler from the 8231-E2B, 8231-E1C, or 8231-E2C system" on page 89.
6. If the disk drive you are installing does not have a bezel preinstalled, then perform the tasks to install a bezel on the disk drive, then continue with this procedure from step 7. For instructions to install a bezel, see "Installing a disk drive bezel in a disk drive or filler" on page 94.
7. 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.
8. Hold the disk drive by the top and bottom edges as you position the drive, and insert it into the system or the expansion unit. Do not hold the disk drive by the handle.
9. Slide the disk drive halfway into the system or expansion unit.
10. Press Enter on the console.
11. When the service indicator starts flashing, slide the disk drive all the way into the system or expansion unit, and push the disk drive handle **(A)** in until it locks, as shown in Figure 33 on page 72.

    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.
    - The light stops flashing and remains on when you have installed the disk drive properly.

Figure 33. Installing a disk drive in the 8231-E2B, 8231-E1C, or 8231-E2C

Completing the disk drive replace by using the HSM

1. Return to the console and wait until the Concurrent Maintenance Results display is shown. Press Enter.
2. If you return to the Service Action Log display, exit the service action log.
3. When the Hardware Service Manager display is shown, press F3.

Completing the procedure

1. Verify the installed part:
   - If you replaced the part because of a failure, verify the installed part. For instructions, see Verifying a repair.
   - If you installed the part for any other reason, verify the installed part. For instructions, see Verifying the installed part.
2. To configure the newly installed disk drive, see the procedure for the operating system or logical partition that controls the disk drive:
   - Preparing a disk drive for use in an AIX system or logical partition.
   - Preparing a disk drive for use in a Linux system or logical partition
   - Configuring a disk drive in an IBM i system or logical partition.
3. To rebuild the data on the replacement disk drive, see the procedure for the operating system or logical partition that controls the disk drive:
   - Rebuilding data on a replacement drive using AIX.
   - Rebuilding data on a replacement drive using Linux.
   - Rebuilding data on a replacement drive using IBM i.

Replacing a disk drive in an 8231-E2B, 8231-E1C, or 8231-E2C 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.

To complete this procedure, you must have already completed the removal procedure. For the removal procedure, see "Removing a disk drive using hot-spare in an IBM i system or logical partition from the 8231-E2B, 8231-E1C, or 8231-E2C" on page 52. If you are replacing a disk drive as part of a service procedure, continue to use the following procedure.

Preparing to replace the disk drive by using the HSM

Perform the following tasks by using the Hardware Service Manager (HSM):

1. Continue with the replacing of the disk drive after you have removed the disk drive.
2. Return to the console and wait until the Concurrent Maintenance Results display is shown.
3. Press F12.
4. The physical locations you entered while removing the disk drive might still appear on the display. If not, retype the physical location where you are installing the 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.
5. Select option **2** (Install device) for the Action to be performed.
6. Set the time delay for one minute:01.

   Important: Do not press Enter at this time.

Replacing a disk drive in the 8231-E2B, 8231-E1C, or 8231-E2C

1. Use the service indicator light-emitting diodes (LEDs) to help identify the part. For information, see Identifying a part.
2. Use the location information that you recorded while removing the disk drives to install or replace the internal disk drives to the correct locations.
3. Find the package that contains the new disk drive.

   Attention: Disk drives are fragile. Handle with care.
4. Remove the disk drive from the static-protective package.
5. If the slot you want to use contains a disk drive filler, remove the disk drive filler from the slot. For instructions, see "Removing a disk drive filler from the 8231-E2B, 8231-E1C, or 8231-E2C system" on page 89.
6. If the disk drive you are installing does not have a bezel preinstalled, then perform the tasks to install a bezel on the disk drive, then continue with this procedure from step 7. For instructions to install a bezel, see "Installing a disk drive bezel in a disk drive or filler" on page 94.
7. 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.
8. Hold the disk drive by the top and bottom edges as you position the drive, and insert it into the system or the expansion unit. Do not hold the disk drive by the handle.
9. Slide the disk drive halfway into the system or expansion unit.
10. Press Enter on the console.

11. When the service indicator starts flashing, slide the disk drive all the way into the system or expansion unit, and push the disk drive handle **(A)** in until it locks, as shown in Figure 34.

   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.
   - The light stops flashing and remains on when you have installed the disk drive properly.
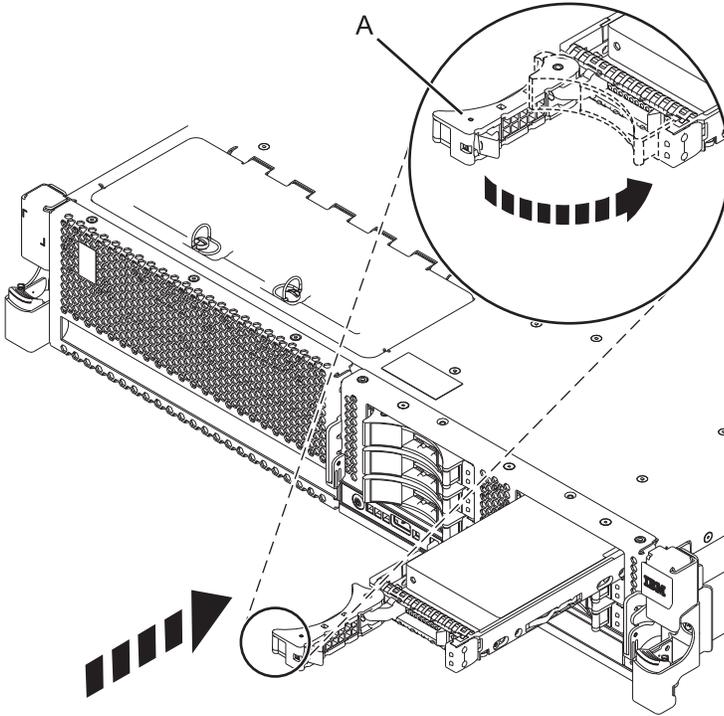

Figure 34. Installing a disk drive in the 8231-E2B, 8231-E1C, or 8231-E2C

Completing the procedure by using the HSM

1. Return to the HSM 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.
2. If you return to the Hardware Service Manager (HSM), exit the HSM.
3. Select **Work with disk units** from the Start System Service Tools display.
4. Select **Non-configured disk units** from the Work with Disk Units display, and press Enter.
5. 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.
6. Press **F3** to return to the Work with Disk Units display.
7. Select **Work with disk unit recovery** from the Work with Disk Units display, and press Enter.
8. Select **Disk unit problem recovery procedure**, and press Enter.
9. Select **Initialize and format disk unit**, and press Enter.

10. Select the new disk and press Enter.

   Note: This will take several minutes to complete.
11. When the disk drive is initialized and formatted, press **F3** to return to the Work with Disk Units display.
12. Select **Start hot spare**, and press Enter.
13. Select the IOA with the new disk, then press Enter and press Enter again.
14. 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.
15. 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.
16. Fail the previous hot spare disk drive by unlocking the disk drive handle by squeezing it and pulling it out toward you.
17. Pull the drive out about one inch and wait ten seconds.
18. Push the disk drive back into the slot and close the handle.
19. Return to step 1 on page 74 and start hot spare on the larger drive.

Replacing a SCSI disk drive in the 8231-E2B, 8231-E1C, or 8231-E2C

Learn how to replace a Small Computer System Interface (SCSI) disk drive in a system or expansion unit.

Replacing a disk drive in the 8231-E2B, 8231-E1C, or 8231-E2C

1. Use the service indicator light-emitting diodes (LEDs) to help identify the part. For information, see Identifying a part.
2. Use the location information that you recorded while removing the disk drives to install or replace the internal disk drives to the correct locations.
3. Find the package that contains the new disk drive.
   Attention: Disk drives are fragile. Handle with care.
4. Remove the disk drive from the static-protective package.
5. If the slot you want to use contains a disk drive filler, remove the disk drive filler from the slot. For instructions, see "Removing a disk drive filler from the 8231-E2B, 8231-E1C, or 8231-E2C system" on page 89.
6. If the disk drive you are installing does not have a bezel preinstalled, then perform the tasks to install a bezel on the disk drive, then continue with this procedure from step 7. For instructions to install a bezel, see "Installing a disk drive bezel in a disk drive or filler" on page 94.
7. 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.
8. Hold the disk drive by the top and bottom edges as you position the drive, and insert it into the system or the expansion unit. Do not hold the disk drive by the handle.
9. Slide the disk drive halfway into the system or expansion unit.
10. Press Enter on the console.

11. When the service indicator starts flashing, slide the disk drive all the way into the system or expansion unit, and push the disk drive handle **(A)** in until it locks, as shown in Figure 35.

> **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.
> - The light stops flashing and remains on when you have installed the disk drive properly.
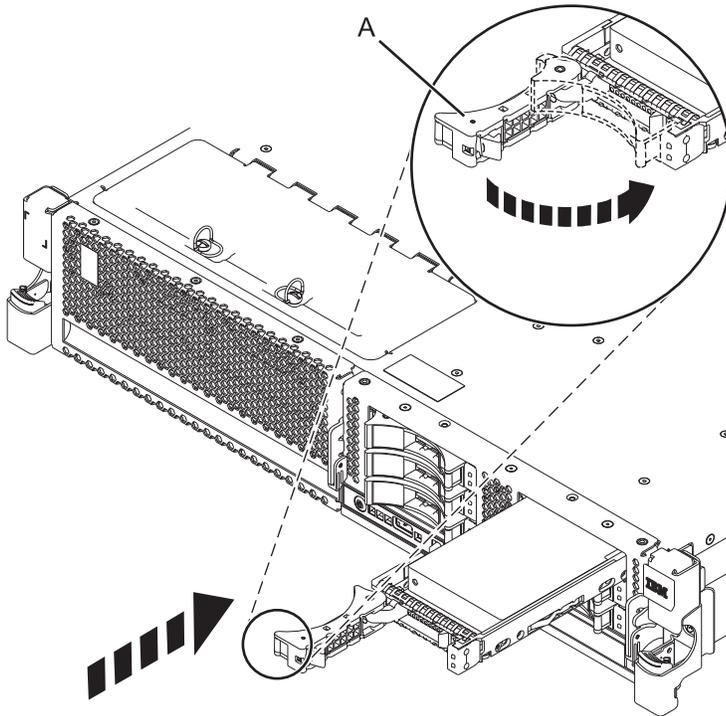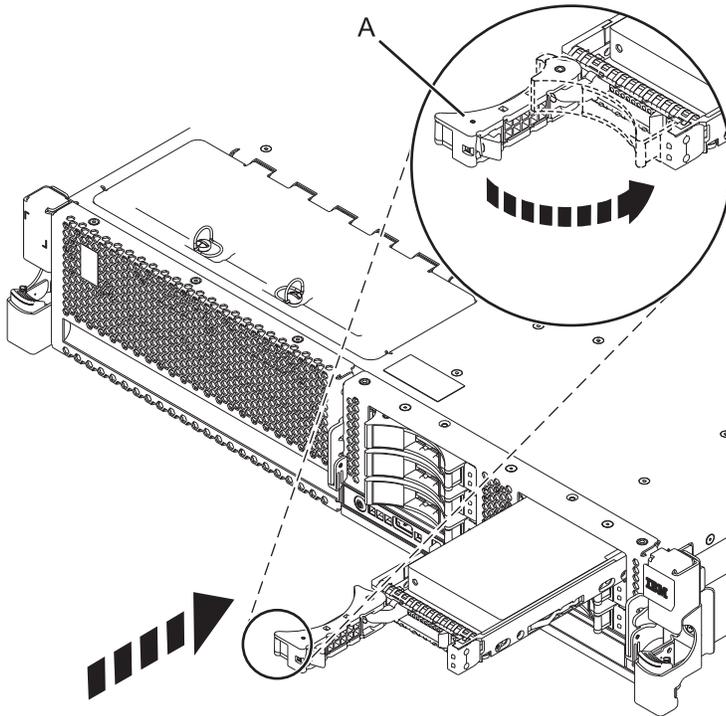

Figure 35. Installing a disk drive in the 8231-E2B, 8231-E1C, or 8231-E2C

Completing the disk drive replace by using the HSM

Perform the following steps using the Hardware Service Manager (HSM):
1. Press Enter.
2. Exit to the SCSI and SCSI RAID Hot-Plug Manager menu.
3. Select **Configure Added/Replaced Devices**. Press Enter.
4. Select the disk drive that you replaced and then press Enter.
   The disk drive is now configured.
5. Exit to the Task Selection display.
6. Select **Log Repair Action**.
7. Select the disk drive that you replaced and then press Enter.
8. Select **Commit** after you have made your selection and then press Enter.
9. Exit to the command line.

Completing the procedure

1. Verify the installed part:

- If you replaced the part because of a failure, verify the installed part. For instructions, see Verifying a repair.
- If you installed the part for any other reason, verify the installed part. For instructions, see Verifying the installed part.

2. To configure the newly installed disk drive, see the procedure for the operating system or logical partition that controls the disk drive:
   - Preparing a disk drive for use in an AIX system or logical partition.
   - Preparing a disk drive for use in a Linux system or logical partition
   - Configuring a disk drive in an IBM i system or logical partition.

3. To rebuild the data on the replacement disk drive, see the procedure for the operating system or logical partition that controls the disk drive:
   - Rebuilding data on a replacement drive using AIX.
   - Rebuilding data on a replacement drive using Linux.
   - Rebuilding data on a replacement drive using IBM i.

Replacing a disk drive in the 8231-E2B, 8231-E1C, or 8231-E2C with the system or logical partition power turned off

Learn to replace 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.

To complete this procedure, you must have already completed the removal procedure. For the removal procedure, see "Removing a disk drive from the 8231-E2B, 8231-E1C, or 8231-E2C with the system or logical partition power turned off" on page 56. If you are installing a new or upgraded disk drive, see "Installing a disk drive or solid-state drive in the 8231-E2B, 8231-E1C, or 8231-E2C with the system or logical partition power turned off" on page 31. If you are replacing 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)

Replacing a disk drive in the 8231-E2B, 8231-E1C, or 8231-E2C

1. Use the service indicator light-emitting diodes (LEDs) to help identify the part. For information, see Identifying a part.
2. Use the location information that you recorded while removing the disk drives to install or replace the internal disk drives to the correct locations.
3. Find the package that contains the new disk drive.

   Attention: Disk drives are fragile. Handle with care.
4. Remove the disk drive from the static-protective package.
5. If the slot you want to use contains a disk drive filler, remove the disk drive filler from the slot. For instructions, see "Removing a disk drive filler from the 8231-E2B, 8231-E1C, or 8231-E2C system" on page 89.
6. If the disk drive you are installing does not have a bezel preinstalled, then perform the tasks to install a bezel on the disk drive, then continue with this procedure from step 7. For instructions to install a bezel, see "Installing a disk drive bezel in a disk drive or filler" on page 94.
7. 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.

8. Hold the disk drive by the top and bottom edges as you position the drive, and insert it into the system or the expansion unit. Do not hold the disk drive by the handle.
9. Slide the disk drive halfway into the system or expansion unit.
10. Press Enter on the console.
11. When the service indicator starts flashing, slide the disk drive all the way into the system or expansion unit, and push the disk drive handle **(A)** in until it locks, as shown in Figure 36.

   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.
   - The light stops flashing and remains on when you have installed the disk drive properly.
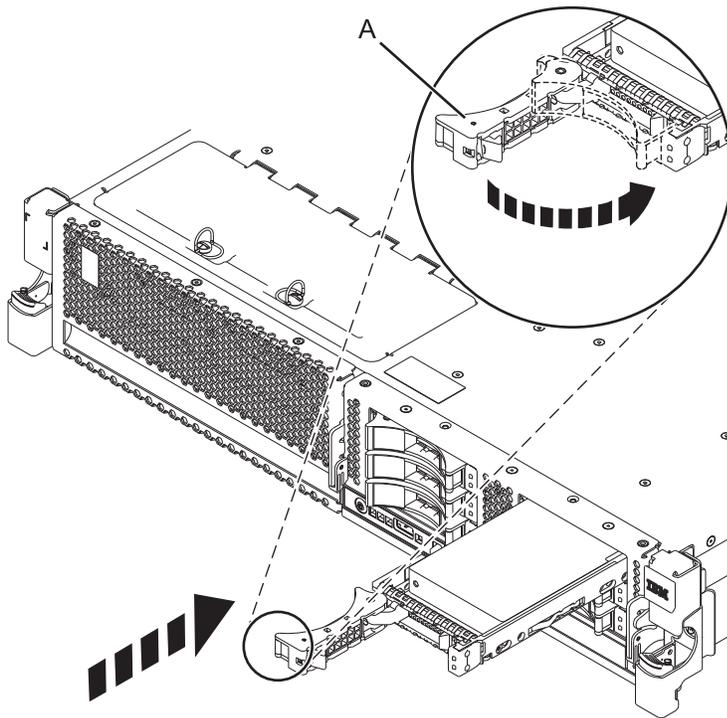
Figure 36. Installing a disk drive in the 8231-E2B, 8231-E1C, or 8231-E2C

Completing the procedure

1. Replace the service access cover. For instructions, see Installing the service access cover on a rack-mounted 8231-E2B, 8231-E1C, or 8231-E2C system.
2. Connect the power cords to the system. For instructions, see Connecting the power cords to the 8231-E2B, 8231-E1C, or 8231-E2C.
3. Place the system in the operating position. For instructions, see Placing the rack-mounted 8231-E2B, 8231-E1C, or 8231-E2C system into the operating position.
4. Start the system or logical partition. For instructions, see Starting the system or logical partition.
5. Verify the installed part:
   - If you replaced the part because of a failure, verify the installed part. For instructions, see Verifying a repair.
   - If you installed the part for any other reason, verify the installed part. For instructions, see Verifying the installed part.

6. To configure the newly installed disk drive, see the procedure for the operating system or logical partition that controls the disk drive:
   - Preparing a disk drive for use in an AIX system or logical partition.
   - Preparing a disk drive for use in a Linux system or logical partition
   - Configuring a disk drive in an IBM i system or logical partition.
7. To rebuild the data on the replacement disk drive, see the procedure for the operating system or logical partition that controls the disk drive:
   - Rebuilding data on a replacement drive using AIX.
   - Rebuilding data on a replacement drive using Linux.
   - Rebuilding data on a replacement drive using IBM i.

Installing the external SAS port in the 8231-E2B, 8231-E1C, or 8231-E2C system

Learn to install an external SAS port as a part of upgrading your disk drive backplane or to enable internal disk sharing.

If you want to replace a failed SAS port, see "Replacing the external SAS port in the 8231-E2B, 8231-E1C, or 8231-E2C system" on page 87. Perform the tasks in this procedure to install an SAS port in the system. Perform the prerequisite tasks as described in Before you begin.

Perform the following steps to connect the SAS cable to the external SAS connection port on the server system backplane:

1. Stop the system. For instructions, see Stopping the system or logical partition.
2. Disconnect the power source from the system by unplugging the system, as described in Disconnecting the power cords.

   (L003)

   or

3. Attach the wrist strap.

Attention:

- Attach a wrist strap to an unpainted metal 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 metal surface of the system for a minimum of 5 seconds.

4. Place the system into the service position. For instructions, see Placing a rack-mounted 8231-E2B, 8231-E1C, or 8231-E2C system into the service position.

5. Remove the service access cover. For instructions, see Removing the service access cover from a rack-mounted 8231-E2B, 8231-E1C, or 8231-E2C system.

6. Disconnect all PCI adapters that are attached to the system. For instructions, see Removing a PCI adapter.

7. If you are installing into a new system, remove the filler from the external SAS connection port on the disk drive backplane.

8. Connect the SAS shroud of the SAS cable to the external SAS connection port **(C)** at the rear of the system backplane until it snaps in place, see Figure 37.

9. Lay the cable **(A)** beside the side wall and slide it towards the SAS connection port on the disk drive backplane.

10. Push the SAS shroud **(B)** into the SAS connection port on the disk drive backplane until it snaps in place.
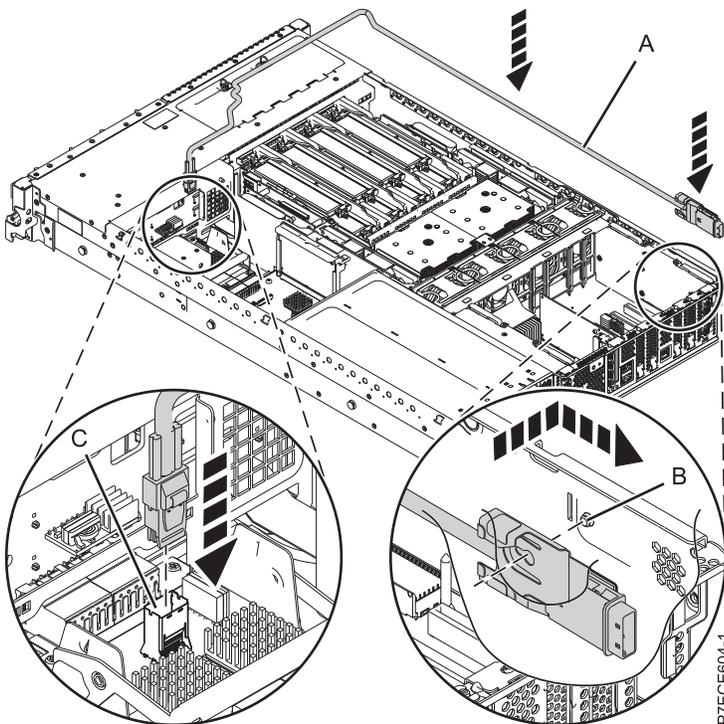
Figure 37. Installing the SAS cable

11. Connect all PCI adapters. For instructions, see Replacing a PCI adapter.

12. Place the system in the operating position. For instructions, see Placing the rack-mounted 8231-E2B, 8231-E1C, or 8231-E2C system into the operating position.

13. Replace the service access cover. For instructions, see Installing the service access cover on a rack-mounted 8231-E2B, 8231-E1C, or 8231-E2C system.
14. Connect the power cords to the system. For instructions, see Connecting the power cords to the 8231-E2B, 8231-E1C, or 8231-E2C.
15. Start the system or logical partition. For instructions, see Starting the system or logical partition.
16. Verify the installed part:
    - If you replaced the part because of a failure, verify the installed part. For instructions, see Verifying a repair.
    - If you installed the part for any other reason, verify the installed part. For instructions, see Verifying the installed part.

You can now attach other supported SAS features to the system.

Removing the external SAS port from the 8231-E2B, 8231-E1C, or 8231-E2C system

Learn to remove a failed SAS port from the disk drive backplane as part of a service procedure.

Perform the prerequisite tasks as described in Before you begin.

Perform the following steps to remove the SAS cable from the external SAS connection port on the server system backplane:

1. Stop the system. For instructions, see Stopping the system or logical partition.
2. Disconnect the power source from the system by unplugging the system. For instructions, see Disconnecting the power cords.

   Note: This system can be equipped with a second power supply. Disconnect it before continuing with this procedure. Ensure that the power source to the system has been disconnected.

   (L003)

   or

3. Attach the wrist strap.

Attention:

- Attach a wrist strap to an unpainted metal 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 metal surface of the system for a minimum of 5 seconds.

4. Place the system into the service position. For instructions, see Placing a rack-mounted 8231-E2B, 8231-E1C, or 8231-E2C system into the service position.

5. Remove the service access cover. For instructions, see Removing the service access cover from a rack-mounted 8231-E2B, 8231-E1C, or 8231-E2C system.

6. Disconnect all PCI adapters. For instructions, see Removing a PCI adapter.

7. Press the side tab **(B)** and pull out the SAS shroud from the external SAS connection port on the disk drive backplane. See Figure 38.

8. Pull out the SAS cable **(C)** from the system.

9. Push the SAS connection port down **(A)** and then dislodge the SAS cable **(C)** out of the system backplane.
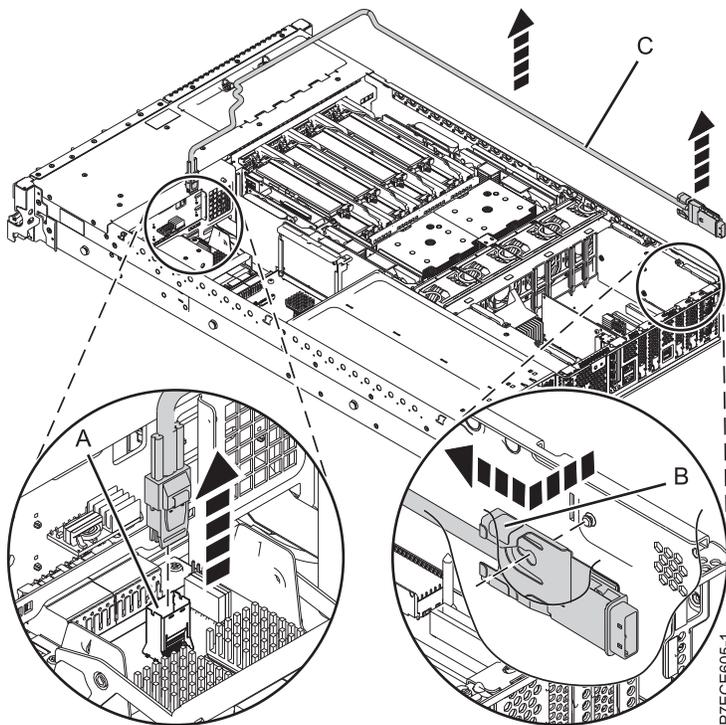
Figure 38. Removing the external SAS port

- You can continue with the procedure to replace the SAS port. See "Replacing the external SAS port in the 8231-E2B, 8231-E1C, or 8231-E2C system" on page 87.
- If you are not replacing the SAS port, you can install a filler into the external SAS connection port on the disk drive backplane.

Replacing the external SAS port in the 8231-E2B, 8231-E1C, or 8231-E2C system

Learn to replace an external SAS port as part of a service procedure.

Perform the prerequisite tasks as described in Before you begin.

Attention: You must have removed the failed external SAS port before you can replace it. Perform this procedure to replace the failed SAS port on the system backplane:

1. Attach the wrist strap.

   Attention:

   - Attach a wrist strap to an unpainted metal 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 metal surface of the system for a minimum of 5 seconds.

2. Connect the SAS shroud of the SAS cable to the external SAS connection port **(C)** at the rear of the system backplane until it snaps in place. See Figure 39 on page 88.

3. Lay the cable **(A)** beside the side wall and slide it toward the SAS connection port on the disk drive backplane.

4. Push the SAS shroud **(B)** into the SAS connection port on the disk drive backplane until it snaps in place.
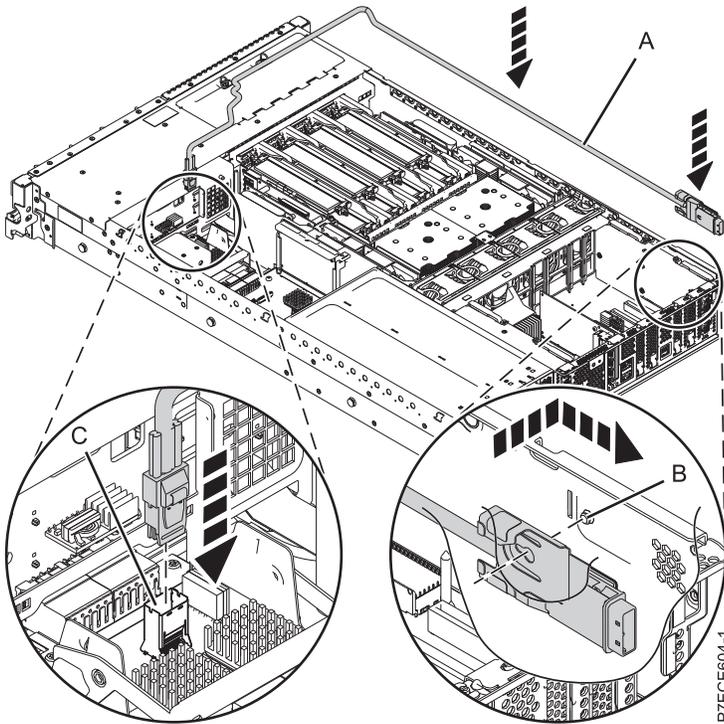
Figure 39. Replacing the SAS cable

5. Connect all PCI adapters. For instructions, see Replacing a PCI adapter.
6. For a rack-mounted system, place the system into the operating position as described in Placing a rack-mounted 8231-E2B, 8231-E1C, or 8231-E2C system into the operating position.
7. Replace the service access cover. For instructions, see Installing the service access cover on a rack-mounted 8231-E2B, 8231-E1C, or 8231-E2C system.
8. Connect the power source to the system by plugging the power cords. For instructions, see Connecting the power cords.
9. Start the system or logical partition. For instructions, see Starting the system or logical partition.
10. Verify the installed part:
    - If you replaced the part because of a failure, verify the installed part. For instructions, see Verifying a repair.
    - If you installed the part for any other reason, verify the installed part. For instructions, see Verifying the installed part.

You can now attach other supported SAS features to the system.

Removing or installing a disk drive filler

Learn how to remove or install a Small Computer System Interface (SCSI) disk drive filler in the server or expansion unit.

Note: Refill the disk drive slots with either another disk drive or a disk drive filler. Filling the disk drive slot ensures proper air flow for cooling and maintains an optimal EMI compliance.

Removing a disk drive filler from the 8231-E2B, 8231-E1C, or 8231-E2C system

Learn how to remove a Small Computer System Interface (SCSI) disk drive filler from the server or expansion unit.

When you are installing a disk drive in a system or an expansion unit, the slot you want to use can contain a disk drive filler.

To remove the filler before installing a disk drive in the slot, complete the following steps:
1. Remove the system unit door, expansion unit door, or open the rack front door.
2. Identify the slot that contains the disk drive filler.

   Attention:
   - Attach a wrist strap to an unpainted metal 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 metal surface of the system for a minimum of 5 seconds.
3. Hold the filler handle **(A)** and pull out the disk drive filler from the slot, as shown in Figure 40 on page 90.
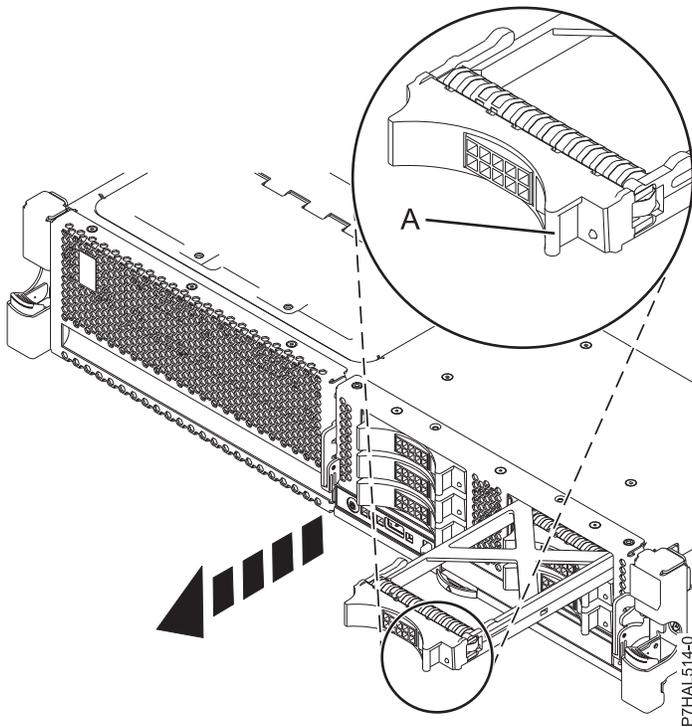
Figure 40. Removing a disk drive filler from the 8231-E2B, 8231-E1C, or 8231-E2C

Return to the procedure that you brought you here.

Installing a disk drive filler in the 8231-E2B, 8231-E1C, or 8231-E2C system

You might need to install a Small Computer System Interface (SCSI) disk drive filler in the server or expansion unit.

When you remove a disk drive from a system or an expansion unit, you can install a disk drive filler in the slot if you are not installing a replacement disk drive.

To install a disk drive filler in a system or an expansion unit, complete the following steps:

1. Hold the disk drive filler by the top and bottom edges as you position the filler, and insert it into the system or the expansion unit.

   Attention:

   - Attach a wrist strap to an unpainted metal 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 metal surface of the system for a minimum of 5 seconds.

2. Slide the disk drive filler all the way into the system or expansion unit, and push the disk drive filler handle **(A)** until it locks, as shown in Figure 41 on page 91.
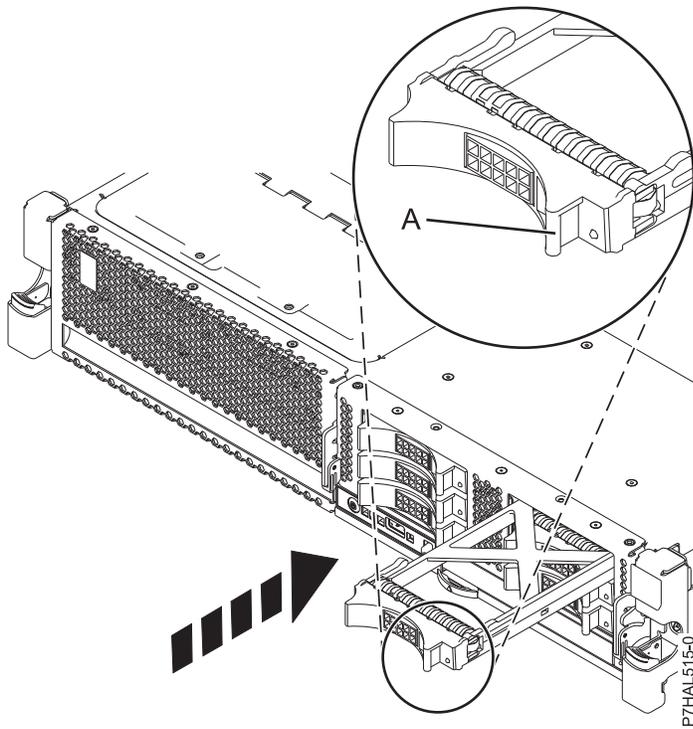
Figure 41. Installing a disk drive filler in the 8231-E2B, 8231-E1C, or 8231-E2C.

Return to the procedure that you brought you here.

Removing or installing a disk drive bezel

Learn how to remove or install the disk drive bezel from and into a disk drive.

Removing a disk drive bezel from a disk drive or filler

Learn how to remove a disk drive bezel from a disk drive or a disk drive filler.

Learn to remove the disk drive bezel from either a failed disk drive that had a bezel installed in it or from the disk drive filler in the slot where you are replacing the failed disk drive. The removed disk drive bezel must be attached in the replacement disk drive or a disk drive filler before installing the disk drive or filler in the system or expansion unit. To install a disk drive filler, see "Installing a disk drive bezel in a disk drive or filler" on page 94. Perform the steps in this procedure only if the disk drive or the disk drive filler has a disk drive bezel attached to it.

Important: If the disk drive bezel does not have a thumbscrew, it is not removable and is a SAS disk drive.

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. From the removed disk drive or disk drive filler, gently pull off the disk drive bezel latch **(A)** from the front of the filler, as shown in Figure 42 on page 94.
2. Loosen and then pull out on the thumbscrew **(C)** to release the bezel **(B)** from the front edge of the filler.
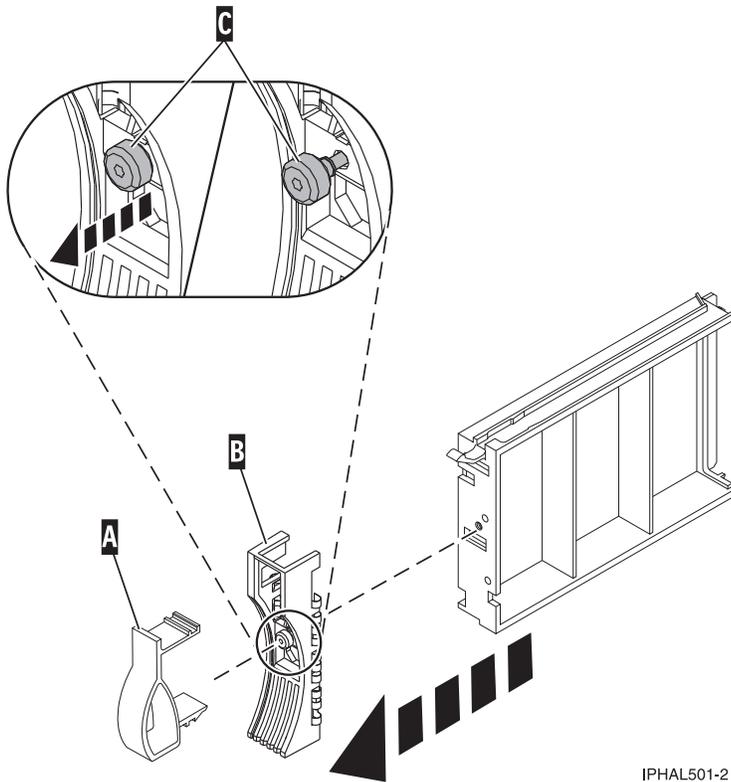
Figure 42. Removing a disk drive bezel

3. Retain the removed disk drive bezel safely and use the removed bezel to attach it to the replacement disk drive or a disk drive filler.

Return to the procedure that brought you here.

Installing a disk drive bezel in a disk drive or filler

Learn how to install a disk drive bezel into a disk drive.

You must have removed the disk drive bezel from either a failed disk drive that had a bezel installed in it or from the disk drive filler. To remove a disk drive filler, see "Removing a disk drive bezel from a disk drive or filler" on page 93. Perform the steps in this procedure only if the disk drive or the disk drive filler removed had a disk drive bezel attached to it.

Note: If the disk drive bezel does not have a thumbscrew, it is not removable and is a SAS disk drive. The replacement SAS disk drive comes with an attached bezel.

1. Attach the disk drive bezel **(A)** to the disk drive or to a disk drive filler.

   Attention:

   - Attach a wrist strap to an unpainted metal 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 metal surface of the system for a minimum of 5 seconds.

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

3. Install the disk drive bezel latch **(C)** onto the front of the disk drive or filler, as shown in Figure 43.
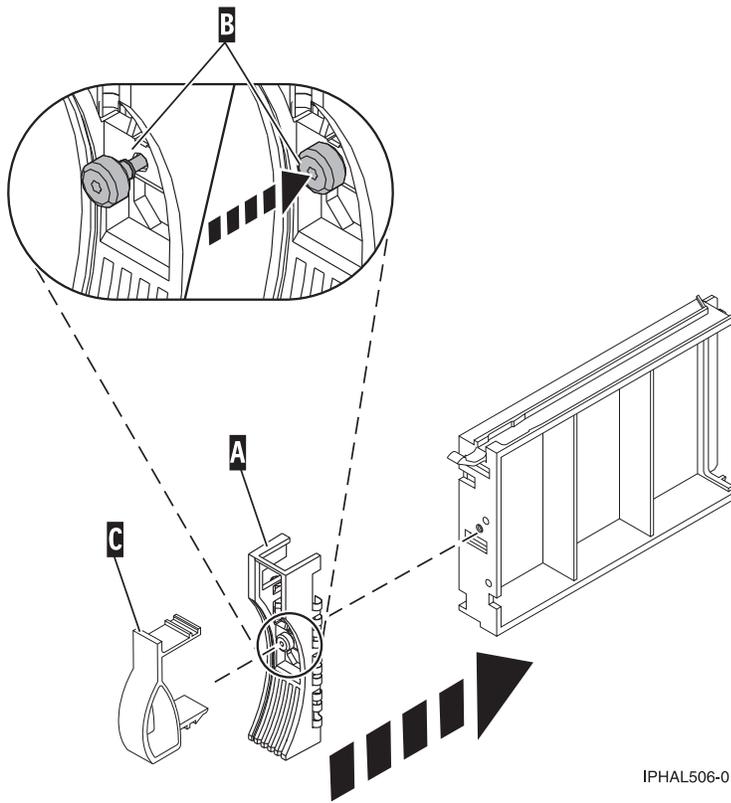
Figure 43. Attaching a bezel to a disk drive filler

Return to the procedure that brought you here.

Disk drive locations and service indicators

Find out where the disk drives and service indicators are located on the system or an expansion unit.

Learn about the disk drive locations and location of the service indicators on the system or expansion unit.

PCIe RAID and SSD SAS adapter locations

Learn about the PCIe RAID and SSD SAS adapter locations and the location of the service indicators on the PCIe RAID and SSD SAS adapter.

The figure Figure 44 shows the PCIe RAID and SSD SAS adapter locations.
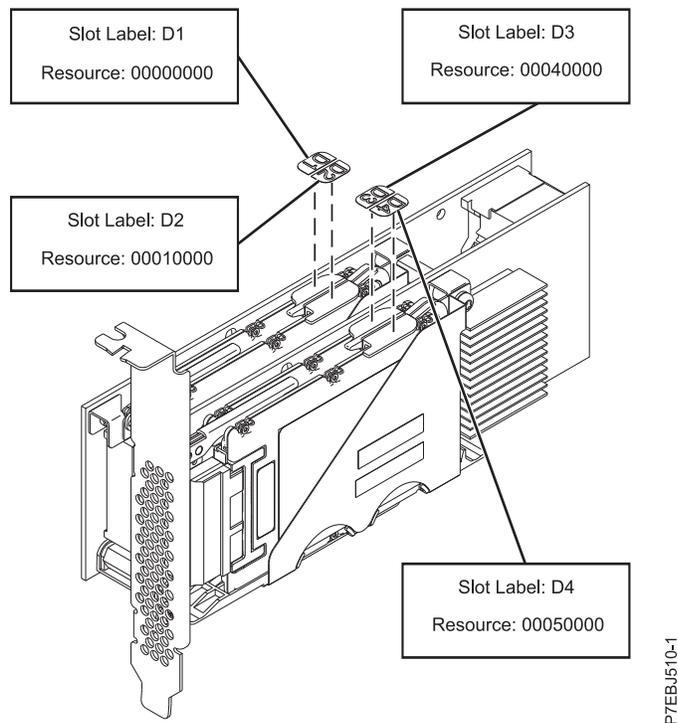
Figure 44. PCIe RAID and SSD SAS adapter locations

Disk drive locations and service indicators for the 8231-E2B, 8231-E1C, or 8231-E2C system

Learn about the disk drive locations and the location of the service indicators on the system.

The following figures show the disk drive locations and service indicators for the 8231-E2B, 8231-E1C, or 8231-E2C. Service indicators are located above the latch handle on the disk drives.
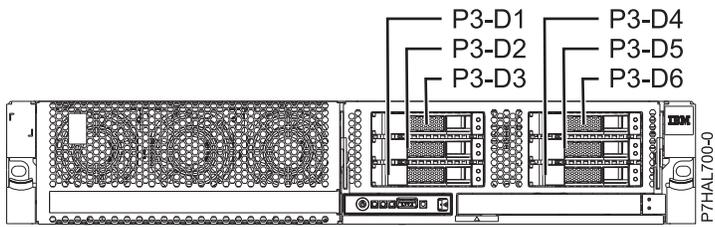
Figure 45. Disk-drive locations for systems with six small-form factor (SFF) bays
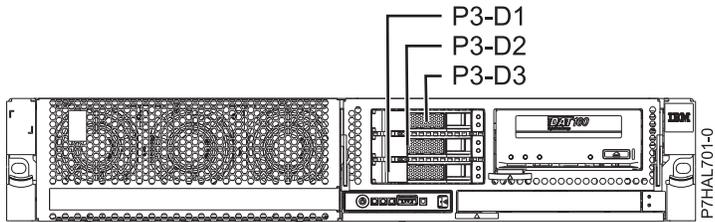
Figure 46. Disk-drive locations for systems with three SFF bays (optional)
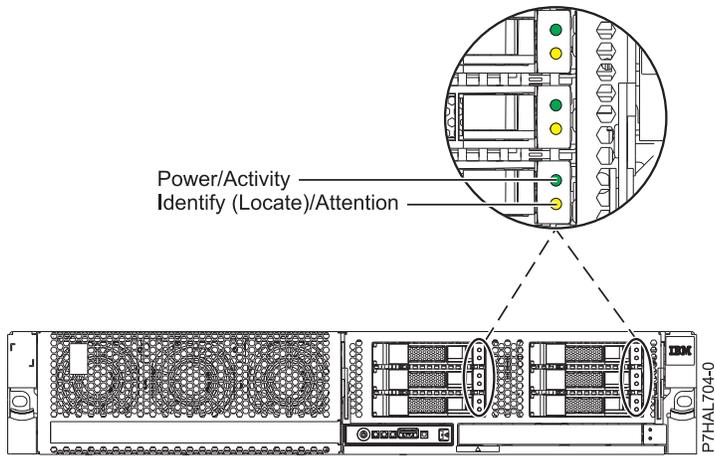
Figure 47. Service indicators locations for systems with six SFF bays

Power/Activity

Identify (Locate)/Attention
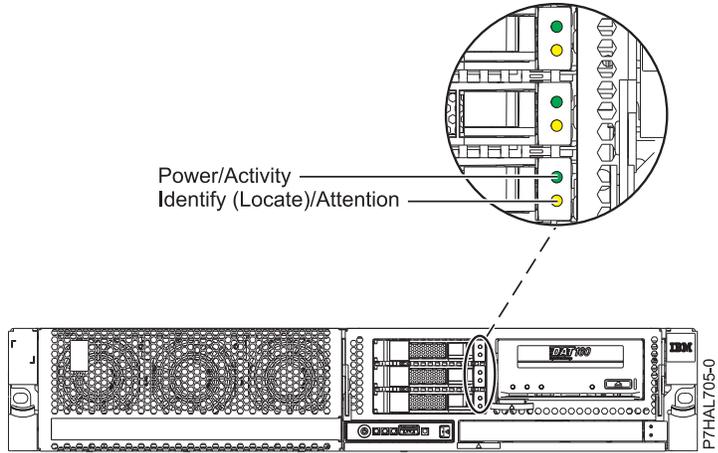
Figure 48. Service indicators locations for systems with three SFF bays (optional)

Disk drive locations and service indicators for the 5886 disk-drive enclosure

Learn about the disk drive locations and where the service indicators are located for your disk-drive enclosure.

The following figure shows the disk drive locations for the 5886 disk-drive enclosure.

P1-D1	P1-D2	P1-D3	P1-D4
P1-D5	P1-D6	P1-D7	P1-D8
P1-D9	P1-D10	P1-D11	P1-D12

Front View

C1   C2
E1   Back View   E2
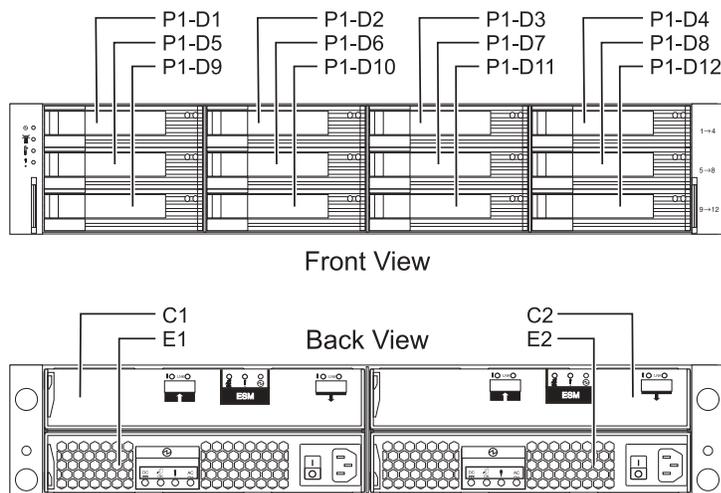
Figure 49. Disk drive locations for the 5886 disk-drive enclosure

The following figure shows the locations of the disk drive service indicators for the 5886 disk-drive enclosure.
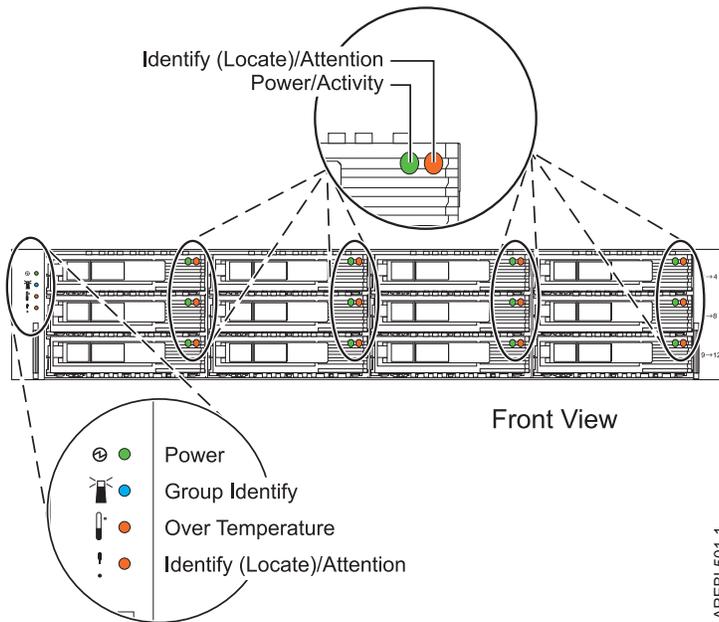
Figure 50. Front view of disk-drive enclosure service indicators for the 5886

Disk-drive locations and service indicators for the 5887 disk-drive enclosure

Learn about the disk-drive locations and where the service indicators are located for the 5887 disk-drive enclosure.

The following figures show the front view and rear view of the 5887 disk-drive enclosure and the disk drive locations in the 5887 enclosure.
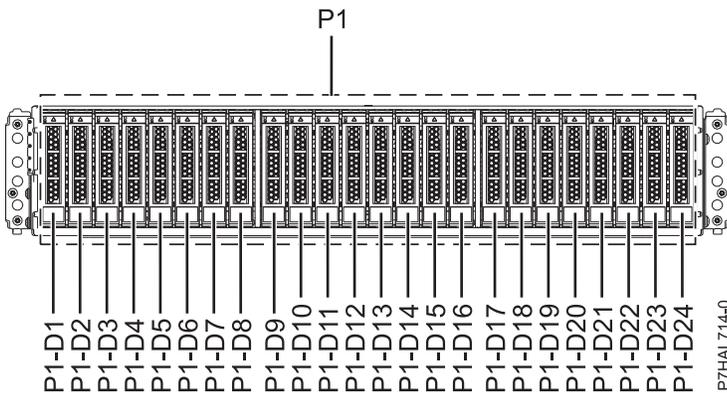
Figure 51. Front view of the 5887 disk-drive enclosure showing the disk-drive locations
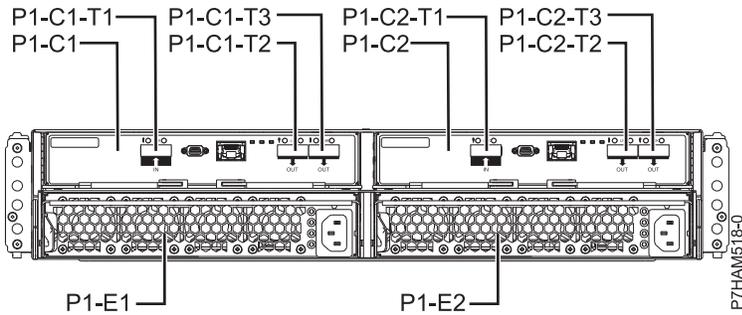
Figure 52. Rear view of the 5887 disk-drive enclosure

The following figure shows the locations of the disk-drive service indicators for the 5887 disk-drive enclosure.
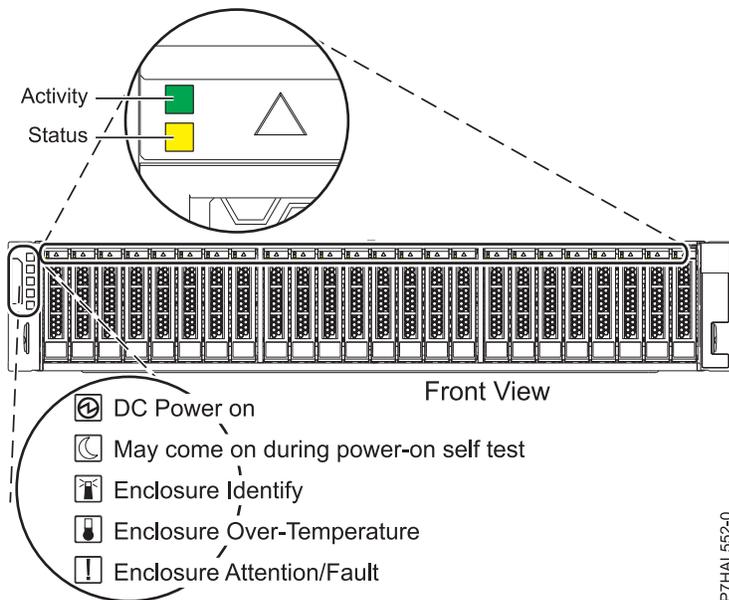
Figure 53. Front view of the 5887 disk-drive enclosure showing the service indicators

Disk drive locations and service indicators for the 5786, 5787, 7031-D24, and 7031-T24 SCSI disk-drive enclosures

Learn about the disk drive locations and where the service indicators 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 rear of the 5786, 5787, 7031-D24, and 7031-T24 SCSI disk-drive enclosures.
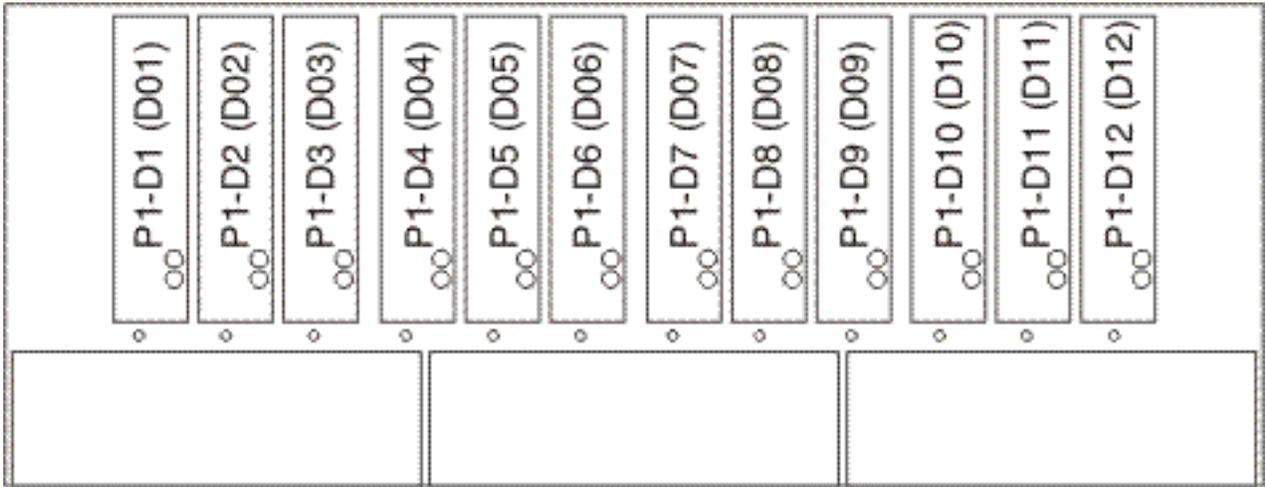
IPHAL975-0

Figure 54. Front view of 5786, 5787, 7031-D24, and 7031-T24 SCSI disk-drive enclosures
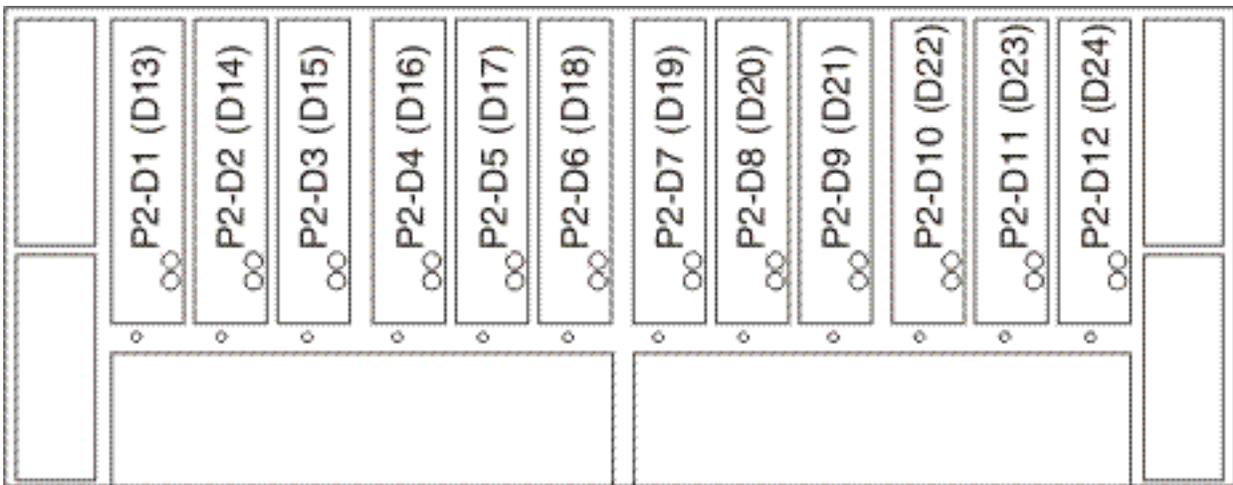
IPHAL976-0

Figure 55. Rear view of 5786, 5787, 7031-D24, and 7031-T24 SCSI disk-drive enclosures

The following figures show the locations of the disk drive service indicators **(A)** for the 5786, 5787, 7031-D24, and 7031-T24 SCSI disk-drive enclosures.
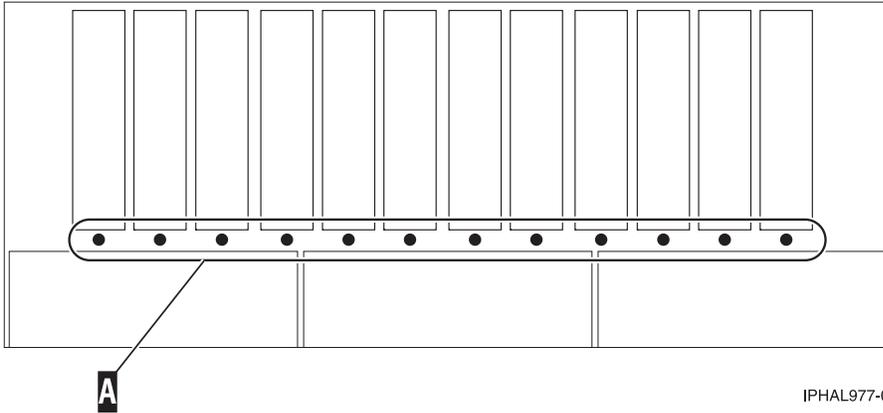
Figure 56. Front view of service indicators for 5786, 5787, 7031-D24, and 7031-T24
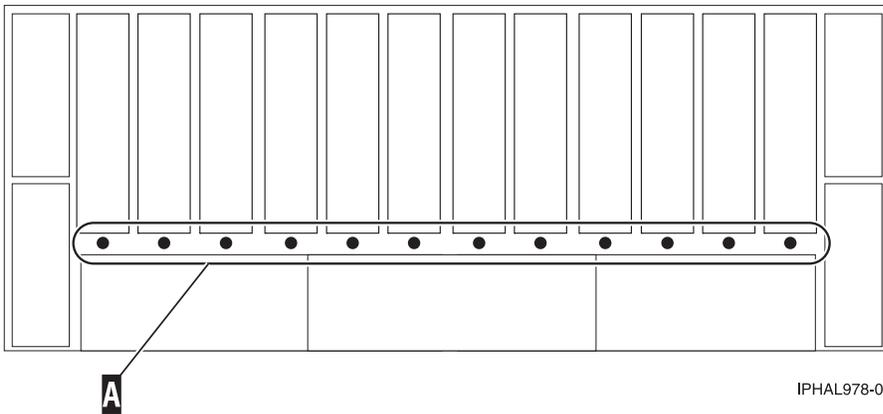
Figure 57. Rear view of service indicators for 5786, 5787, 7031-D24, and 7031-T24

Disk-drive locations and service indicators for the 5802 expansion unit

Learn about the disk-drive locations and where the service indicators are located for your expansion unit.

The following figure shows the disk-drive locations for the 5802.

Service indicators are located at the bottom of the latch handle on each disk drive.
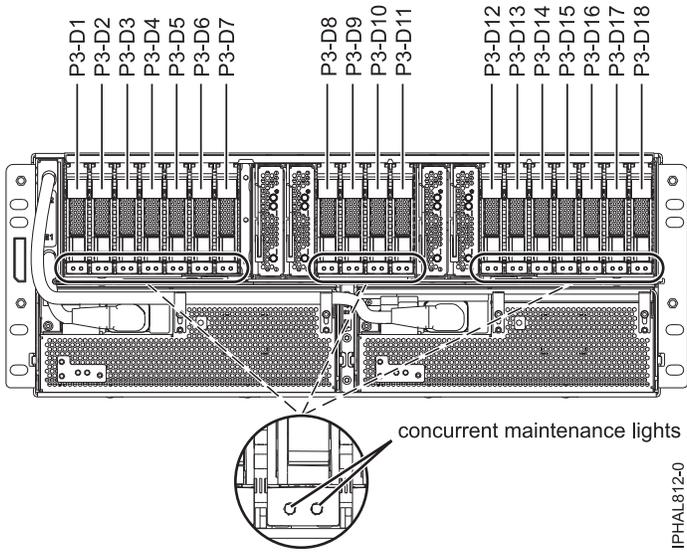
Figure 58. Disk drive locations

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.

Removing a disk drive using Linux kernel 2.6

Learn how to remove 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 59. 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 60. 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 61. 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 62. 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 service indicator turns on for that disk drive slot. .
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 metal 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 metal 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 63 on page 110. If the handle is not all the way out, the disk drive does not slide out of the system or expansion unit.
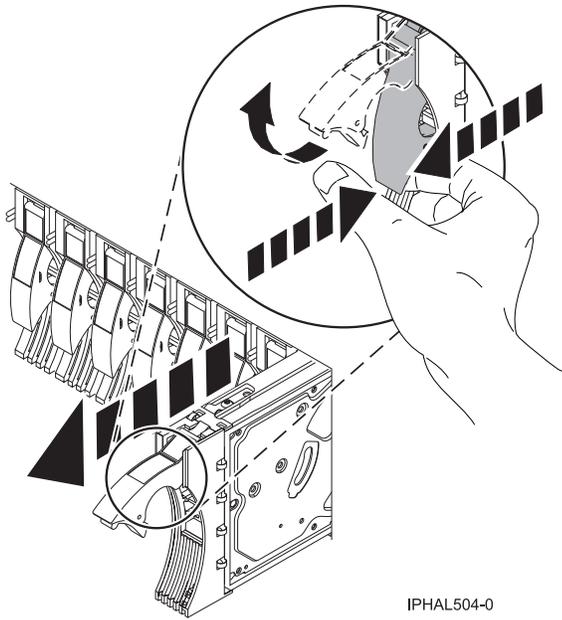
Figure 63. Removing a disk drive from a model or 7311-D20

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.
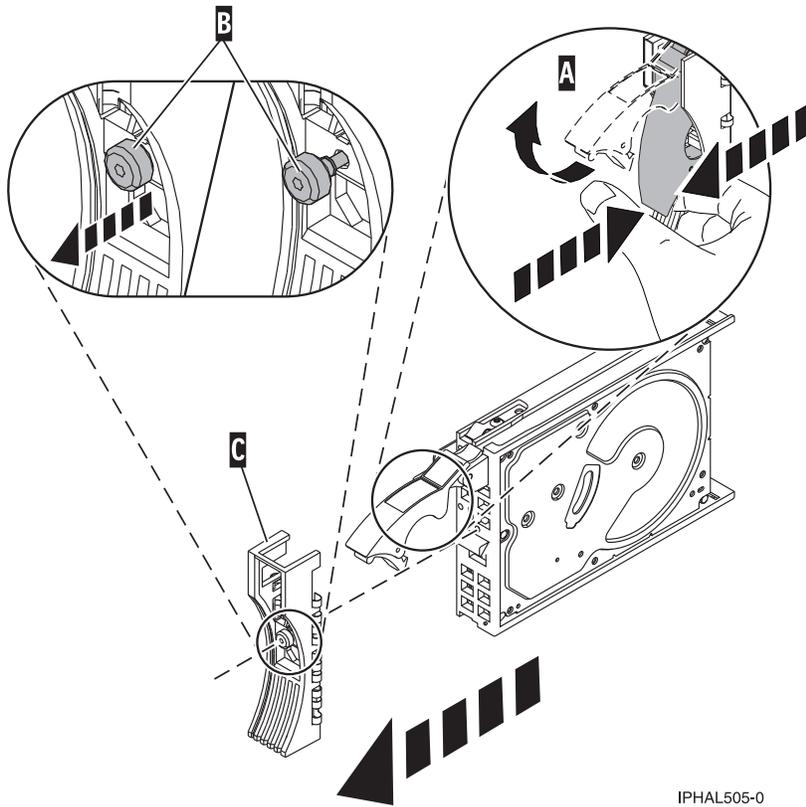
Figure 64. Removing a disk-drive bezel

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 65 on page 112.

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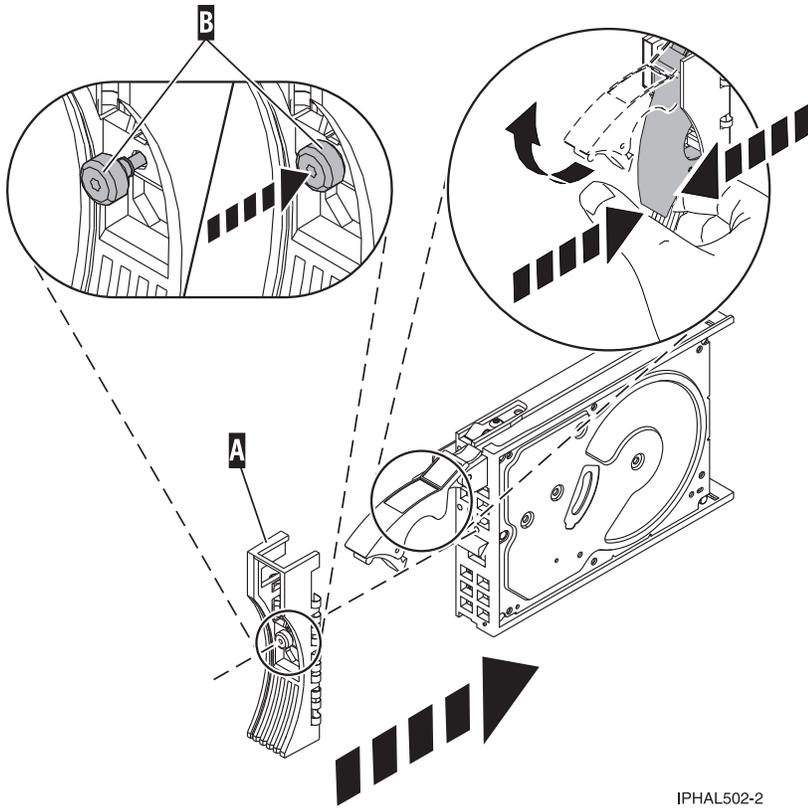
IPHAL502-2

Figure 65. 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 66. 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 67.

IPHAL503-0
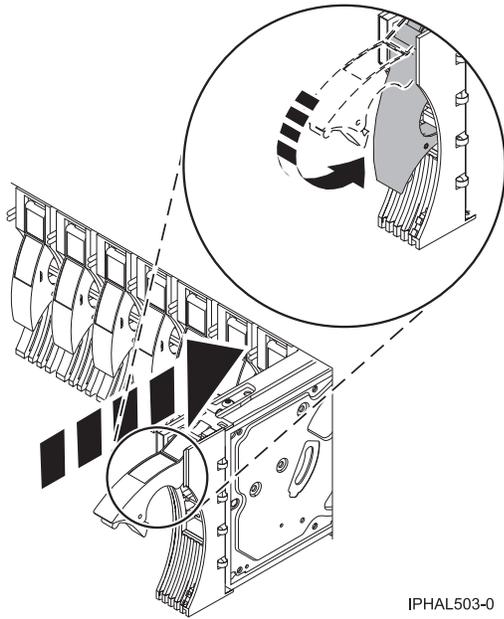
Figure 67. Installing a disk drive in a model or 7311-D20

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

Completing the procedure

1. Replace the front cover.
2. Install or close the system, expansion unit, or rack front door.
3. Verify the installed part:
   - If you replaced the part because of a failure, verify the installed part. For instructions, see Verifying a repair.
   - If you installed the part for any other reason, verify the installed part. For instructions, see Verifying the installed part.
4. To configure the newly installed disk drive, see the procedure for the operating system or logical partition that controls the disk drive:
   - Preparing a disk drive for use in an AIX system or logical partition.
   - Preparing a disk drive for use in a Linux system or logical partition
   - Configuring a disk drive in an IBM i system or logical partition.
5. To rebuild the data on the replacement disk drive, see the procedure for the operating system or logical partition that controls the disk drive:
   - Rebuilding data on a replacement drive using AIX.
   - Rebuilding data on a replacement drive using Linux.
   - Rebuilding data on a replacement drive using IBM i.

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.

Rebuild 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 68. 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
```
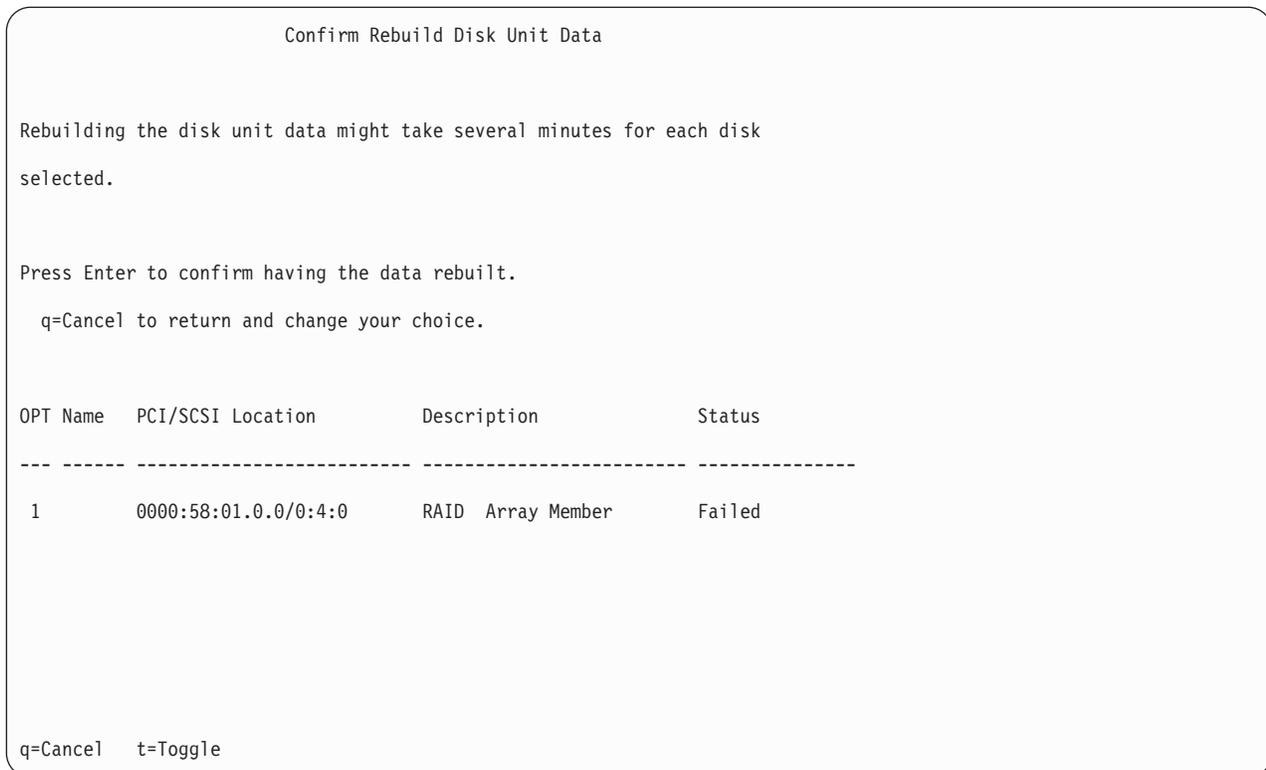
Figure 69. Example Confirm Rebuild Disk Unit Data display

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.

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

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 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 117.

2. **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 in an IBM i 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 web site 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 119 for mirroring or no protection, go to 1 on page 120 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 119.
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.

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 must determine the status of the disk drive in the load source slot and configure or exchange that disk drive, which might require you to turn off the power to 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 in the 8231-E2B, 8231-E1C, or 8231-E2C with the IBM i system or logical partition power turned on" on page 69.

   • 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 if it is running. For instructions on stopping the system, see Stopping the system or logical partition.

7. Exchange the disk drives from the two locations you recorded in step 5 on page 120 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

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

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.

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)
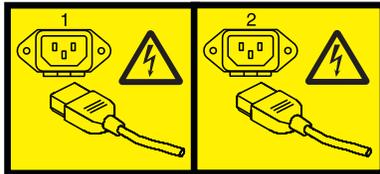
or

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 70 on page 123.
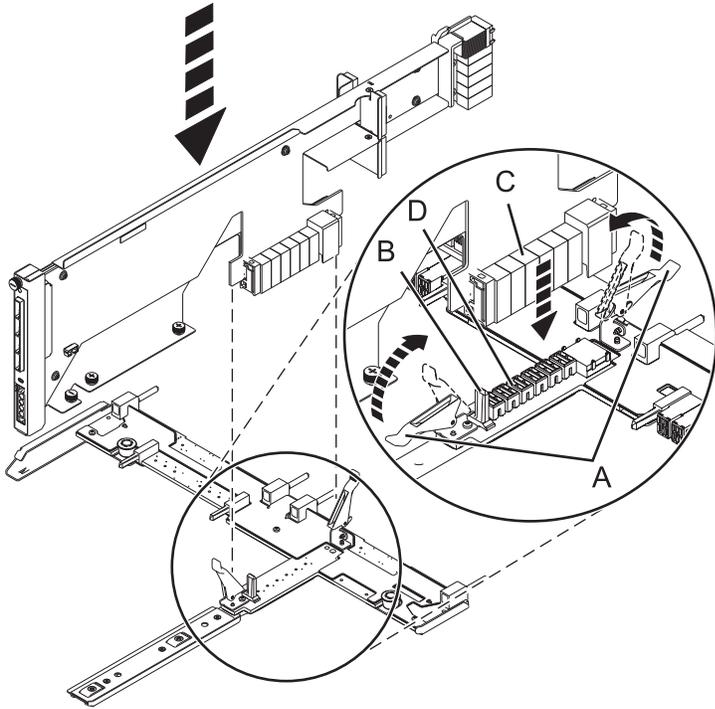
Figure 70. Installing the SAS conduit card into the midplane

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.
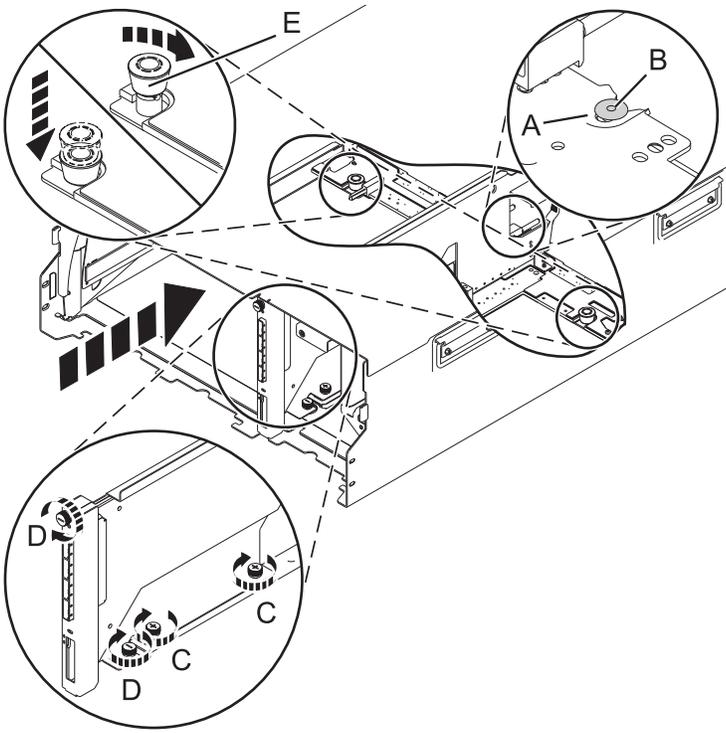
Figure 71. Installing the SAS conduit card and the midplane

5. Attach the power cord cover and secure the thumbscrew **(A)** to the system.
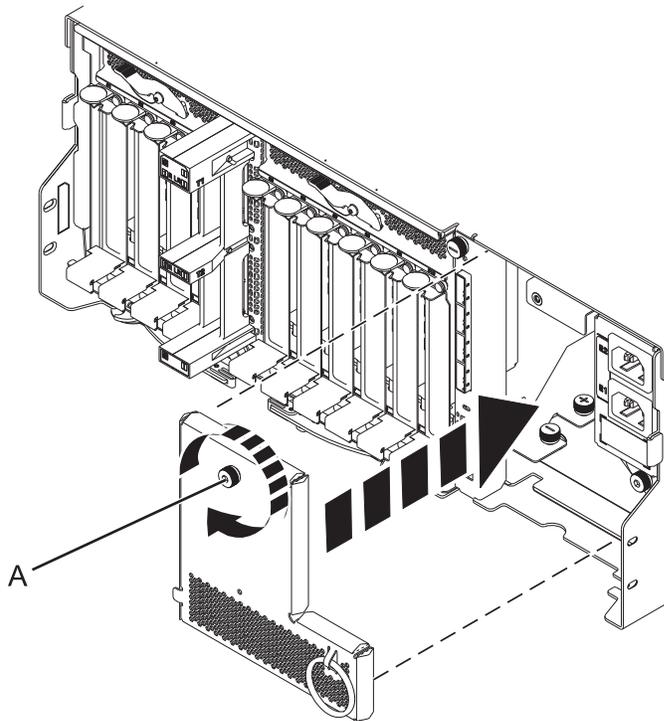
Figure 72. Installing the power cord plate

6. Carefully slide the enclosure management controller into the system and close the latch **(A)** as shown in Figure 73.
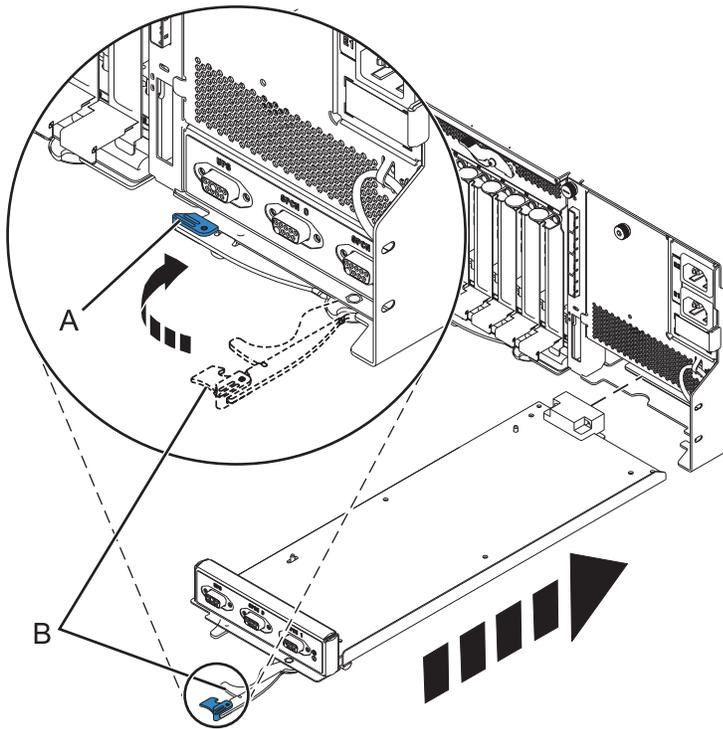
Figure 73. Replacing the enclosure management controller

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 74 on page 126.
9. Secure the I/O system board with the locking tabs **(A)**, as shown in Figure 74 on page 126.
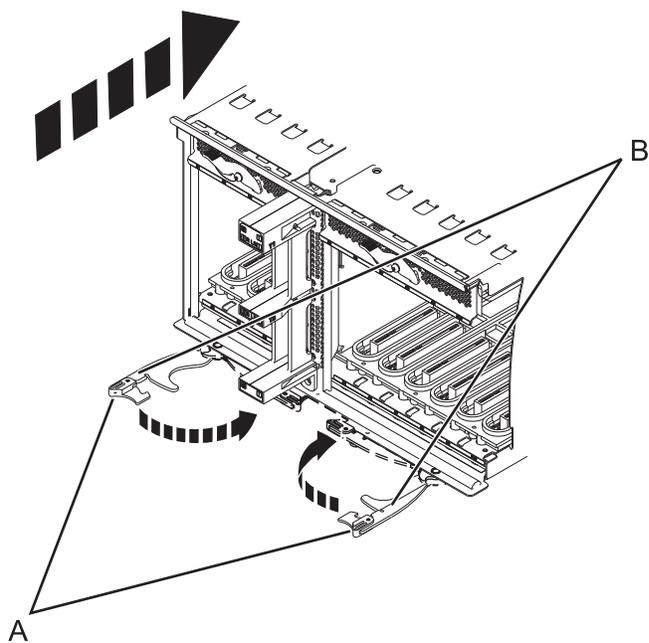
Figure 74. Install the I/O system board on a rack mounted model

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 75 on page 127.

11. Close the locking handle **(A)** until the power supply locks into position.
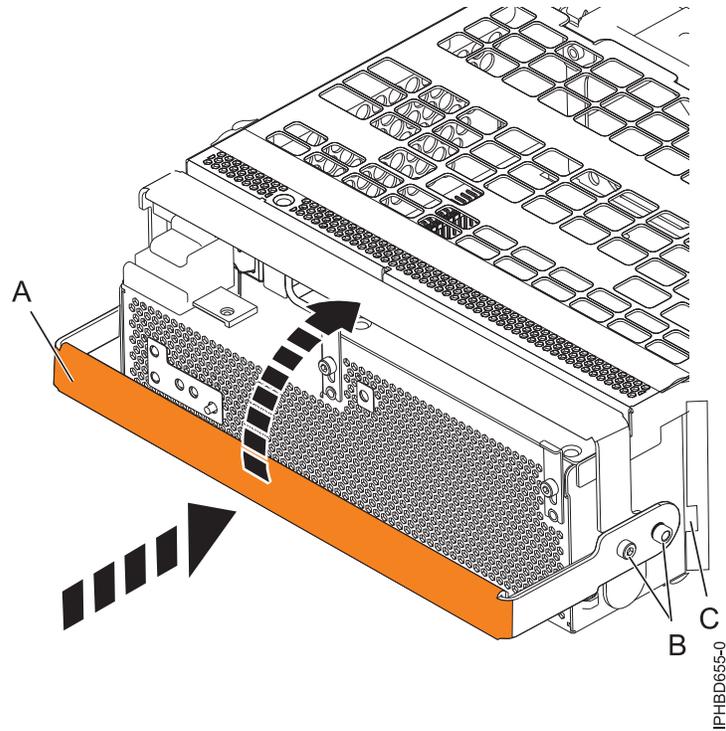
Figure 75. Replacing a power supply

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 76 on page 128.

14. Secure the backplane in place by moving the locking tabs from the open position **(B)** to the locked position **(A)**.
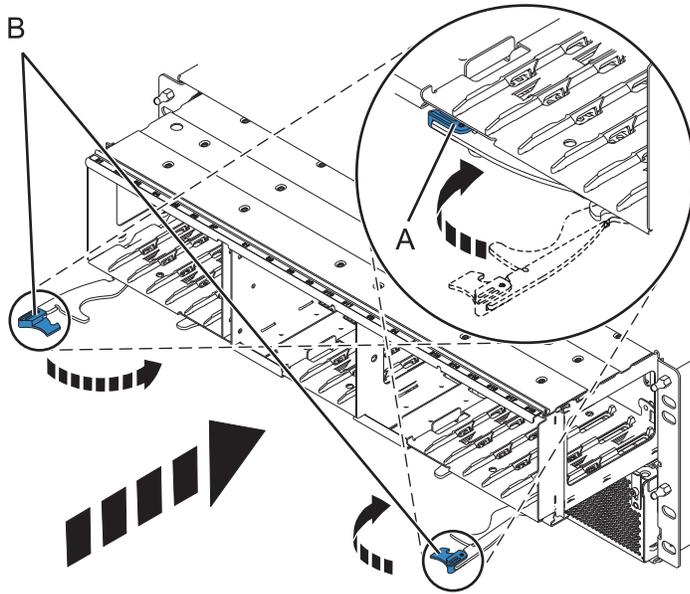
Figure 76. Installing the backplane on a rack-mounted model

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.
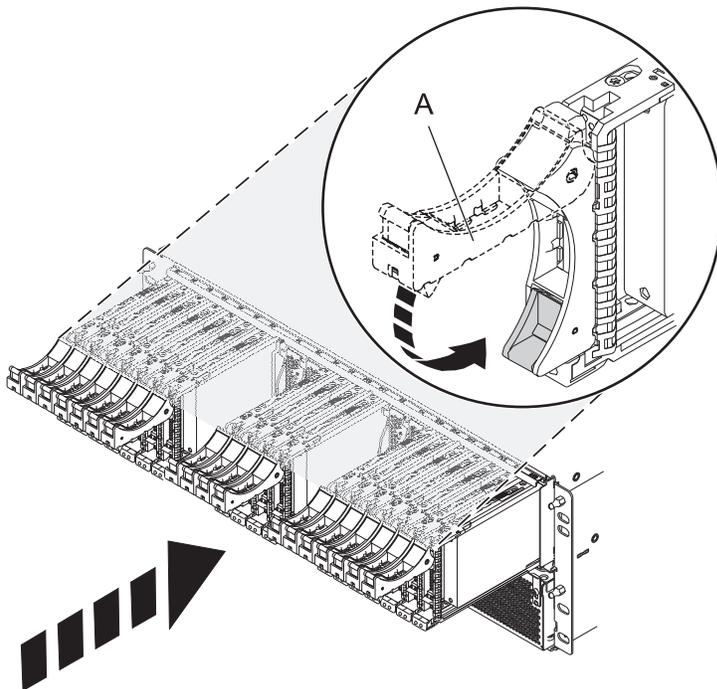
16. Replace all expander cards and fillers, if you had removed them earlier.

 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.
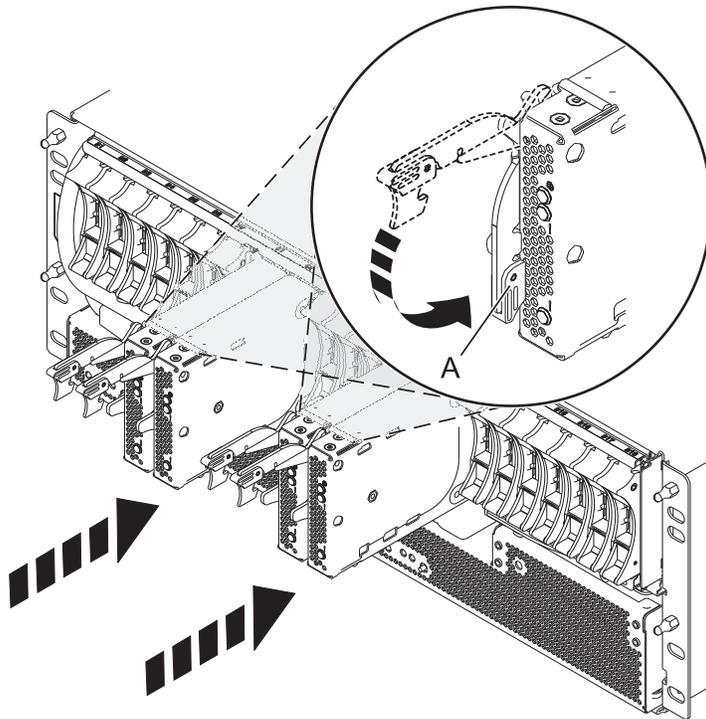
17. Start the system. For instructions, see Starting the system or logical partition.

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 77 on page 130.

 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.
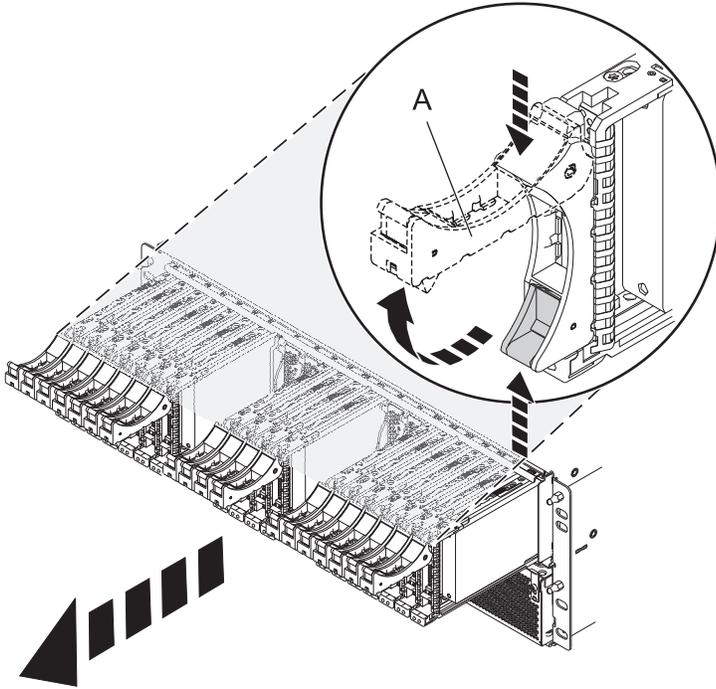
Figure 77. Removing the disk drives from the backplane

4. Remove the port cards and fillers as shown in Figure 78 on page 131.

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.
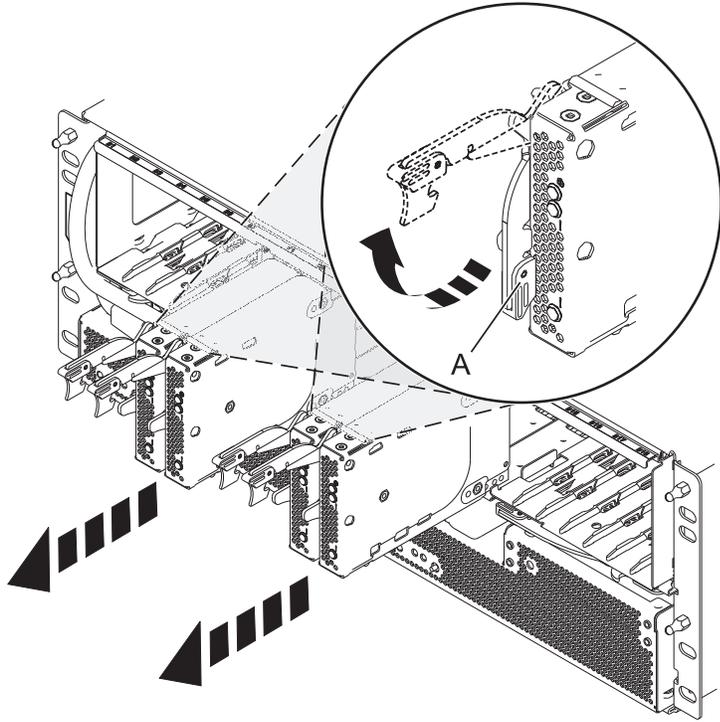
Figure 78. Removing the port card from the backplane

5. Remove the backplane as shown in Figure 79 on page 132.

   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.
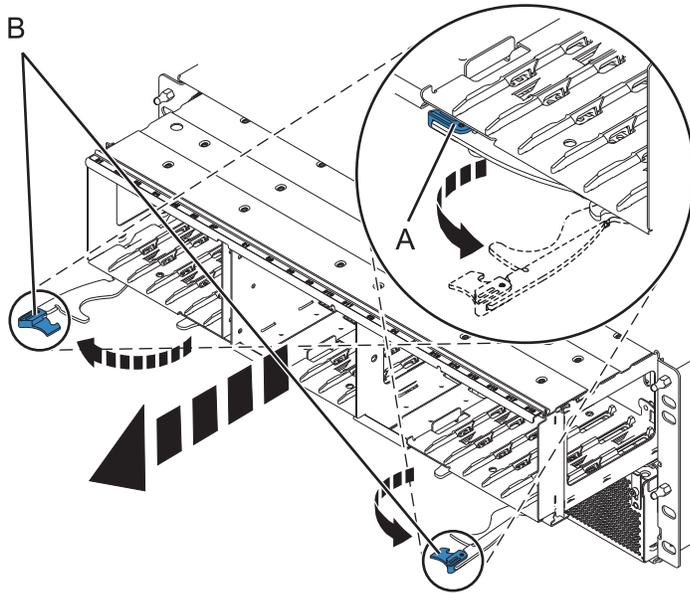
Figure 79. Removing the backplane from the enclosure

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.
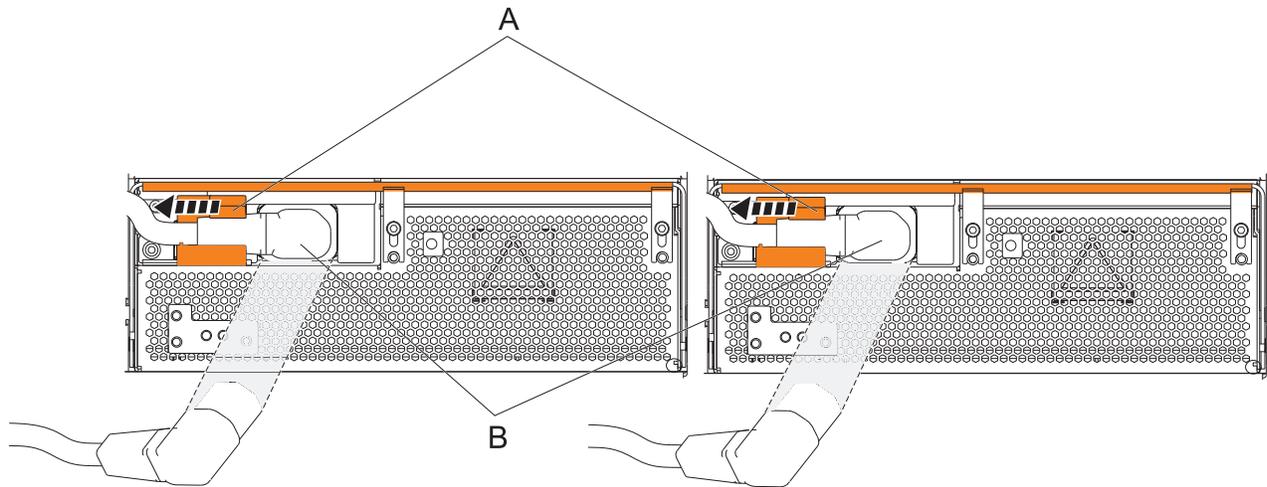
Figure 80. Disconnecting the OCA power cords

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.
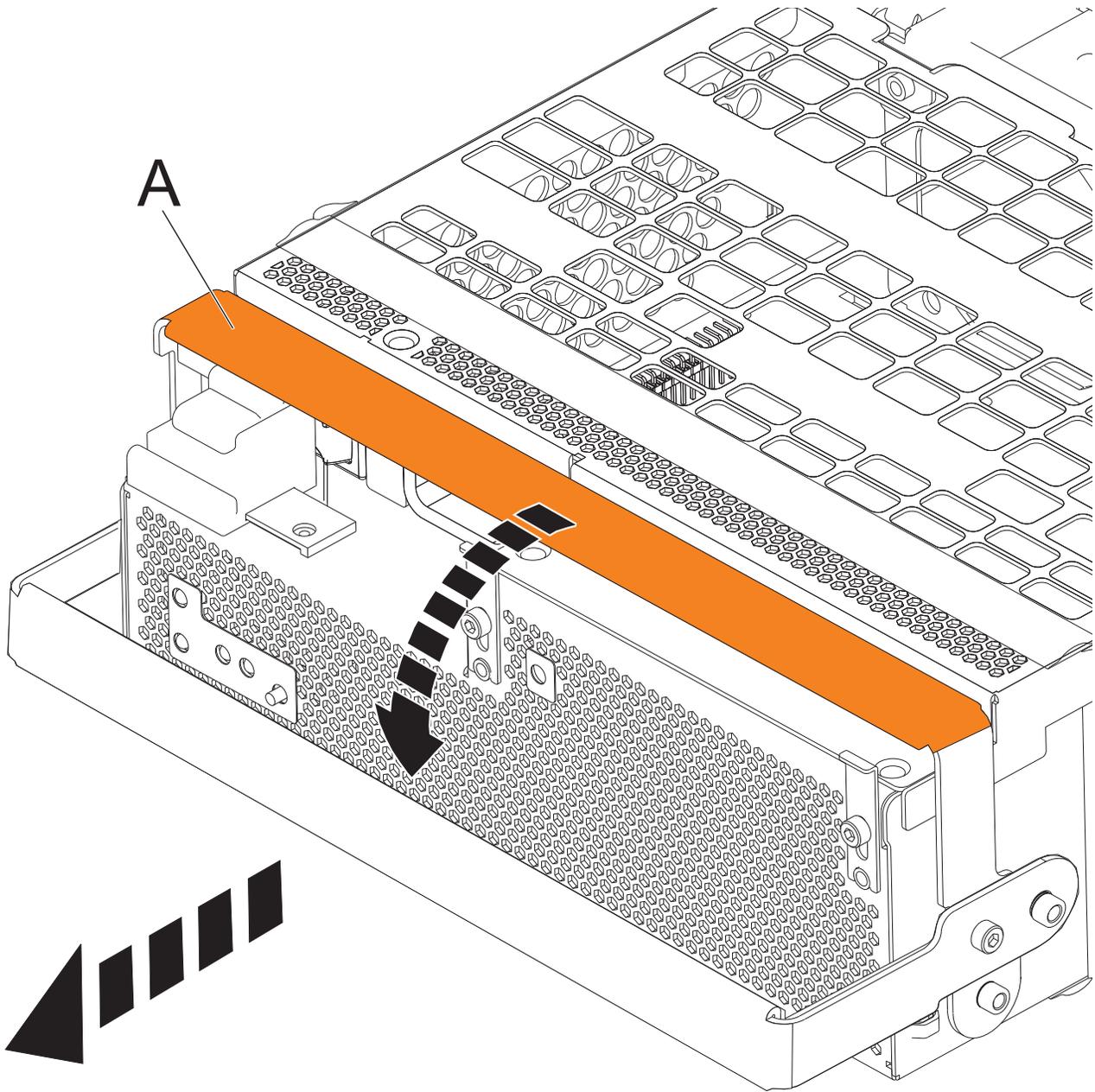
Figure 81. Remove the offline converter assemblies

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.
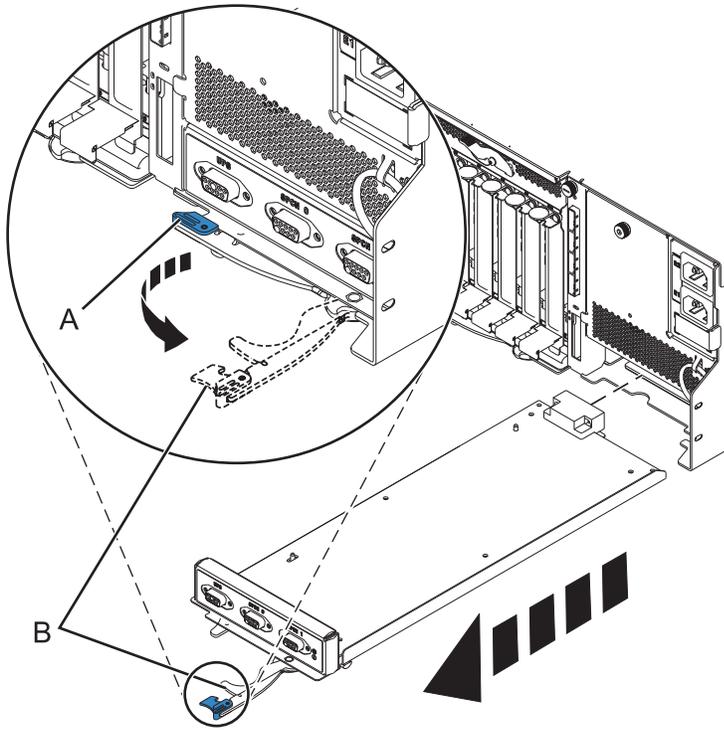
Figure 82. Remove the enclosure management controller

9. Remove the power cord plate by turning the thumbscrew **(A)** and pulling the plate away from the system, as shown in Figure 83.
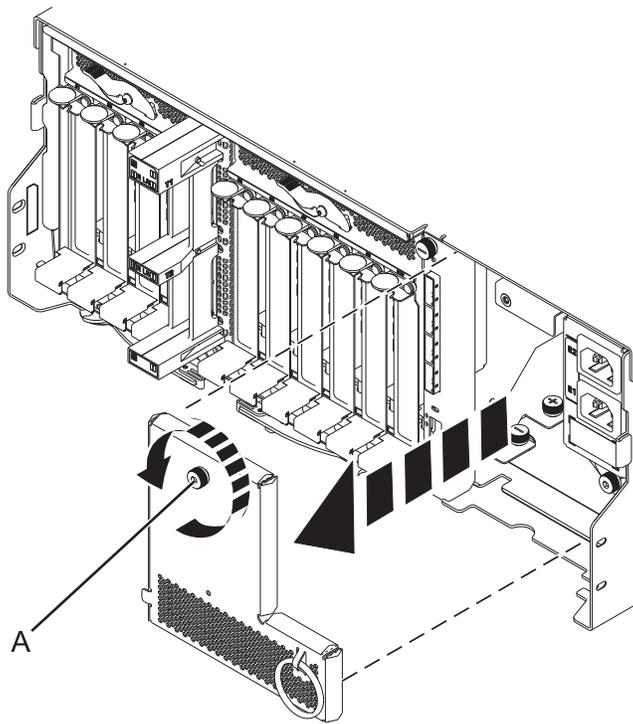
Figure 83. Removing the power cord plate

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 84.
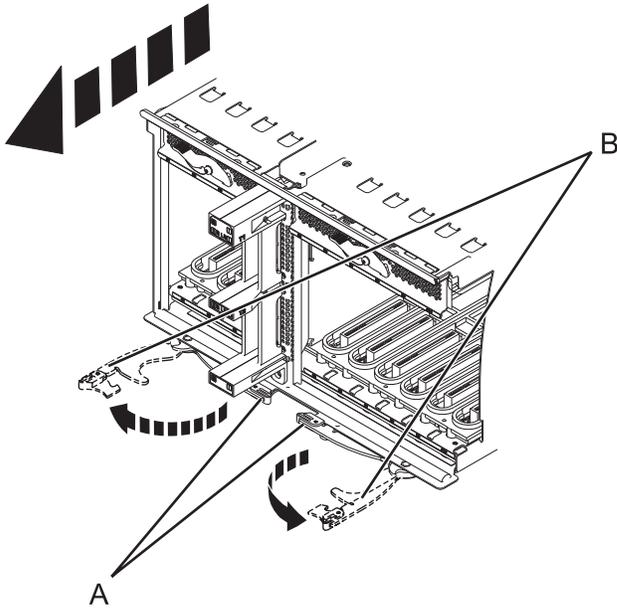
Figure 84. Removing the I/O system board

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.
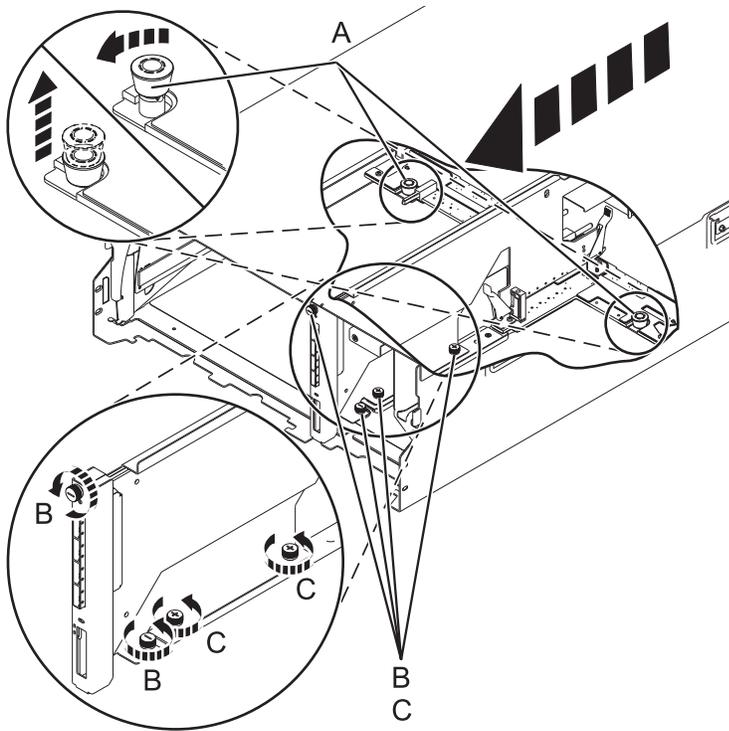
Figure 85. Removing the SAS conduit card and midplane

14. Push the handles **(A)** on the conduit card down to disengage the card from the midplane, and remove the card.
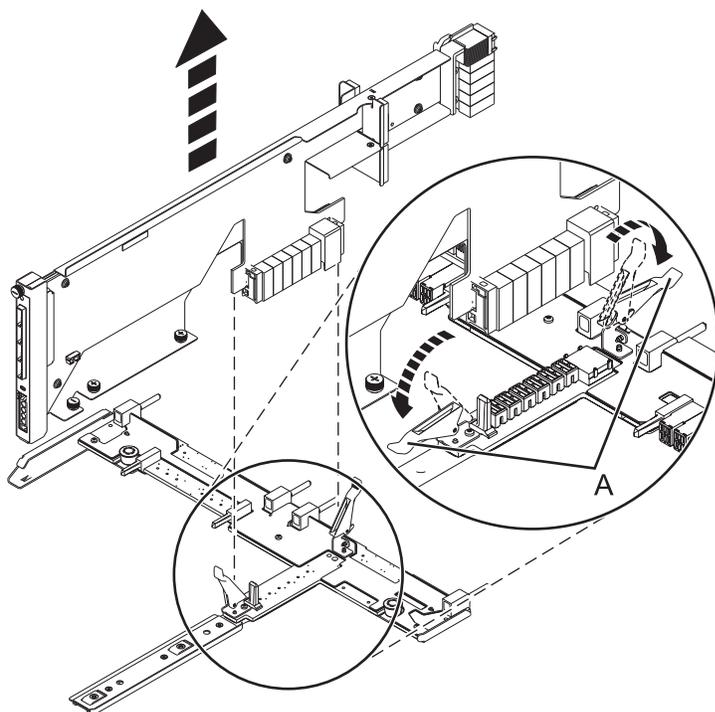
Figure 86. Removing the SAS conduit card from the midplane

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 the power turned off

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

Review the requirements in Before you begin.

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.
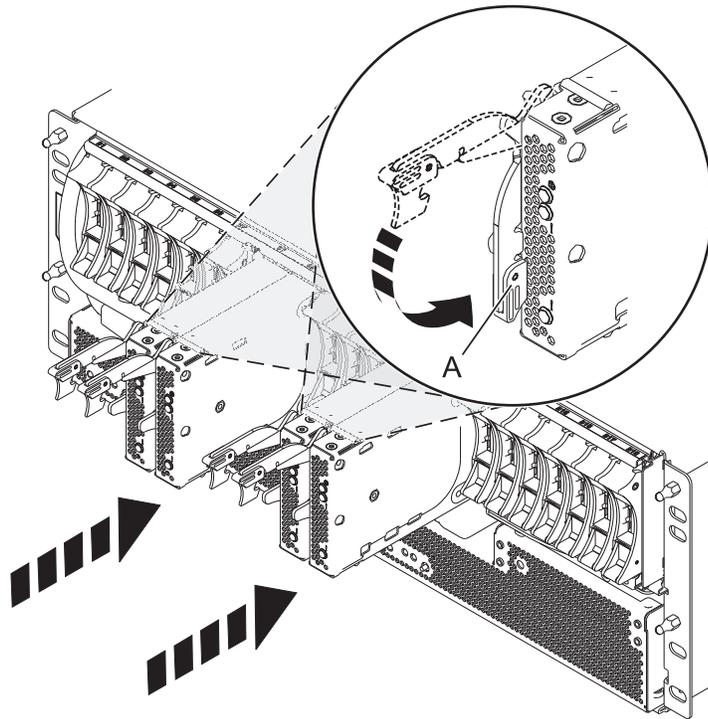
Figure 87. Installing the SAS expander card

3. Start the system. For instructions see, Starting the system or logical partition.
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 turned 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 turned off.

1. Perform prerequisite tasks. For instructions, see Before you begin.
2. Identify the card you are going to remove. For information, see Identifying a part.
3. Lift the handle **(A)** and pull the card out of the system, as shown in the following figure.
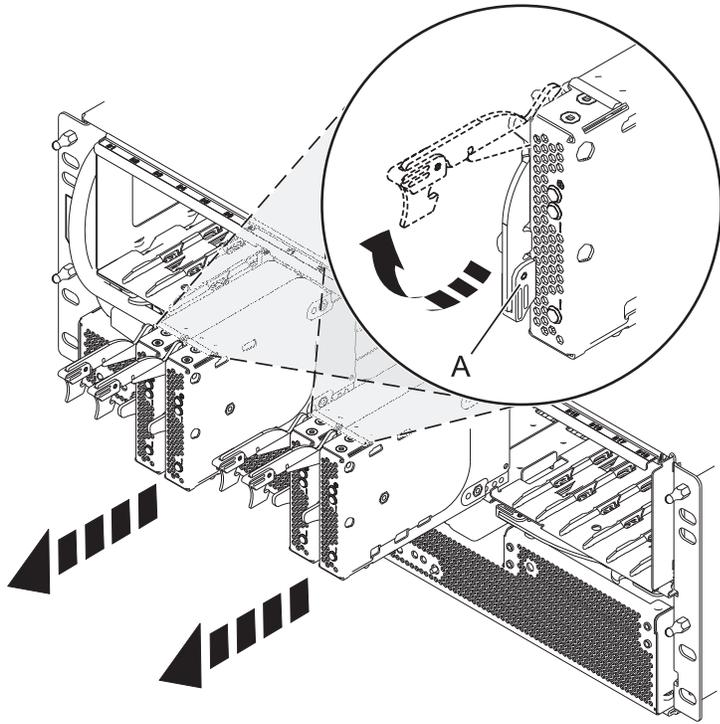
Figure 88. Removing the SAS expander card.

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 combination identify and fault LED (amber color) shows the location of a field replaceable unit (FRU). When removing a FRU, first verify whether you are working on the correct FRU by using the identify function in the management console or other user interface. When removing a FRU under the direction of the hardware management console, the identify function is activated and deactivated automatically at the correct times.

The identify function causes the amber LED to blink. When you turn off the identify function, the LED returns to the state it was previously. For parts that have a blue service button, the identify function sets LED information for the service button so that when the button is pressed, the correct LEDs on that part blink.

If you need to use the identify function, use the following procedures.

Control panel LEDs

Use this information as a guide to the control panel LEDs and buttons.

The control panel has LEDs that indicate various system status.
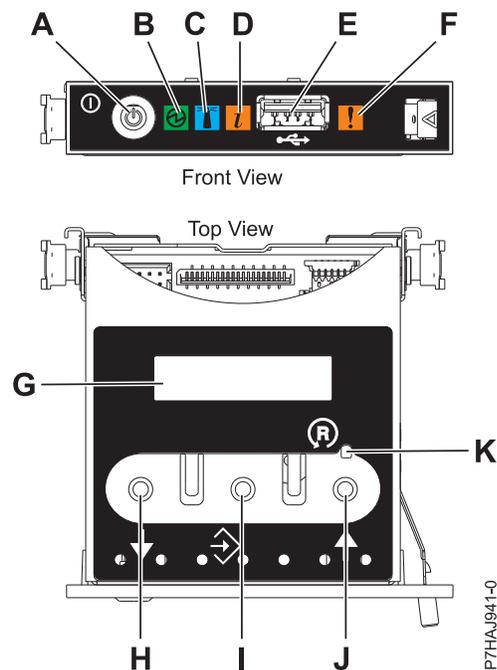
Figure 89. Control panel

- **A**: Power-on button
- **B**: Power LED
  - A constant light indicates full system power to the unit.
  - A blinking light indicates standby power to the unit.

  Note: There is approximately a 30-second transition period from the time the power-on button is pressed to when the power LED goes from blinking to solid. During the transition period, the LED might blink faster.
- **C**: Enclosure identify light
  - A constant light indicates the identify state, which is used to identify a part.
  - No light indicates that the system is operating normally.
- **D**: System information light
  - No light indicates that the system is operating normally.
  - Light on indicates that the system requires attention.
- **E**: USB port
- **F**: Enclosure fault roll-up light
  - A constant light indicates a fault in the system unit.
  - No light indicates that the system is operating normally.
- **G**: Function/Data display
- **H**: Decrement button
- **I**: Enter button
- **J**: Increment button
- **K**: Pinhole reset button

Related concepts

Identifying a failing part
Use these instructions to learn how to locate and identify a failing part on your system or expansion unit using the appropriate method for your system.

Identifying a failing part in an AIX system or logical partition

Use these instructions to learn how to locate a failing part, and then activate the indicator light for that part on a system or logical partition running the AIX operating system.

Locating a failing part in an AIX system or logical partition

You might need to use AIX tools, before activating the indicator light, to locate a part that is failing.

1. Log in as root user or `celogin-`.
2. At the command line, type `diag` and press Enter.
3. From the Function Selection menu, select **Task Selection** and press Enter.
4. Select **Display Previous Diagnostic Results** and press Enter.
5. From the Display Previous Diagnostic Results display, select **Display Diagnostic Log Summary**. The Display Diagnostic Log display shows a chronological list of events.
6. Look in the **T** column for the most recent **S** entry. Select this row in the table and press Enter.
7. Select **Commit**. The details of this log entry are shown.
8. Record the location information and the SRN value shown near the end of the entry.
9. Exit to the command line.

Use the location information for the failing part to activate the indicator light that identifies the failing part. See "Activating the indicator light for the failing part" on page 149.

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 a Hardware Management Console or or a Systems Director Management Console

You can use the power button or the Advanced System Management Interface to start a system that is not managed by a Hardware Management Console (HMC) or an IBM Systems Director Management Console (SDMC).

To start a system that is not managed by a HMC or 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 LED, 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.
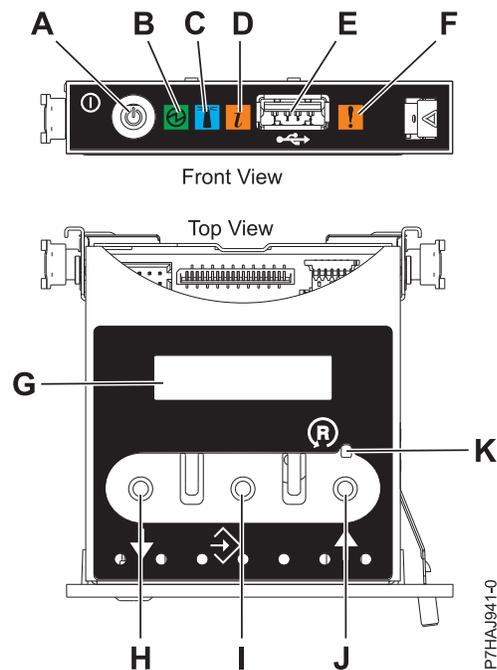
Figure 90. Control panel

- **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 for the enclosure or for a resource within the enclosure.
  - No light indicates that no resources in the enclosure are being identified.
- **D**: Attention light
  - No light indicates that the system is operating normally.
  - A solid light indicates that the system requires attention.
- **E**: USB port
- **F**: Enclosure fault roll-up light
  - A constant light indicates a fault indicator active in the system.
  - No light indicates that the system is operating normally.
- **G**: Function/Data display
- **H**: Decrement button
- **I**: Enter button
- **J**: Increment button
- **K**: Pinhole reset button

4. Observe the following after pressing the power button:
   - The power-on light begins to blink faster.
   - The system cooling fans are activated after approximately 30 seconds and begin to accelerate to operating speed.
   - Progress indicators, also referred to as checkpoints, appear on the control panel display while the system is being started. The power-on light on the control panel stops blinking and remains on, indicating that system power is on.

Tip: If pressing the power button does not start the system, do the following steps to start the system using the Advanced System Management Interface (ASMI):

1. Access the ASMI. For instructions, see Accessing the ASMI.
2. Start the system using the ASMI. For instructions, see Powering the system on and off.

Starting a system or logical partition by using the Hardware Management Console

You can use the Hardware Management Console (HMC) user interface to start the system or logical partition after the required cables are installed and the power cables are connected to a power source.

For instructions on working with the HMC, see Managing the Hardware Management Console. For instructions on starting a logical partition, see Logical partitioning. For instructions on starting the system, see Powering on the managed system.

Progress indicators, also referred to as checkpoints, appear on the control panel display while the system is being started. When the power-on light on the control panel stops blinking and remains on, the system power is on.

Starting a system or virtual server with the Systems Director Management Console

You can use the IBM Systems Director Management Console (SDMC) user interface to start the system or virtual server after the required cables are installed and the power cables are connected to a power source.

For instructions on working with the SDMC, see Managing and configuring the SDMC. For instructions on starting a virtual server, see Managing virtual servers. For instructions on shutting down and restarting virtual servers, see Shutting down and restarting virtual servers.

Progress indicators, also known as checkpoints, display on the control panel while the system is being started. When the power-on light on the control panel stops flashing 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.

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. At the Linux command line, type shutdown -h now.

   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.
4. At the Linux command line, type shutdown -h now.

   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.
5. 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.
6. Set the power switches of any devices connected to the system to off.
7. 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)
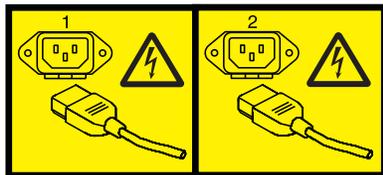
or

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.

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

Use the following steps to stop the system using the HMC.

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

Stopping a system with the Systems Director Management Console

You can use the IBM Systems Director Management Console (SDMC) user interface to stop the system or a virtual server.

By default, the managed system is set to power off automatically when you shut down the last running virtual server on the managed system. If you set the managed system properties on the SDMC 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 virtual servers on the managed system before powering off the managed system. Powering off the managed system without shutting down the virtual servers first causes the virtual servers 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 with 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

Use the following steps to stop the system using the SDMC.

1. In the Power Systems Resource area, select the managed system you want to power off.
2. From the **Actions** menu, select **Operations** → **Power Off**.
3. Select the appropriate power-off mode and click **OK**.

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.
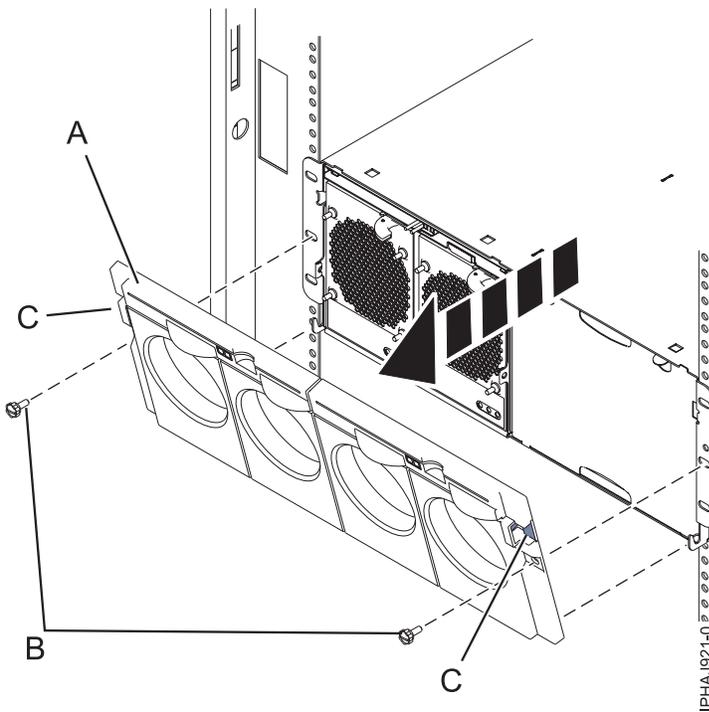
Figure 91. Remove the front cover for model 7314-G30 or 5796

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.
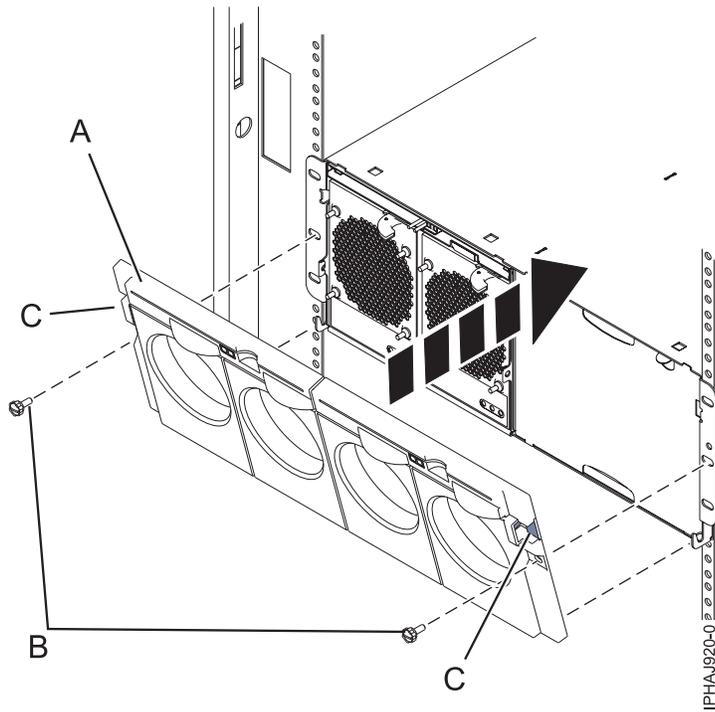
Figure 92. Front cover on a model 7314-G30 or 5796

3. Press the cover onto the chassis and release the latches. The cover securely snaps into place.
4. Replace the two thumbscrews **(B)** into the slots on the left and right of the front cover.

System covers

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

Removing and replacing covers for the 8202-E4B, 8202-E4C, 8205-E6B, or 8205-E6C

Use these instructions to remove, replace, or install covers to access components or perform service.

Removing the front cover on a rack-mounted 8202-E4B, 8202-E4C, 8205-E6B, or 8205-E6C 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 shipping screws (if present) that secure the system to the rack.

   Note: Replacing the shipping screws is optional but should be done in geographic areas that are prone to seismic activity.

2. Pull the cover away from the system. The cover has an indentation where you can hold onto it more easily.
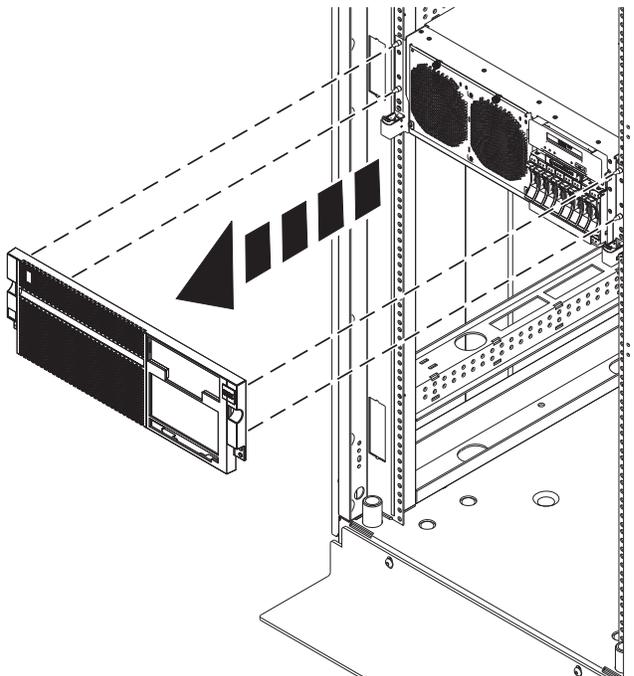
Figure 93. Removing the front cover

Removing the front cover on a stand-alone 8202-E4B, 8202-E4C, or 8205-E6B system

Use this procedure to remove the cover to access components or perform service.

To remove the front cover, follow these steps:

1. Open the front door **(A)** by swinging it towards the left as shown in the following figure.
2. Press latch **(B)** and pull the cover away from the system. The cover has an indentation where you can hold onto it more easily.
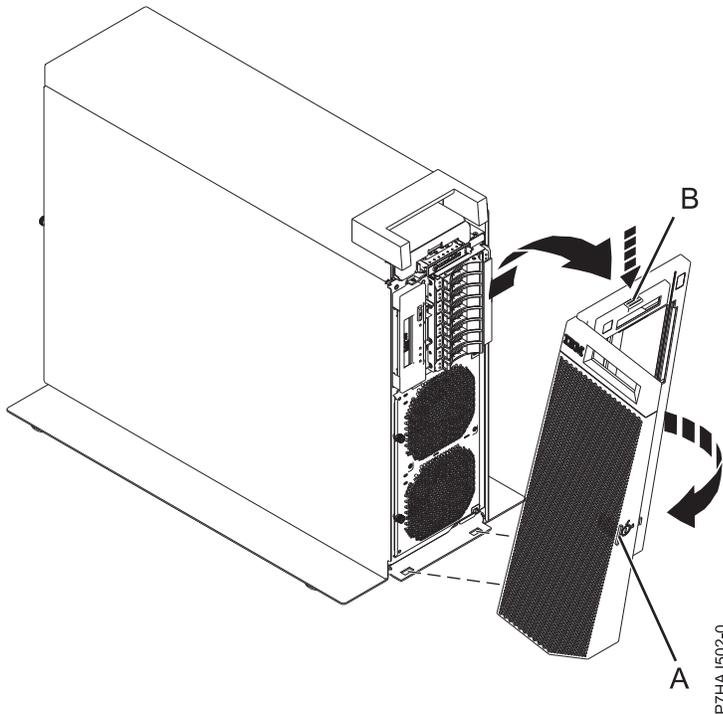
Figure 94. Removing the front cover

Installing the front cover on a rack-mounted 8202-E4B, 8202-E4C, 8205-E6B, or 8205-E6C system

Use this procedure to install the cover to access components or perform service.

To install the front cover, follow these steps:

1. Push the cover onto the system.
2. Gently push the cover in until the four cover clips are seated in their respective mounting posts as shown in the following figure. The cover snaps into place and has an indentation where you can hold onto it more easily.

   Note: Replacing the shipping screws is optional but should be done in geographic areas that are prone to seismic activity.
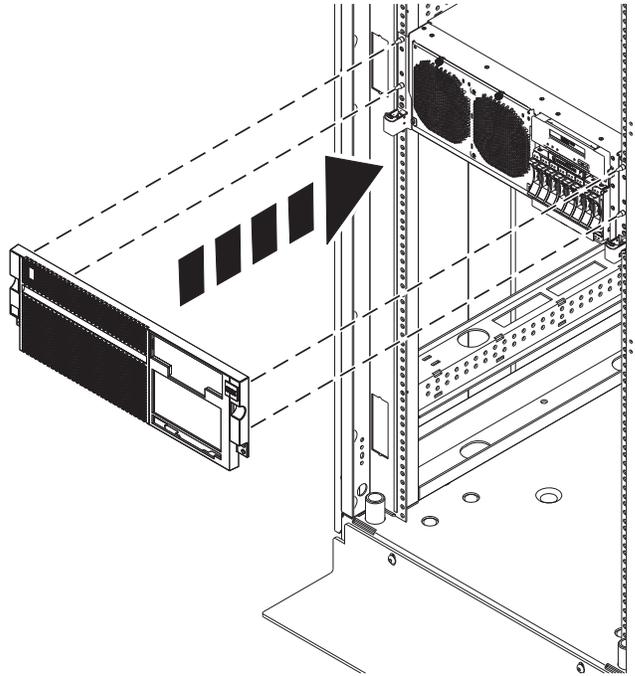
Figure 95. Removing the front cover

Installing the front cover and front door on a stand-alone 8202-E4B, 8202-E4C, or 8205-E6B system

Use this procedure to install the cover to access components or perform service.

To install the front cover and front door, complete the following steps.

1. Align the cover **(A)** until the two cover tabs are seated into the slots on the base plate **(B)**, as shown in the following figure.
2. Rotate the cover up and towards the system until the release latch is seated into its respective slot. The cover has an indentation where you can hold onto it more easily.
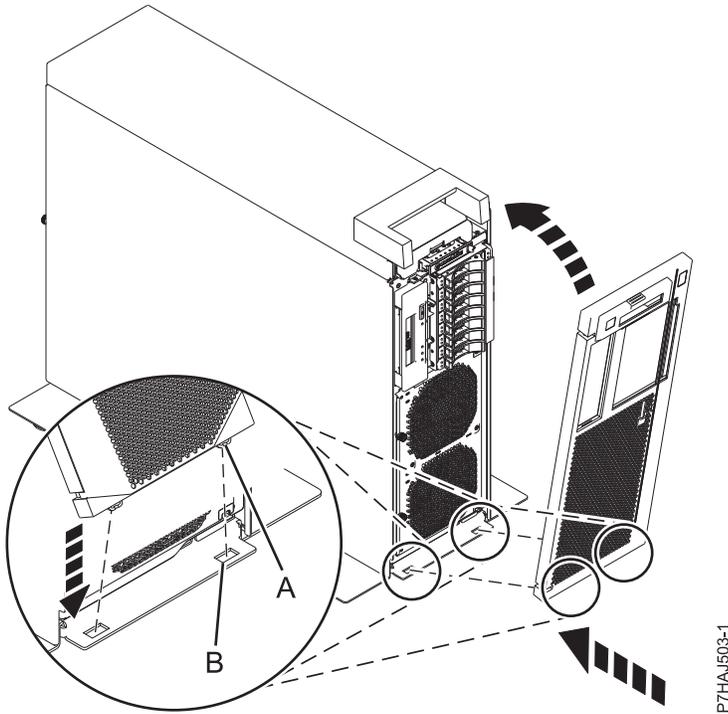
Figure 96. Installing the front cover

3. Hold the front door at an approximate 120 degree angle to the system as shown in the following figure. Engage the latches.
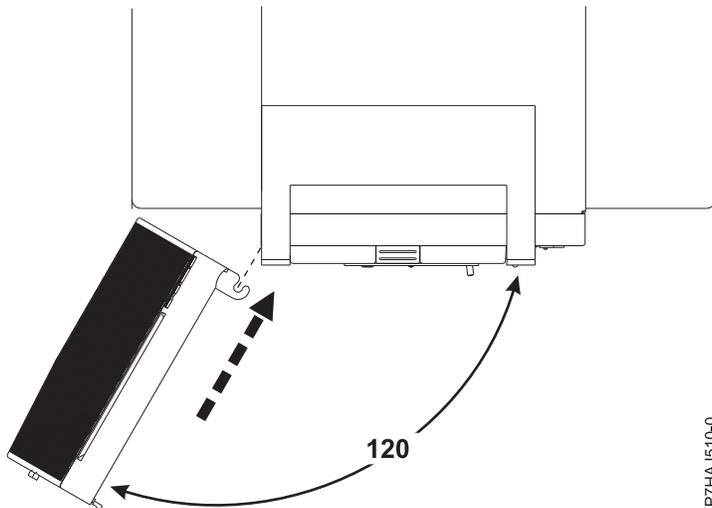
Figure 97. Installing the front door

Removing the service access cover on a rack-mounted 8202-E4B, 8202-E4C, 8205-E6B, or 8205-E6C system

Use this procedure to remove the service access cover.

1. Loosen the two thumbscrews **(A)** located at the back of the cover.
2. Slide the cover toward the back of the system unit. When the front of the service access cover has cleared the upper frame ledge, lift the cover up and off the system unit.

Attention: When the service access cover is removed, the system powers down.

Figure 98. Removing the service access cover

Removing the service access cover on a stand-alone 8202-E4B, 8202-E4C, or 8205-E6B system

Use this procedure to remove the service access cover.

1. Loosen the thumbscrew **(A)** located at the back of the outside cover.
2. Slide the cover **(B)** toward the back of the system unit. When the front of the service access cover has cleared the upper frame ledge, lift the cover up and off the system unit.
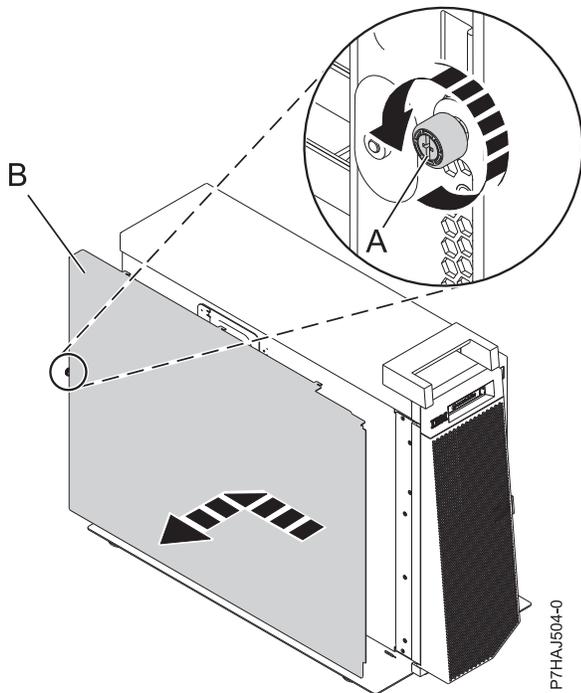
Figure 99. Installing the outside service access cover

3. Loosen the two thumbscrews **(A)** located at the back of the inside cover.
4. Slide the cover **(B)** toward the back of the system unit. When the front of the service access cover has cleared the upper frame ledge, lift the cover up and off the system unit.

   Attention: When the service access cover is removed, the system powers down.
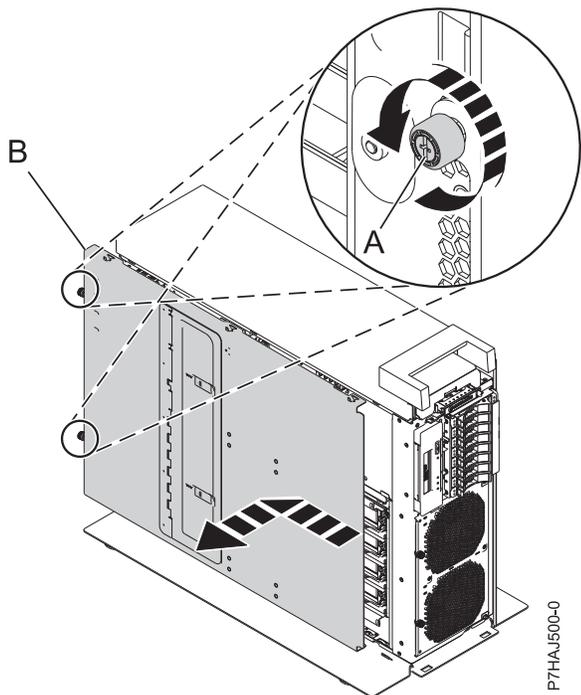
Figure 100. Removing the inside service access cover

Installing the service access cover on a rack-mounted 8202-E4B, 8202-E4C, 8205-E6B, or 8205-E6C system

Use this procedure to install the service access cover.

1. Place the service access cover on top of the system, about 25 mm (1 in.) from the upper chassis ledge.
2. Hold the service access cover against the system unit and slide it toward the front of the system. The tabs of the service access cover slide beneath the upper chassis ledge.
3. Align the two thumbscrews **(A)** located on the back of the service access cover with the two holes on the back of the system chassis.
4. Tighten the thumbscrews to secure the service access cover.
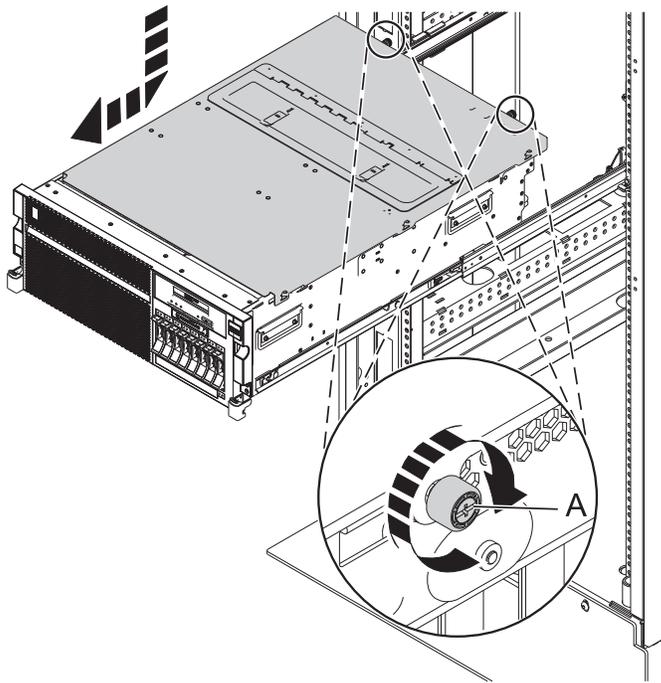
Figure 101. Installing the service access cover

Installing the service access cover on a stand-alone 8202-E4B, 8202-E4C, or 8205-E6B system

Use this procedure to install the service access cover.

1. Place the inside service access cover **(A)** on top of the system, about 25 mm (1 in.) from the upper chassis ledge.
2. Hold the service access cover against the system unit and slide it toward the front of the system. The tabs of the service access cover slide beneath the upper chassis ledge.
3. Align the two thumbscrews **(B)** located on the back of the service access cover with the two holes on the back of the system chassis.
4. Tighten the thumbscrews to secure the service access cover.
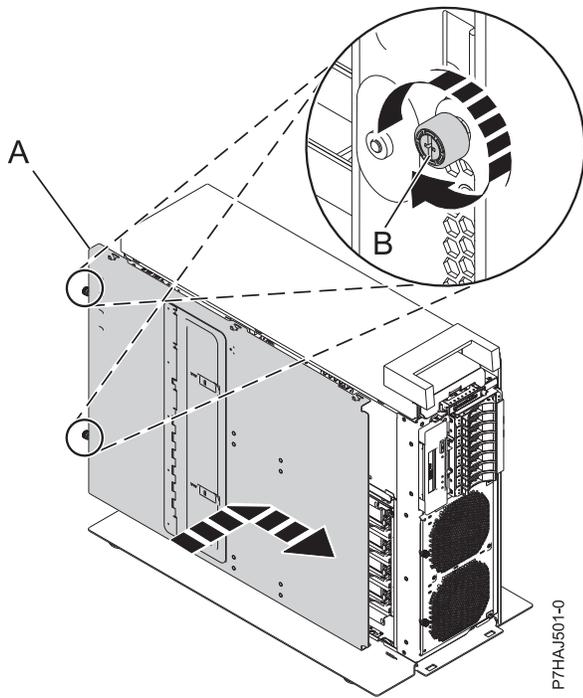
Figure 102. Installing the inside service access cover

5. Place the outside service access cover **(A)** on top of the system.
6. Hold the service access cover against the system unit and slide it toward the front of the system. The tabs of the service access cover slide beneath the upper chassis ledge.
7. Align the thumbscrew **(B)** located on the back of the service access cover with the hole on the back of the system chassis.
8. Tighten the thumbscrew to secure the service access cover.
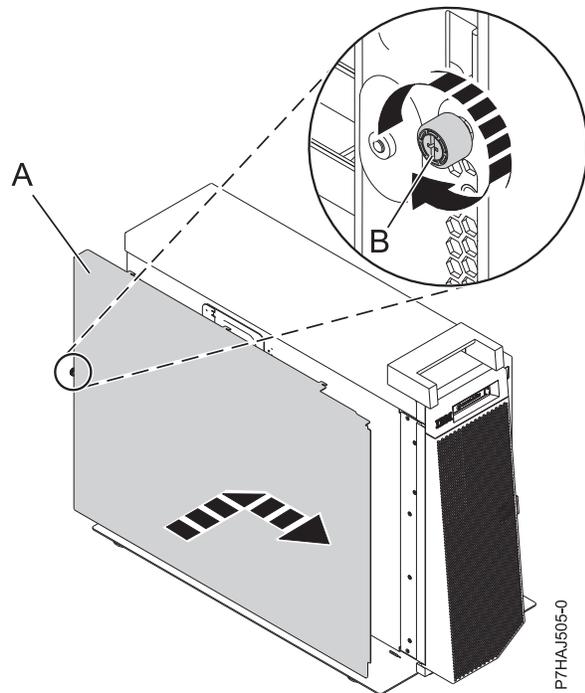
Figure 103. Installing the outside service access cover

Removing and replacing covers for the 8231-E2B, 8231-E1C, or 8231-E2C

Use these instructions to remove, replace, or install covers to access components or perform service.

Removing the service access cover for the 8231-E2B, 8231-E1C, or 8231-E2C

Use this procedure to remove the service access cover.

1. Loosen the thumbscrew **(A)** located at the back of the cover.
2. Slide the cover **(B)** toward the back of the system unit. When the front of the service access cover has cleared the upper frame ledge, lift the cover up and off the system unit.

   Attention: When the service access cover is removed, the system powers down.
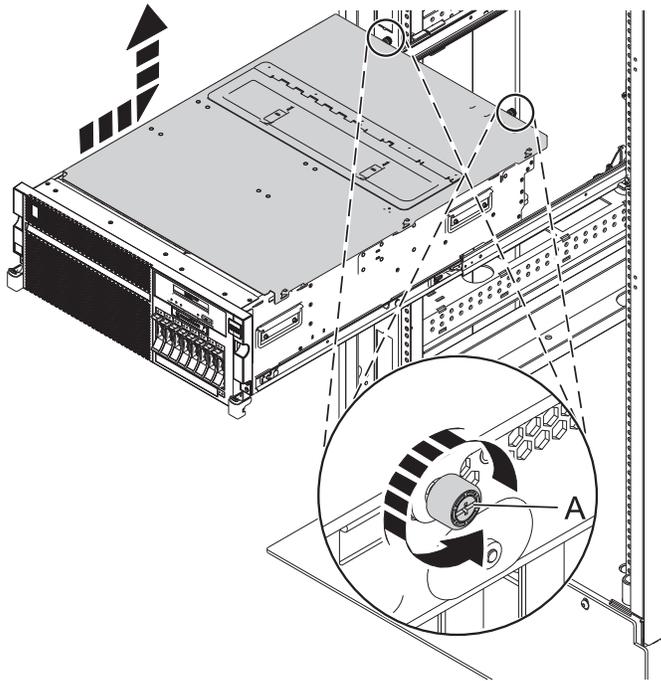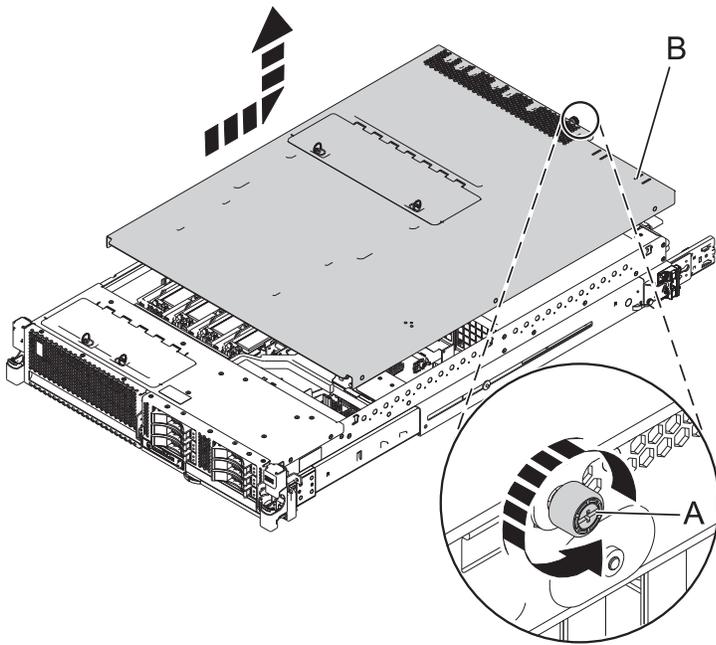
Figure 104. Removing the service access cover

Installing the service access cover for the 8231-E2B, 8231-E1C, or 8231-E2C

Use this procedure to install the service access cover.

1. Place the service access cover **(A)** on top of the system, about 25 mm (1 in.) from the upper chassis ledge.
2. Hold the service access cover against the system unit and slide it toward the front of the system. The tabs of the service access cover slide beneath the upper chassis ledge.
3. Align the thumbscrew **(B)** located on the back of the service access cover with the two holes on the back of the system chassis.
4. Tighten the thumbscrews to secure the service access cover.
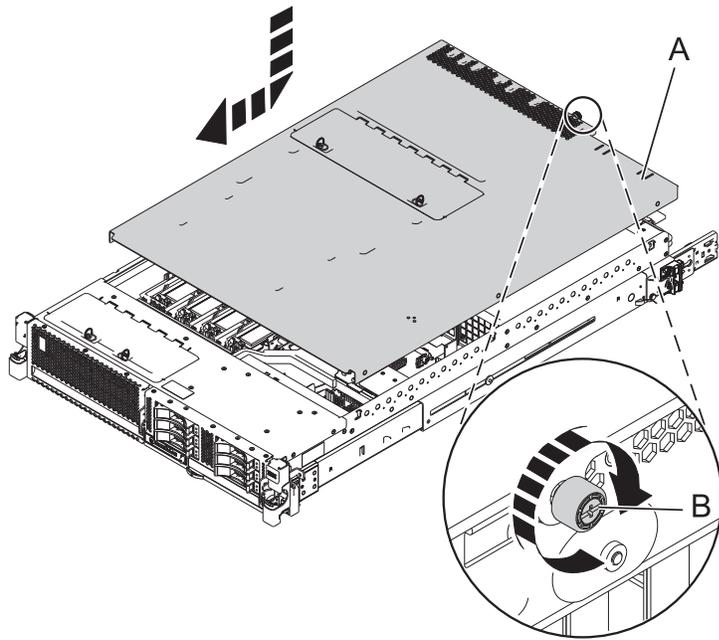
Figure 105. Installing the service access cover

Removing and replacing covers on the 8233-E8B or 8236-E8C system

Use these instructions to remove, replace, or install covers to access components or perform service.

Removing the front cover from an 8233-E8B or 8236-E8C system

Use this procedure to remove the cover to access components or perform service.

To remove the front cover, follow these steps:

1. Remove the two screws **(A)** that secure the system to the rack **(B)** as shown in the following figure.
2. Pull the cover away from the system. The cover has an indentation where you can hold onto it more easily.
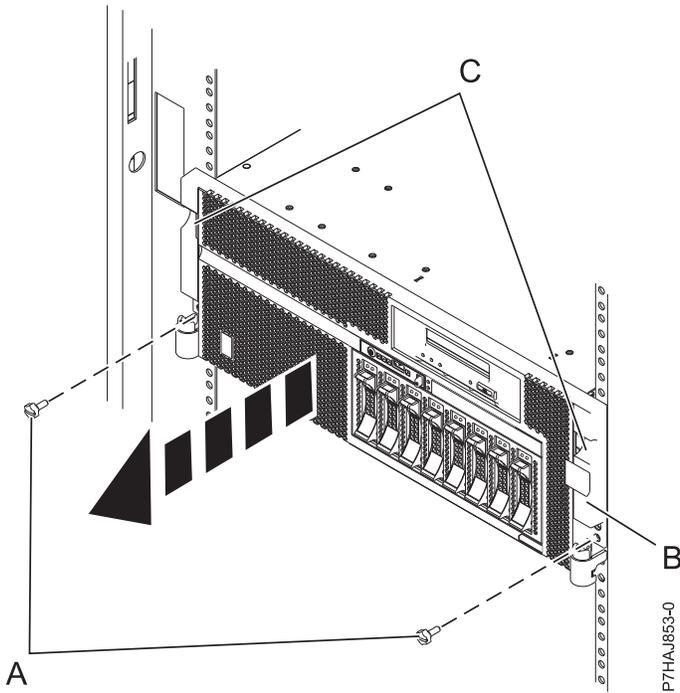
Figure 106. Removing the front cover

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)**.
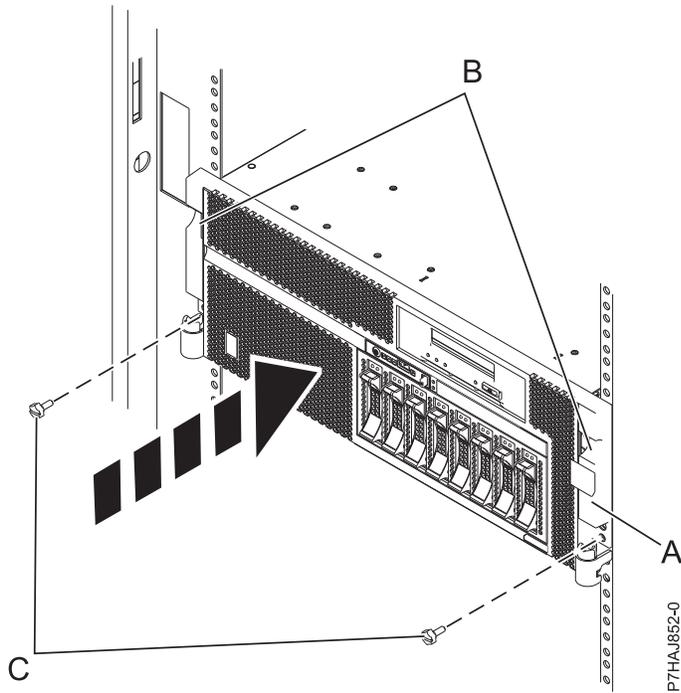
Figure 107. Installing the front cover

Removing the service access cover from an 8233-E8B or 8236-E8C system

Use this procedure to remove the service access cover to perform service or to gain access to internal components.

To remove the service access cover, follow these steps:

1. Place the system into the service position. For instructions, see "Placing the 8233-E8B or 8236-E8C in the service position" on page 199.
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.
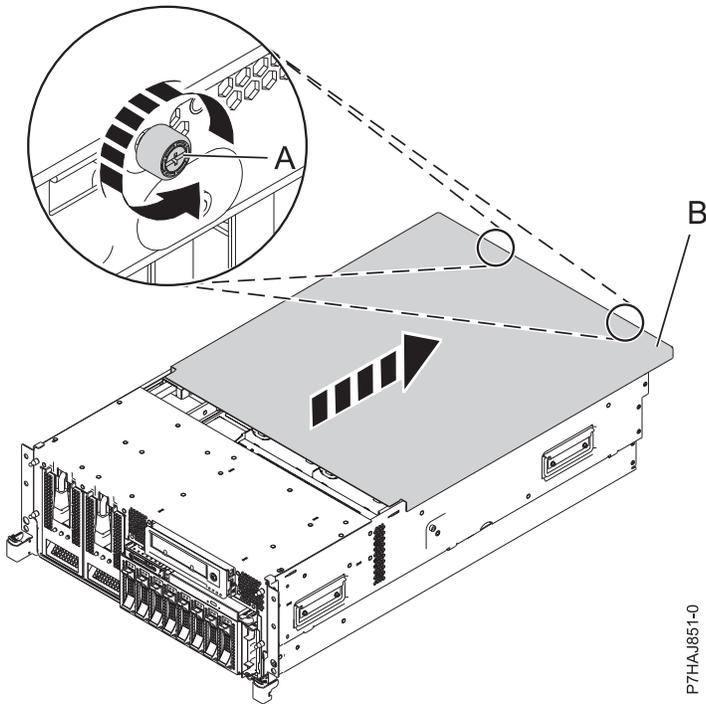
Figure 108. Removing the service access cover

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.
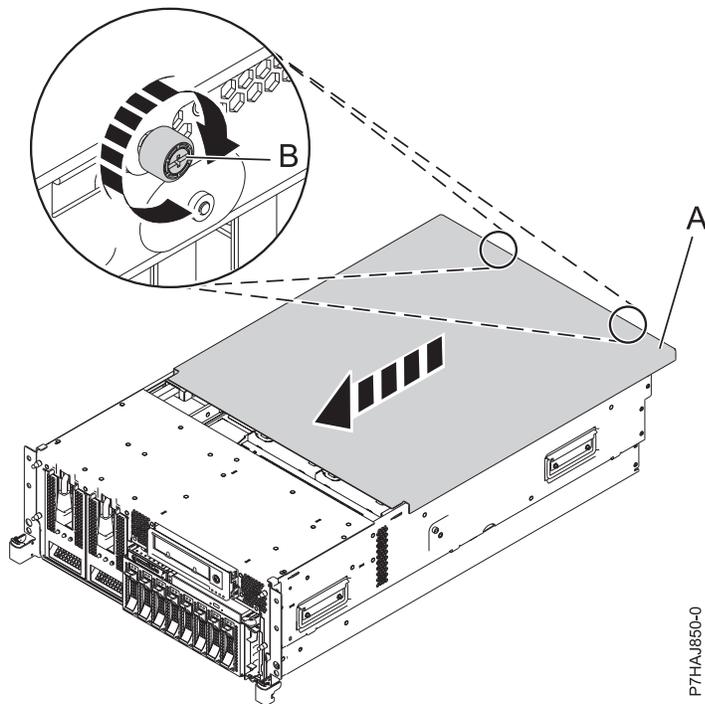
Figure 109. Installing the service access cover

Removing and replacing covers for the 9117-MMB, 9117-MMC, 9179-MHB, or 9179-MHC

Use these instructions to remove, replace, or install covers to access components or perform service.

Removing the front cover from the 9117-MMB, 9117-MMC, 9179-MHB, or 9179-MHC

Use this procedure to remove the cover to access components or perform service.

This procedure applies to covers that are shipped after 1 March 2011. For covers that are shipped prior to 1 March 2011, use the Removing the front cover with the cover removal tool procedure.

Note: The older covers shipped before 1 March 2011 can be identified by a single blue stripe on the cover assembly latches. Newer covers shipped after 1 March 2011 have two blue stripes on the cover assembly latches.

To remove the front cover, complete the following steps.
1. If necessary, open the front rack door.
2. Pull out the latches **(A)** located on both sides of the cover as shown in the following figure.
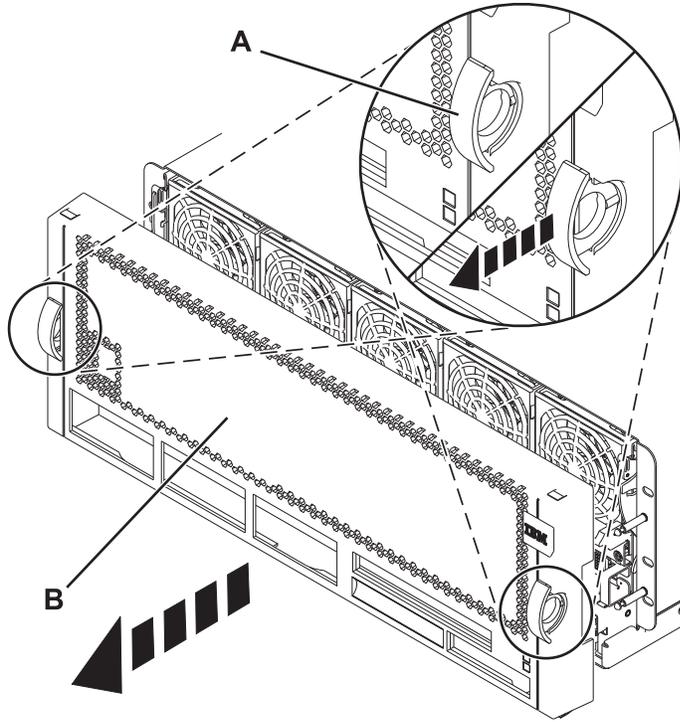
Figure 110. Removing the front cover

3. Pull off the cover **(B)** to remove it from the system unit.

Removing the front cover with the cover removal tool

Removing the front cover on the 9117-MMB or 9179-MHB systems shipped before 1 March 2011 requires the use of a cover removal tool.

Systems shipped before 1 March 2011 require the use of a cover removal tool to prevent the front fans from being inadvertently removed and causing an unexpected outage.

Note: The older covers shipped before 1 March 2011 can be identified by a single blue stripe **(A)** on the cover assembly latches. Newer covers shipped after 1 March 2011 have two blue stripes **(B)** on the cover assembly latches. See Figure 111 on page 179.
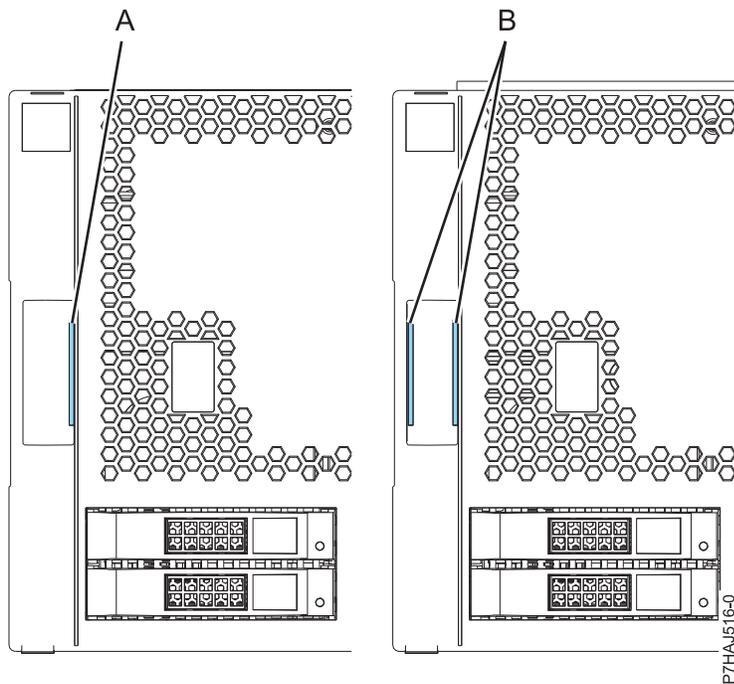
Figure 111. Identifying the older and newer covers

Important: Do not remove the cover to view the enclosure serial number. If you need to check the enclosure serial number, use one of the following methods:

- From the Advanced System Management Interface (ASMI), complete the following steps. This procedure can be performed in FSP standby mode.
    1. Expand **System Information**.
    2. Click **Vital Product Data** in left column.
    3. From the Vital Product Data panel, click **Enclosure VPD (EV)** for each enclosure configured.
    4. Click **Details** to view results.
- From the Hardware Management Console (HMC), complete the following steps. The server must be powered on to partition standby mode.
    1. Expand **Hardware Information**.
    2. Select **View Hardware Topology** to view the Enclosure ID for each enclosure.

To remove the front cover with the cover removal tool, complete the following steps:

1. Remove the cover removal tool (PN 74Y9219) from the shipping box, if needed.
2. If necessary, open the front rack door.
3. Align the cover removal tool **(A)** with the front cover of the system as shown in the following figure.
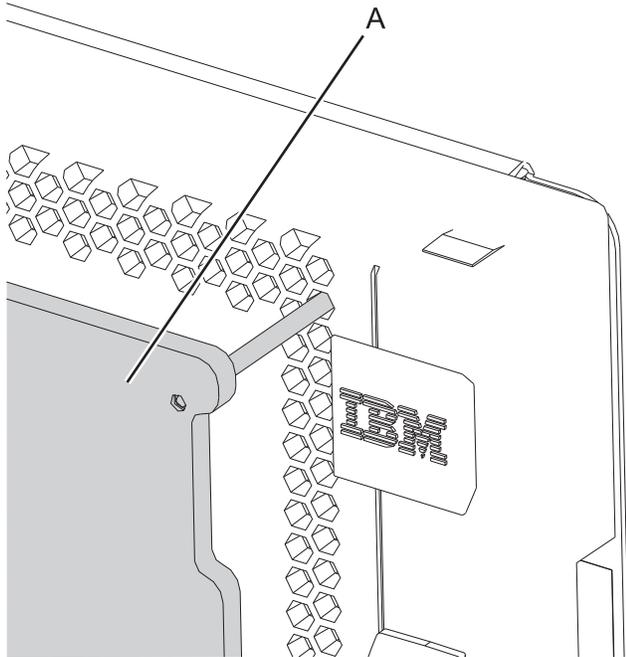
Figure 112. Aligning the cover removal tool

> **Note:** The top pins of the cover removal tool align with the second hole down from the top of the cover. Pins must be inserted through the hole until the removal tool pins contact the system and cannot be pushed forward any further. There is a gap between the system and the cover removal tool.

4. Place hands on the cover removal tool as shown in the following figure while pressing the tool against the system.
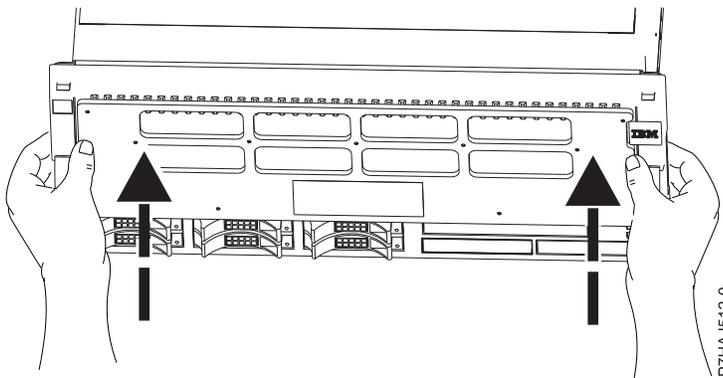
Figure 113. Cover removal tool use

5. While keeping forward pressure on the cover removal tool, pull the cover assembly latches to disengage them as shown in the following figure, which releases the retention mechanism.
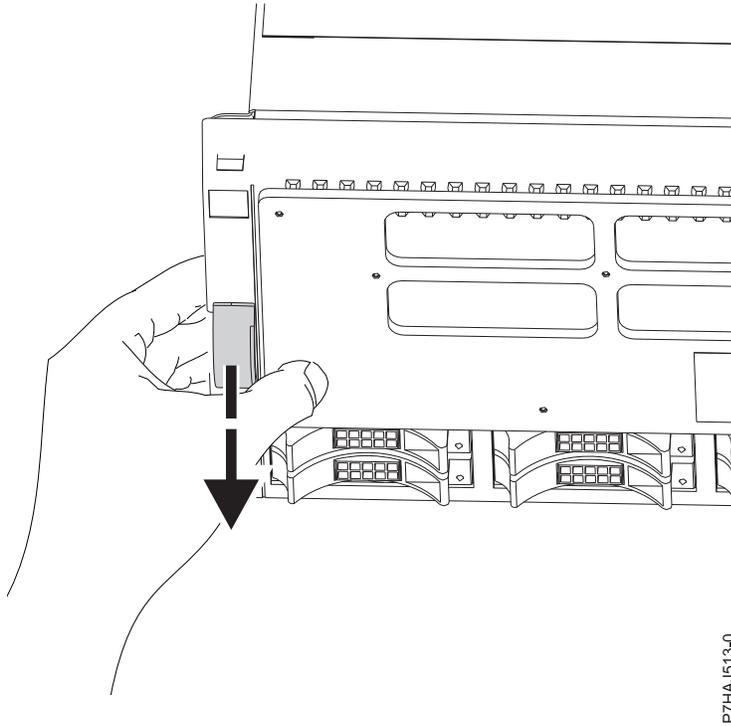
Figure 114. Releasing the cover latches

6. If the front cover is difficult to remove, the cover might be adhering to the fan assemblies at the top of the system. Apply forward pressure against the cover removal tool and place fingers underneath the edge of the cover near the top corners. Then, pull the cover towards the cover removal tool as shown in the following figure.
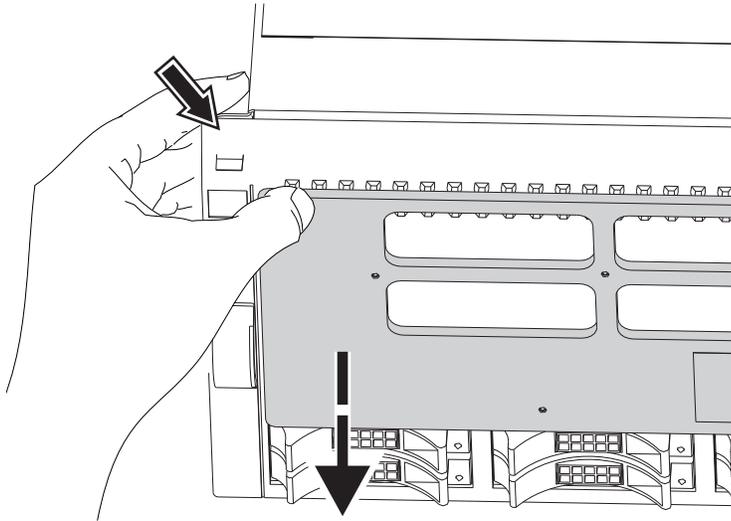
P7HAJ514-0

Figure 115. Removing a cover that adheres to the fan assemblies

7. After the cover assembly is unlatched and lying against the cover removal tool, remove both from the front of the system as shown in the following figure.
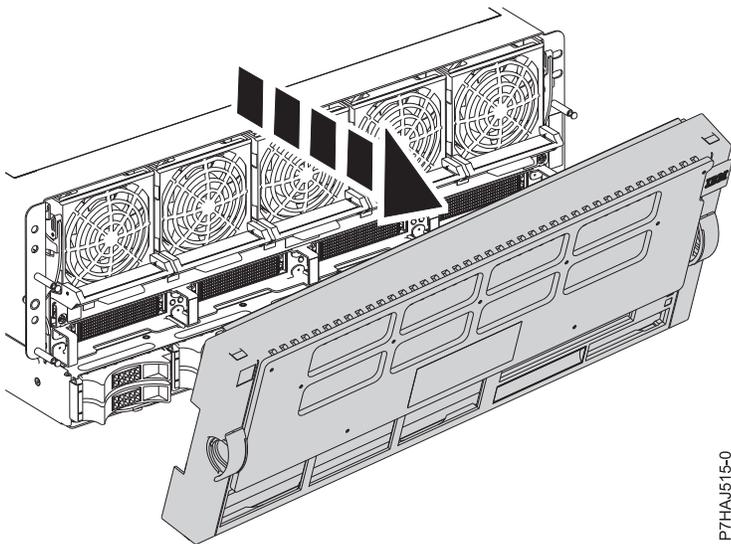
P7HAJ515-0

Figure 116. Removing the cover

8. Repeat these steps for all system covers that must be removed.

Installing the front cover on the 9117-MMB, 9117-MMC, 9179-MHB, or 9179-MHC

Use this procedure to install the cover after accessing components or performing service.

To install the front cover, follow these steps:

1. Position the cover **(A)** on the front of the system unit so that the four pins on the system match the four holes on the back of the cover.
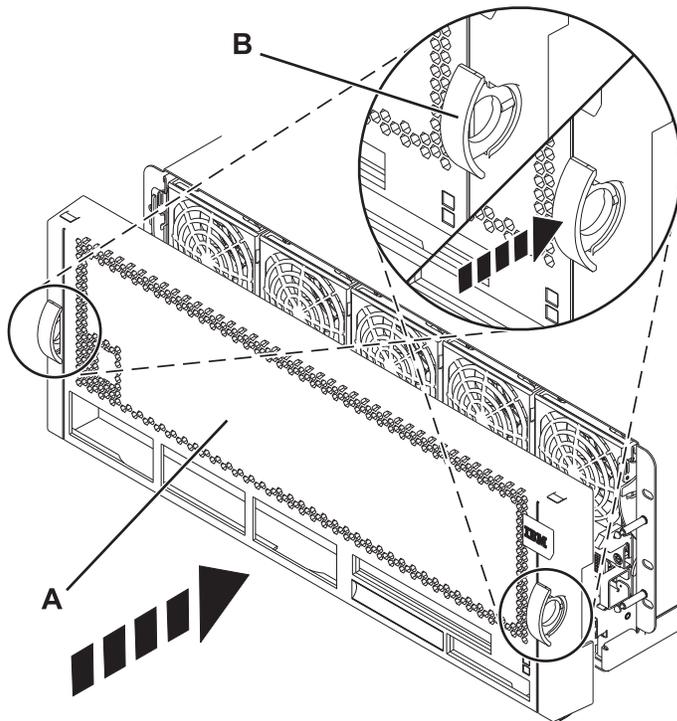
Figure 117. Installing the front cover

2. Press the tabs **(B)** to snap the cover into position.
3. Close the front rack door.

Placing the 8231-E2B, 8231-E1C, or 8231-E2C system into the service or operating position

Use these procedures to place a system into the service position or operating position to perform service or to gain access to internal components.

Placing the rack-mounted 8231-E2B, 8231-E1C, or 8231-E2C system into the service position

Use this procedure to place the rack-mounted system into the service position.

Notes:

- When placing the system into the service position, it is essential that all stability plates are firmly in position to prevent the rack from toppling. Ensure that only one system unit is in the service position at a time.
- Ensure that the cables at the back of the system unit do not catch or bind as you pull the unit forward in the rack.
- When the system unit rails are fully extended, the rail safety latches lock into place. This action prevents the system from being pulled out too far.

1. Open the front rack door.
2. Identify the system unit you are servicing in the rack.
3. While holding the system unit release latches down on both the left and right sides, pull the system unit out from the rack until the rails are fully extended and locked.

Figure 118. Placing the system in the service position

Placing the rack-mounted 8231-E2B, 8231-E1C, or 8231-E2C system into the operating position

Use this procedure to place the rack-mounted system into the operating position.

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

1. Unlock the blue rail safety latches **(A)** by lifting them upwards.

Figure 119. Unlocking the safety rail latches

2. Push the system unit back into the rack until both system-unit release latches have locked into position.

Figure 120. Placing the system into the operating position

3. Close the front rack door of the unit you are servicing.

Placing the rack-mounted 8202-E4B, 8202-E4C, 8205-E6B, or 8205-E6C system into the service position

Use this procedure to place the rack-mounted system into the service position.

Notes:

- When placing the system into the service position, it is essential that all stability plates are firmly in position to prevent the rack from toppling. Ensure that only one system unit is in the service position at a time.
- Ensure that the cables at the back of the system unit do not catch or bind as you pull the unit forward in the rack.
- When the system unit rails are fully extended, the rail safety latches lock into place. This action prevents the system from being pulled out too far.

1. Open the front rack door.
2. Identify the system unit you are servicing in the rack.
3. Remove the two screws **(A)** (if present) that secure the system unit **(B)** to the rack.

   Note: Replacing the shipping screws is optional but should be done in geographic areas that are prone to seismic activity.

Figure 121. Placing the system in the service position

4. While holding the system unit release latches **(A)** down on both the left and right sides, pull the system unit **(B)** out from the rack until the rails are fully extended and locked.

A

B

Placing the rack-mounted 8202-E4B, 8202-E4C, 8205-E6B, or 8205-E6C system into the operating position

Use this procedure to place the rack-mounted system into the operating position.

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

1. Unlock the blue rail safety latches **(A)** by lifting them upward. The rail safety latches are located near the middle of the system.

Figure 122. Placing the system into the operating position

2. Push the system unit **(B)** back into the rack until both system-unit release latches have locked into position.
3. Replace and tighten the two screws (if present) **(A)** that secure the system unit **(B)** to the rack.

   Note: Replacing the two shipping screws is optional but should be done in geographic areas that are prone to seismic activity.
4. Close the front rack door of the unit you are servicing.
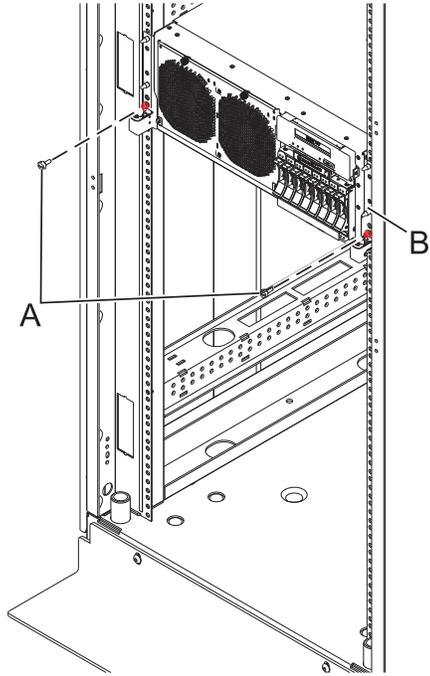
Figure 123. Placing the system into the operating position

Service and operating positions

Use these procedures to place IBM Power Systems servers into the service or operating position.

Placing the 8202-E4B, 8202-E4C, 8205-E6B, or 8205-E6C system into the service or operating position

Use these procedures to place a system into the service position or operating position to perform service or to gain access to internal components.

Placing the rack-mounted 8202-E4B, 8202-E4C, 8205-E6B, or 8205-E6C system into the service position

Use this procedure to place the rack-mounted system into the service position.

Notes:
- When placing the system into the service position, it is essential that all stability plates are firmly in position to prevent the rack from toppling. Ensure that only one system unit is in the service position at a time.
- Ensure that the cables at the back of the system unit do not catch or bind as you pull the unit forward in the rack.
- When the system unit rails are fully extended, the rail safety latches lock into place. This action prevents the system from being pulled out too far.
1. Open the front rack door.
2. Identify the system unit you are servicing in the rack.
3. Remove the two screws **(A)** (if present) that secure the system unit **(B)** to the rack.

   Note: Replacing the shipping screws is optional but should be done in geographic areas that are prone to seismic activity.

Figure 124. Placing the system in the service position

4. While holding the system unit release latches **(A)** down on both the left and right sides, pull the system unit **(B)** out from the rack until the rails are fully extended and locked.

Placing the rack-mounted 8202-E4B, 8202-E4C, 8205-E6B, or 8205-E6C system into the operating position

Use this procedure to place the rack-mounted system into the operating position.

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

1. Unlock the blue rail safety latches **(A)** by lifting them upward. The rail safety latches are located near the middle of the system.
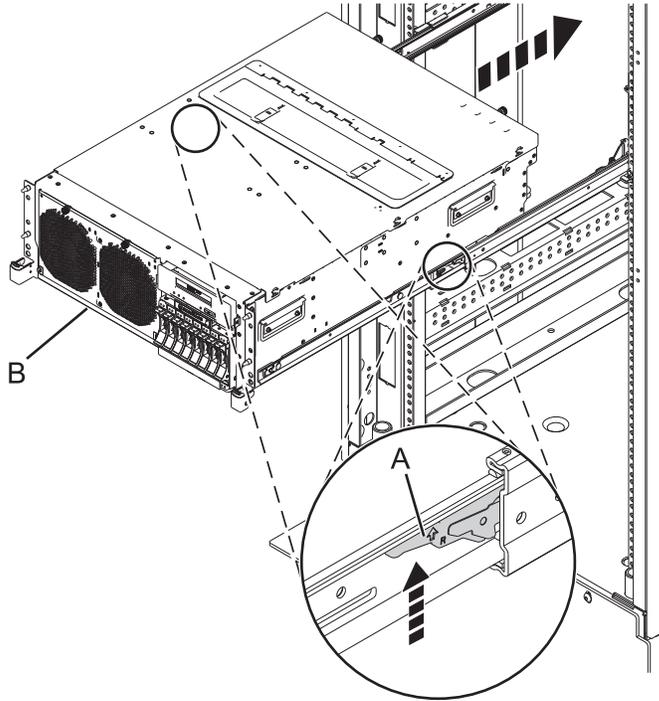
Figure 125. Placing the system into the operating position

2. Push the system unit **(B)** back into the rack until both system-unit release latches have locked into position.
3. Replace and tighten the two screws (if present) **(A)** that secure the system unit **(B)** to the rack.

   Note: Replacing the two shipping screws is optional but should be done in geographic areas that are prone to seismic activity.
4. Close the front rack door of the unit you are servicing.
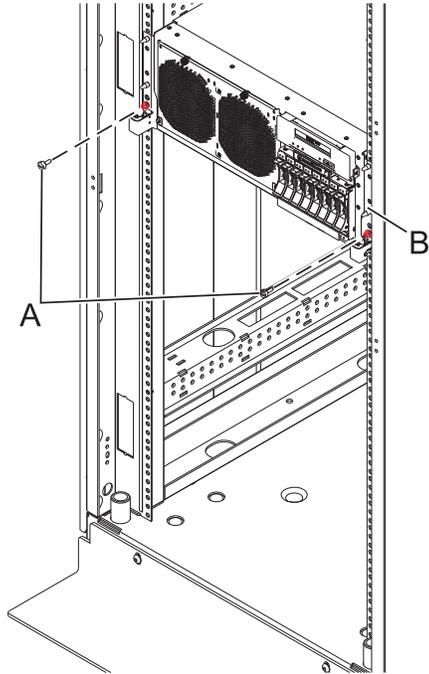
Figure 126. Placing the system into the operating position

Placing the 8231-E2B, 8231-E1C, or 8231-E2C system into the service or operating position

Use these procedures to place a system into the service position or operating position to perform service or to gain access to internal components.

Placing the rack-mounted 8231-E2B, 8231-E1C, or 8231-E2C system into the service position

Use this procedure to place the rack-mounted system into the service position.

Notes:

- When placing the system into the service position, it is essential that all stability plates are firmly in position to prevent the rack from toppling. Ensure that only one system unit is in the service position at a time.
- Ensure that the cables at the back of the system unit do not catch or bind as you pull the unit forward in the rack.
- When the system unit rails are fully extended, the rail safety latches lock into place. This action prevents the system from being pulled out too far.

1. Open the front rack door.
2. Identify the system unit you are servicing in the rack.
3. While holding the system unit release latches down on both the left and right sides, pull the system unit out from the rack until the rails are fully extended and locked.
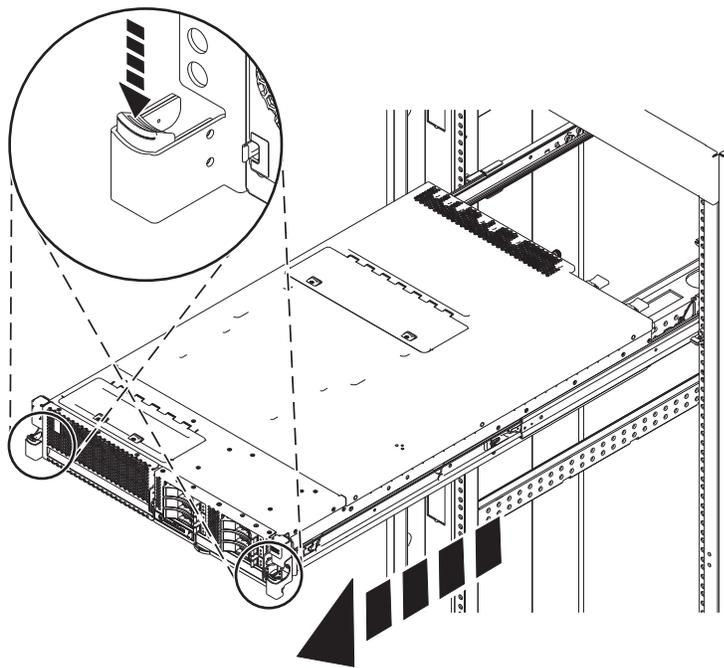
Figure 127. Placing the system in the service position

Placing the rack-mounted 8231-E2B, 8231-E1C, or 8231-E2C system into the operating position

Use this procedure to place the rack-mounted system into the operating position.

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

1. Unlock the blue rail safety latches **(A)** by lifting them upwards.
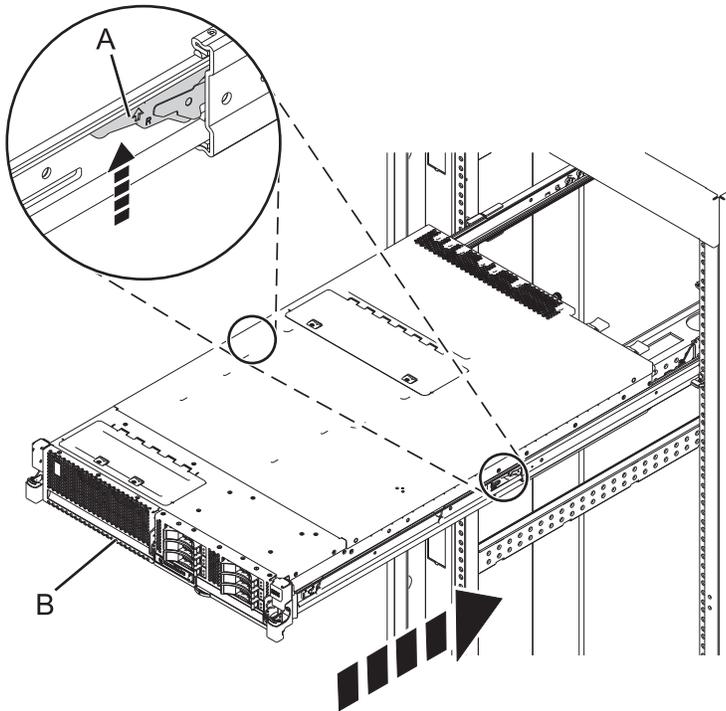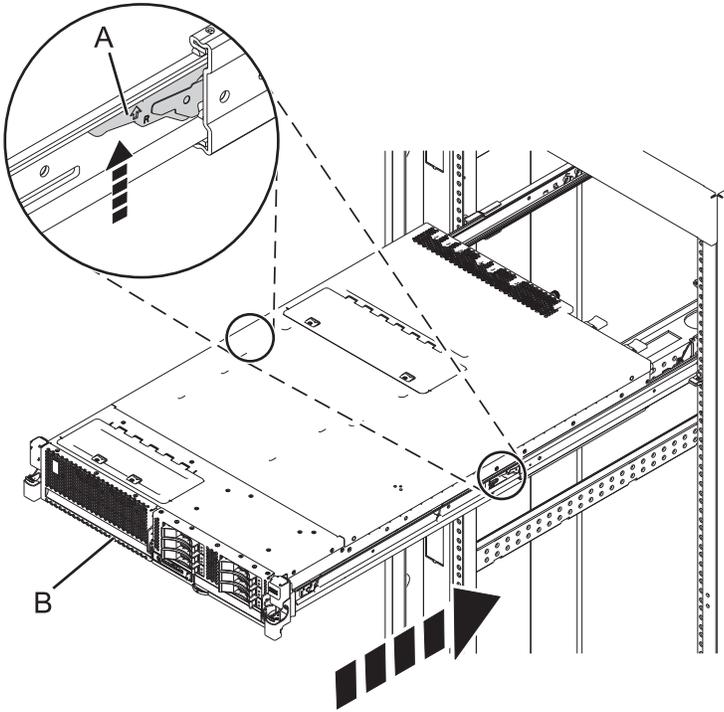
Figure 128. Unlocking the safety rail latches

2. Push the system unit back into the rack until both system-unit release latches have locked into position.
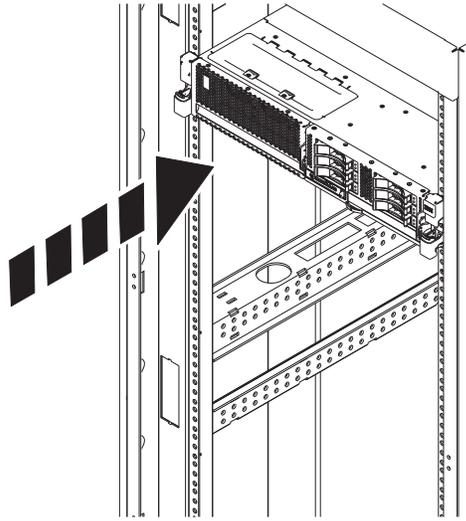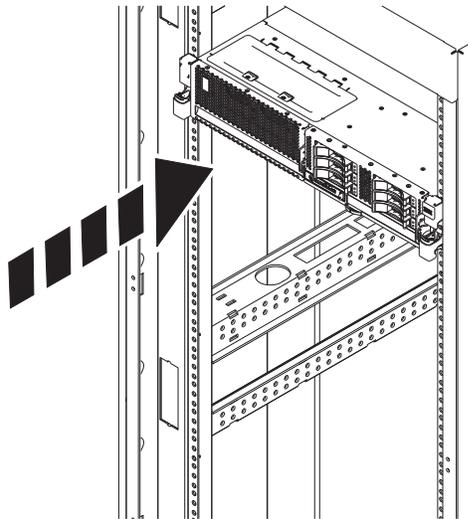

Figure 129. Placing the system into the operating position

3. Close the front rack door of the unit you are servicing.

Placing the rack-mounted 8233-E8B or 8236-E8C system into the service position or operating position

Use these procedures to place a system into the service position or operating position to perform service or to gain access to internal components.

Placing the 8233-E8B or 8236-E8C in the service position

Use this procedure to perform service or gain access to internal components by placing the rack-mounted system or expansion unit in the service position.

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

DANGER

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

Electrical voltage and current from power, telephone, and communication cables are hazardous. To avoid a shock hazard:
- Connect power to this unit only with the IBM provided power cord. Do not use the IBM provided power cord for any other product.
- Do not open or service any power supply assembly.
- Do not connect or disconnect any cables or perform installation, maintenance, or reconfiguration of this product during an electrical storm.
- The product might be equipped with multiple power cords. To remove all hazardous voltages, disconnect all power cords.
- Connect all power cords to a properly wired and grounded electrical outlet. Ensure that the outlet supplies proper voltage and phase rotation according to the system rating plate.
- Connect any equipment that will be attached to this product to properly wired outlets.
- When possible, use one hand only to connect or disconnect signal cables.
- Never turn on any equipment when there is evidence of fire, water, or structural damage.
- Disconnect the attached power cords, telecommunications systems, networks, and modems before you open the device covers, unless instructed otherwise in the installation and configuration procedures.
- Connect and disconnect cables as described in the following procedures when installing, moving, or opening covers on this product or attached devices.

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

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

  (D005)

DANGER

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

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

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

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

(R001)

To place the rack-mounted system or expansion unit into the service position, follow these steps:
1. If necessary, open the front rack door.
2. Remove the two screws **(A)** that secure the system unit to the rack as shown in the following figure.
3. Release the rack latches **(B)** on both the left and right sides as shown in the following figure.
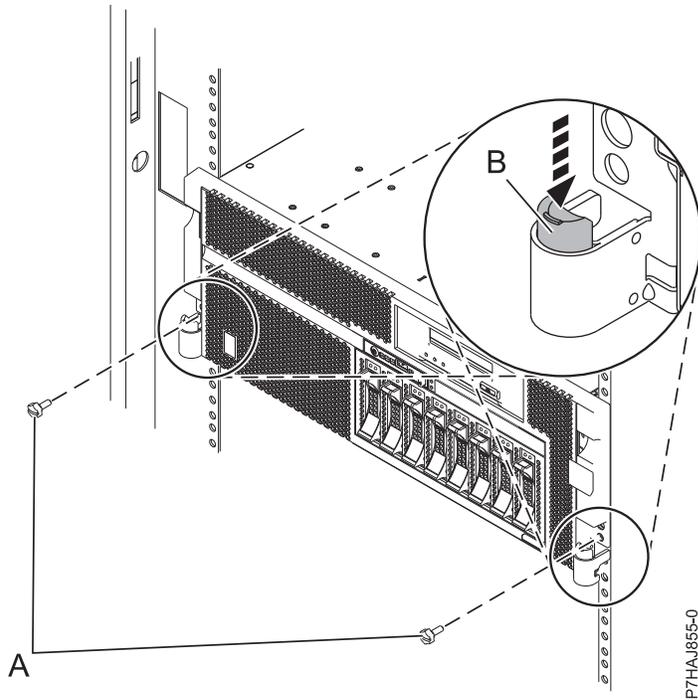
Figure 130. Releasing the rack latches

4. If required, unplug the cables from the back of the system or expansion unit before you pull the unit out from the rack. Ensure that the cables at the rear of the system or expansion unit do not catch or bind as you pull the unit out from the rack.

5. Slowly pull the system or expansion unit out from the rack until the rails are fully extended and locked. Ensure that the rails are fully extended. When the rails are fully extended, the rail safety latches lock into place. This action prevents the system or expansion unit from being pulled out too far.

Placing the 8233-E8B or 8236-E8C in the operating position

Use this procedure to place the system or expansion unit in the operating position to make the unit available for use.

To place the system into the operating position follow these steps:

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

1. Simultaneously release the blue rail safety latches **(B)**, located near the front of each rail, and push the system or expansion unit into the rack as shown in the following figure.

   Note: Ensure that the cables at the rear of the system or expansion unit do not catch or bind as you push the unit back into the rack.
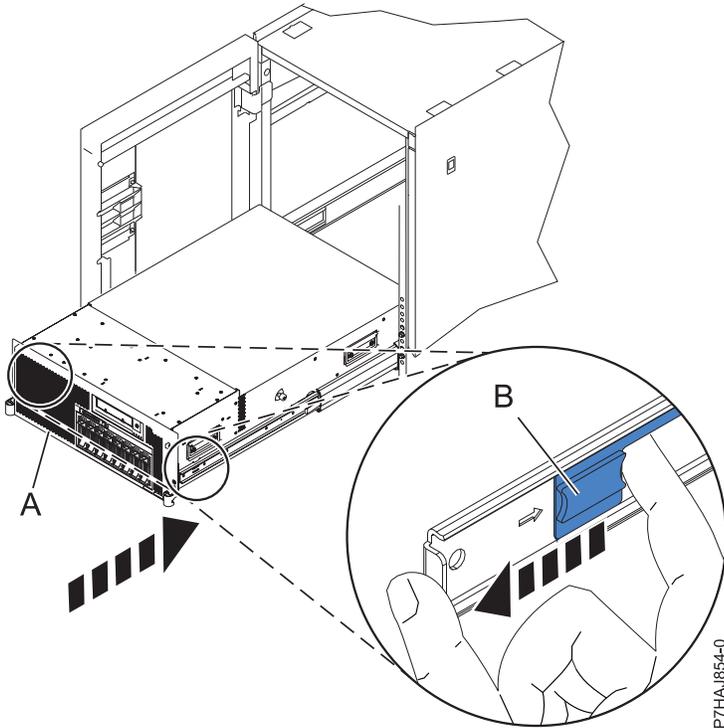
Figure 131. Releasing the rail safety latches

2. Replace and tighten the two thumbscrews **(C)** that secure the system or expansion unit **(A)** to the rack as shown in the following figure.
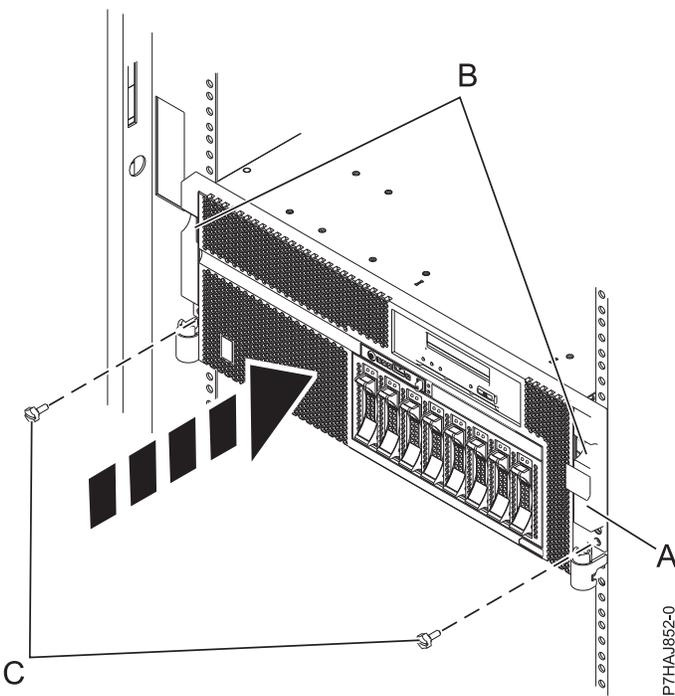
Figure 132. Replacing the thumbscrews

3. Close the front rack door.

Power cords

Use these procedures to disconnect and connect the power cords on IBM Power Systems servers that contain the POWER7 processor.

Disconnecting the power cords from the 8202-E4B, 8202-E4C, 8205-E6B, or 8205-E6C system

Use these procedures to disconnect the power cords from the system.

1. For a rack-mounted system, open the back rack door on the unit you are servicing and identify the system unit you are servicing in the rack.
2. For both a rack-mounted system and a stand-alone system, disconnect all power cords from the unit you are servicing. This system might be equipped with two power supplies. Before continuing with any remove and replace procedures that require the power off, ensure that both power sources to the system have been completely disconnected.
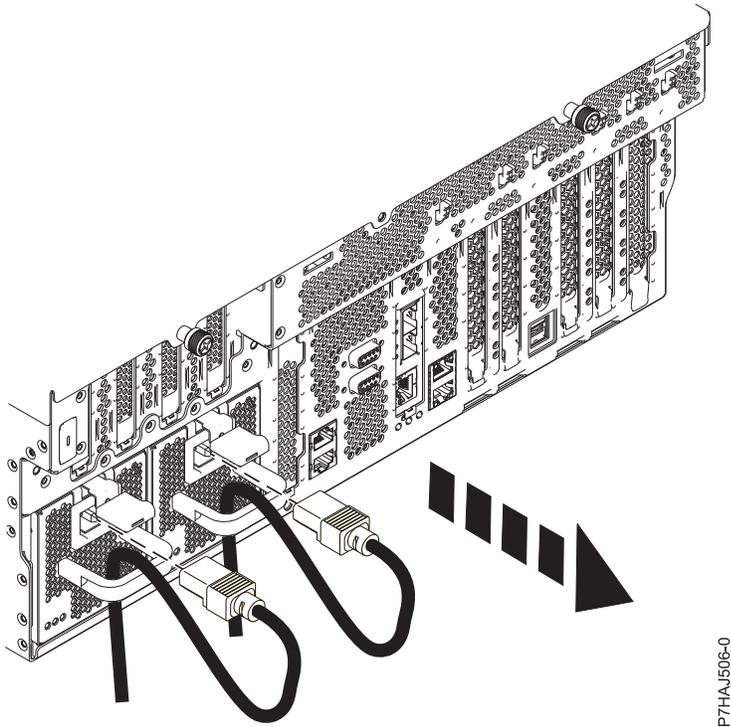
Figure 133. Removing the power cords for a rack-mounted system
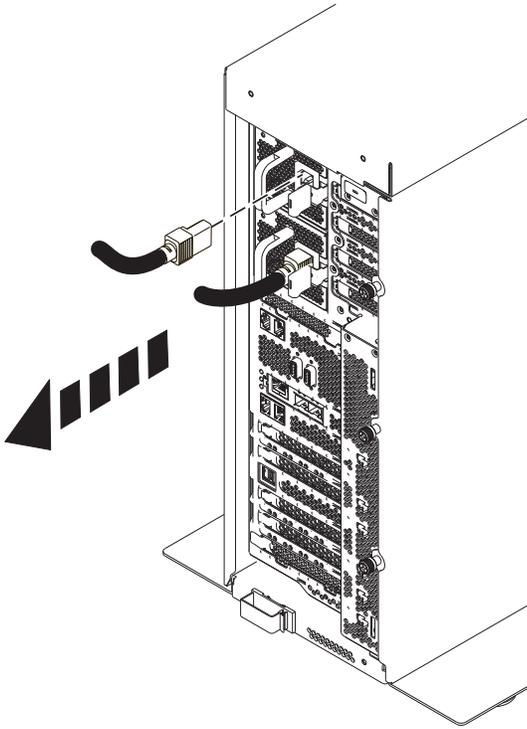
Figure 134. Removing the power cords for a stand-alone system

Connecting the power cords to the 8202-E4B, 8202-E4C, 8205-E6B, or 8205-E6C system

Use this procedure to connect the power cords to the system.

1. Identify the system unit you are servicing in the rack.
2. Connect all power cords to the unit you are servicing. Ensure that the cords are threaded through the handles.
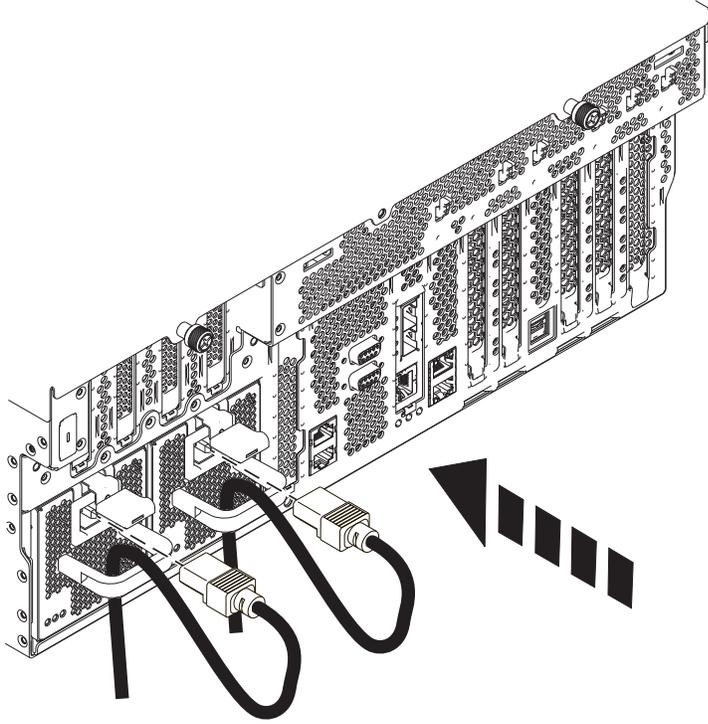
P7HAJ507-0

Figure 135. Connecting the power cords

3. Close the back rack door.

Disconnecting the power cords from the 8231-E2B, 8231-E1C, or 8231-E2C

Use these procedures to disconnect the power cords from the system.

1. Open the back rack door on the unit you are servicing.
2. Identify the system unit you are servicing in the rack.
3. Disconnect all power cords from the unit you are servicing. This system might be equipped with two power supplies. Before continuing with any remove and replace procedures that require the power off, ensure that both power sources to the system have been completely disconnected.
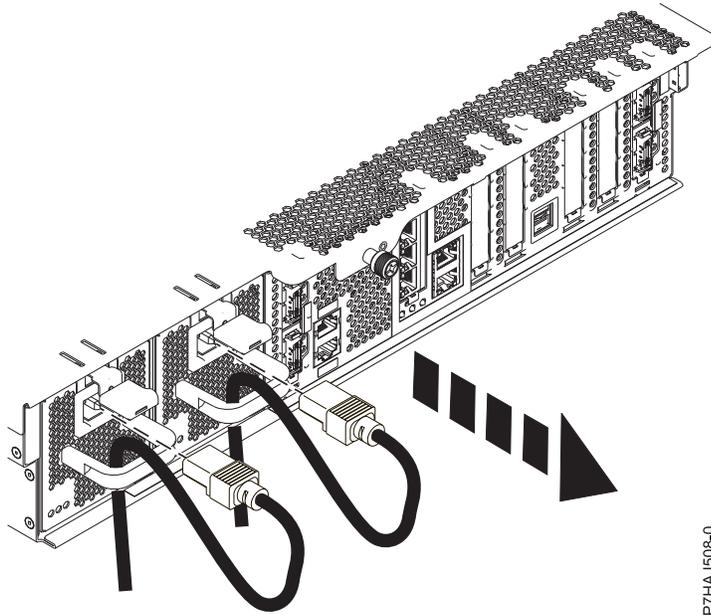
Figure 136. Removing the power cords

Connecting the power cords to the 8231-E2B, 8231-E1C, or 8231-E2C

Use these procedures to connect the power cords to the system.

1. Open the back rack door on the unit you are servicing.
2. Identify the system unit you are servicing in the rack.
3. Disconnect all power cords from the unit you are servicing. Ensure that the cords are threaded through the handles.
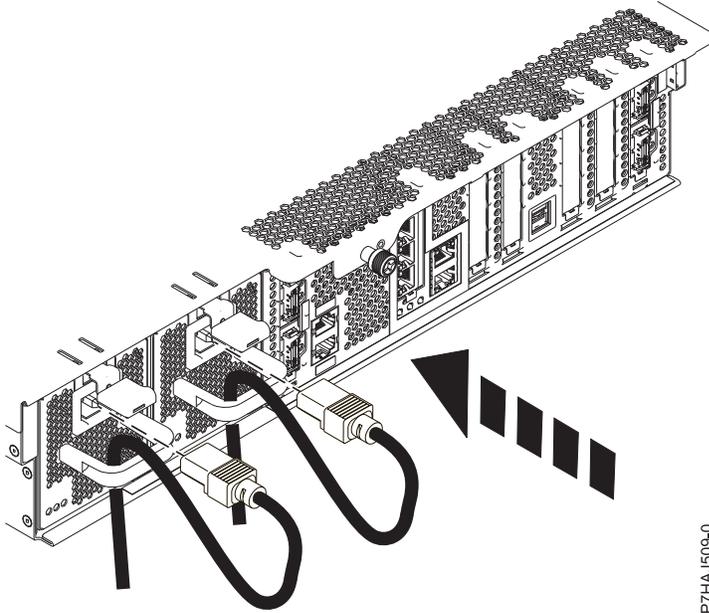
P7HAJ509-0

Figure 137. Connecting the power cords

Verifying the installed part

You can verify a newly installed or replaced part on your system, logical partition, or expansion unit using the operating system, stand-alone diagnostics, or the Hardware Management Console (HMC).

Verifying an installed feature or replaced part in an AIX system or logical partition

If you installed feature or replaced a part, you might want to use the tools in the AIX operating system to verify that the feature or part is recognized by the system or logical partition.

To verify the operation of a newly installed feature or replacement part, select the appropriate procedure:
- Verify the installed feature using AIX
- Verifying the replaced part using AIX

Verify the installed feature by using the AIX operating system:

1. Log in as root user.
2. At the command line, type `diag` and press Enter.
3. Select **Advanced Diagnostics Routines** and press Enter.
4. From the **Diagnostic Mode Selection** menu, select **System Verification** and press Enter.
5. When the **Advanced Diagnostic Selection** menu appears, do one of the following:
   - To test a single resource, select the resource that you just installed from the list of resources and press Enter.
   - To test all the resources available to the operating system, select **All Resources** and press Enter.
6. Select **Commit**, and wait until the diagnostic programs run to completion, responding to any prompts that appear.
7. Did the diagnostics run to completion and display the message `No trouble was found`?
   - **No:** If a service request number (SRN) or other reference code is displayed, suspect a loose adapter or cable connection. Review the installation procedures to ensure that the new feature is installed correctly. If you cannot correct the problem, collect all SRNs or any other reference code information that you see. If the system is running in logical partitioning (LPAR) mode, note the logical partition in which you installed the feature. Contact your service provider for assistance.
   - **Yes:** The new device is installed correctly. Exit the diagnostic programs and return the system to normal operations.

Verify the replacement part by using the AIX operating system:

To verify the operation of a newly installed feature or replacement part, follow these steps:
1. Did you use either the AIX operating system or the online diagnostics service aid concurrent (hot-swap) service to replace the part?

     No: Go to step 2.

     Yes: Go to step 5 on page 210.
2. Is the system powered off?

     No: Go to step 4 on page 210.

     Yes: If the system supports slow boot, set the system to perform a slow boot. For information, see Performing a slow boot.

3. Start the system and wait until the AIX operating system login prompt is displayed or until apparent system activity on the operator panel or display has stopped.

   Did the AIX login prompt display?

   - **No:** If a service request number (SRN) or other reference code is displayed, suspect a loose adapter or cable connection. Review the procedures for the part that you replaced to ensure that the new part is installed correctly. If you cannot correct the problem, collect all SRNs or any other reference code information that you see. If the system does not start or you have no login prompt, see: Problems with loading and starting the operating system.

     If the system is partitioned, note the logical partition in which you replaced the part. Contact your service provider for assistance.

   - **Yes:** Go to step 4.

4. At the command prompt, type `diag –a` and press Enter to check for missing resources. If you see a command prompt, go to step 5.

   If the **Diagnostic selection** menu is shown with **M** appearing next to any resource, follow these steps:

   a. Select the resource and press Enter.

   b. Select **Commit**.

   c. Follow any instructions that are shown.

   d. If the *Do you want to review the previously displayed error?* message is shown, select **Yes** and press Enter.

   e. If an SRN is shown, suspect a loose card or connection. If no obvious problem is shown, record the SRN and contact your service provider for assistance..

   f. If no SRN is shown, go to step 5.

5. Test the part by doing the following steps:

   a. At the command line, type `diag` and press Enter.

   b. From the **Function Selection** menu, select **Advanced Diagnostics Routines** and press Enter.

   c. From the **Diagnostic Mode Selection** menu, select **System Verification** and press Enter.

   d. Select **All Resources**, or select the diagnostics for the individual part to test only the part you replaced and any devices that are attached to the part you replaced and press Enter.

      Did the **Resource Repair Action** menu appear?

      No: Go to step 6.

      Yes: Go to step 7.

6. Did the *Testing Complete, No trouble was found* message appear?

   - **No:** There is still a problem. Contact your service provider. **This ends the procedure.**

   - **Yes:** Select **Log Repair Action**, if not previously logged, from the **Task Selection** menu to update the AIX error log. If the repair action was reseating a cable or adapter, select the resource associated with that repair action. If the resource associated with your action is not displayed on the resource list, select **sysplanar0** and press Enter.

     Tip: This action changes the indicator light for the part from the fault state to the normal state. Go to step 9 on page 211.

7. Select the resource for the replaced part from the **Resource Repair Action** menu. When a test is run on a resource in system verification mode, and that resource has an entry in the AIX error log, if the test on the resource was successful, the **Resource Repair Action** menu appears. Complete the following steps to update the AIX error log to indicate that a system-detectable part has been replaced.

   Note: On systems with an indicator light for the failing part, this action changes the indicator light to the normal state.

a. Select the resource that has been replaced from the **Resource Repair Action** menu. If the repair action was reseating a cable or adapter, select the resource associated with that repair action. If the resource associated with your action does not appear on the resource list, select **sysplanar0** and press Enter.

b. Select **Commit** after you make your selections. Did another **Resource Repair Action** display appear?

   No: If the **No Trouble Found** display appears, go to step 9

   Yes: Go to step 8.

8. Select the parent or child of the resource for the replaced part from the **Resource Repair Action** menu if necessary. When a test is run on a resource in system verification mode, and that resource has an entry in the AIX error log, if the test on the resource was successful, the **Resource Repair Action** menu appears. Complete the following steps to update the AIX error log to indicate that a system-detectable part has been replaced.

   Note: This action changes the indicator light for the part from the fault state to the normal state.

   a. From the **Resource Repair Action** menu, select the parent or child of the resource that has been replaced. If the repair action was to reseat a cable or adapter, select the resource associated with that repair action. If the resource associated with your action does not appear on the resource list, select **sysplanar0** and press Enter.

   b. Select **Commit** after you make your selections.

   c. If the **No Trouble Found** display appears, go to step 9.

9. If you changed the service processor or network settings, as instructed in previous procedures, restore the settings to the values they had prior to servicing the system.

10. Did you do any hot-plug procedures before doing this procedure?

    No: Go to step 11.

    Yes: Go to step 12.

11. Start the operating system, with the system or logical partition in normal mode. Were you able to start the operating system?

    No: Contact your service provider. **This ends the procedure.**

    Yes: Go to step 12.

12. Are the indicator lights still on?

    - **No. This ends the procedure.**
    - **Yes.** Turn off the lights. See the following for instructions: Changing service indicators.

Verifying the installed part in an IBM i system or logical partition

If you have installed a new feature or part, verify that the system recognizes the feature or part by using the IBM i system service tools.

To verify the installed part, follow these steps:

1. Deactivate the failing item indicator light. For instructions, see "Deactivating the failing-part indicator light" on page 150.

2. Sign on **with at least service level authority**.

3. On the command line of the IBM i session, type `strsst` and press Enter.

   Note: If you cannot get to the System Service Tools display, use function 21 from the control panel. Alternatively, if the system is managed by Hardware Management Console (HMC), use the Service Focal Point Utilities to get to the Dedicated Service Tools (DST) display.

4. Type your service tools user ID and service tools password on the System Service Tools (SST) Sign On display and press Enter.

Note: The service tools password is case-sensitive.

5. Select **Start a service tool** from the System Service Tools (SST) display and press Enter.
6. Select **Hardware service manager** from the Start a Service Tool display and press Enter.
7. Select **Logical hardware resources (buses, IOPs, controllers)** from the Hardware Service Manager display and press Enter. This option allows you to display and work with logical resources. Logical hardware resources are the functional resources of the system used by the operating system.

With the Logical Hardware Resources display, you can show logical hardware resource status or information, and associated packaging hardware resources. Use the online Help information to better understand specific functions, fields, or symbols.

Deactivating the failing-part indicator light

Use this procedure to turn off any indicator light that you turned on as a part of a service action.

To deactivate the indicator light, follow these steps:

1. Sign on to an IBM i session, **with at least service level authority**.
2. On the command line of the session, type `strsst` and press Enter.

   Note: If you cannot get to the System Service Tools display, use function 21 from the control panel. Alternatively, if the system is managed by a Hardware Management Console (HMC), use the Service Focal Point utilities to get to the Dedicated Service Tools (DST) display.

3. Type your service tools user ID and service tools password on the System Service Tools (SST) Sign On display. Press Enter.

   Remember: The service tools password is case-sensitive.

4. Select **Start a service tool** from the System Service Tools (SST) display and press Enter.
5. Select **Hardware service manager** from the Start a Service Tool display and press Enter.
6. Select **Work with service action log** from the Hardware Service Manager display and press Enter.
7. On the Select Timeframe display, change the **From: Date and Time** field to a date and time prior to when the problem occurred.
8. Search for an entry that matches one or more conditions of the problem:
   - System Reference code
   - Resource
   - Date and time
   - Failing item list
9. Select option **2** (Display failing item information) to display the service action log entry.
10. Select option **2** (Display details) to display location information for the failing part to be replaced. The information displayed in the date and time fields is the date and time for the first occurrence of the specific System reference code for the resource displayed during the time range selected.
11. Select option **7** (Indicator off) to turn off the indicator light.
12. Select the **Acknowledge all errors** function at the bottom of the Service Action Log display, if all problems have been resolved.
13. Close the log entry by selecting option **8** (Close new entry) on the Service Action Log Report display.

Verifying the installed part in a Linux system or logical partition

If you have installed a new part, learn how to verify that the system recognizes the part.

To verify the newly installed or replaced part, continue with "Verifying an installed part by using stand-alone diagnostics" on page 213.

Verifying an installed part by using stand-alone diagnostics

If you have installed or replaced a part, verify that the system recognizes the new part. You can use stand-alone diagnostics to verify an installed part in an AIX or Linux system, expansion unit, or logical partition.

- If this server is directly attached to another server or attached to a network, ensure communications with the other servers have stopped.
- The stand-alone diagnostics require use of all of the logical partition resources. No other activity can be running on the logical partition.
- The stand-alone diagnostics require access to the system console.

You access these diagnostics from a CD-ROM or from the Network Installation Management (NIM) server. This procedure describes how to use the diagnostics from a CD-ROM. For information on running diagnostics from the Network Installation Management (NIM) server, see Running stand-alone diagnostics from a Network Installation Management server.

To use stand-alone diagnostics, follow these steps:

1. Stop all jobs and applications and then stop the operating system on the system or logical partition.
2. Remove all tapes, diskettes, and CD-ROM.
3. Turn off the system unit power. The next step boots the server or logical partition from the stand-alone diagnostics CD-ROM. If the optical drive is not available as the boot device on the server or logical partition on which you are working, follow these steps:
   a. Access the ASMI. See Accessing the ASMI for information on using the ASMI.
   b. On the ASMI main menu, click on **Power/Restart Control**.
   c. Click Power On/Off System.
   d. Select the **Service mode boot from default boot list** option in the AIX or Linux logical partition mode boot drop-down menu.
   e. Click **Save settings and power on**. As soon as the optical drive has power, insert the standalone diagnostic CD-ROM.
   f. Go to step 5.
4. Turn on the system unit power and immediately insert the diagnostics CD-ROM into the optical drive.
5. After the **keyboard** POST indicator displays on the system console and before the last POST indicator (**speaker**) displays, press the numeric 5 key on the system console to indicate that a service mode boot should be initiated using the default-service mode boot list.
6. Enter any requested password.
7. At the **Diagnostic Operating Instructions** display, press Enter.

   Tip: If a service request number (SRN) or other reference code is displayed, suspect a loose adapter or cable connection.

   Note: If you received an SRN or any other reference code when you attempted to start the system, contact your service provider for assistance..
8. If the terminal type is requested, select the **Initialize Terminal** option on the Function Selection menu to initialize the operating system.
9. From the Function Selection menu, select **Advanced Diagnostics Routines** and press Enter.
10. From the Diagnostic Mode Selection menu, select **System Verification** and press Enter.
11. When the Advanced Diagnostic Selection menu appears, select **All Resources**, or test only the part you replaced, and any devices that are attached to the part you replaced, by selecting the diagnostics for the individual part and press Enter.
12. Did the `Testing Complete, No trouble was found` message appear?

- **No:** There is still a problem. Contact your service provider.
- **Yes:** Go to step 13.

13. If you changed the service processor or network settings, as instructed in previous procedures, restore the settings to the value they had prior to servicing the system.

14. If the indicator lights are still on, follow these steps:

    a. Select **Identify and Attention Indicators** from the Task Selection menu to turn off the system attention and indicator lights and press Enter.

    b. Select **Set System Attention Indicator to NORMAL** and press Enter.

    c. Select **Set All Identify Indicators to NORMAL** and press Enter.

    d. Choose **Commit**.

       Note: This changes the system attention and identify indicators from the *Fault* state to the *Normal* state.

    e. Exit to the command line.

Verifying the installed part by using Hardware Management Console

If you have installed or replaced a part, use the Hardware Management Console (HMC) to update your HMC records after you have completed a service action on your server. If you have reference codes, symptoms, or location codes that you used during the service action, locate the records for use during this procedure.

To verify the installed part, complete these steps:

1. At the HMC, examine the service action event log for any open service action events. See "Viewing serviceable events by using the HMC" on page 216 for details.

2. Are there any service action events that are open?

   No: If the system attention LED is still on, use the HMC to turn off the LED. See "Activating and deactivating LEDs by using the HMC" on page 215. **This ends the procedure.**

   Yes: Continue with the next step.

3. Record the list of open service action events.

4. Examine the details of the open service action event. Is the error code associated with this service action event the same as you gathered earlier.

   - **No**: Select one of the following options:
     - Review the other serviceable events, find one that does match, and continue with the next step.
     - If the log does not match what you had gathered earlier, contact your service provider.
   - **Yes**: Continue with the next step.

5. Select and highlight the service action event from the Error Associated With This Serviceable Event window.

6. Click **Close Event**.

7. Add comments for the serviceable event. Include any unique additional information. Click **OK**.

8. Did you replace, add, or modify a field replaceable unit (FRU) of the open service action event?

   - **No**: Select the **No FRU Replaced for this Serviceable Event** option, and click **OK** to close the service action event.
   - **Yes**: Perform the following steps:
     a. From the FRU list, select a FRU that you need to update.
     b. Double-click the FRU and update the FRU information.
     c. Click **OK** to close the service action event.

9. If you continue to have problems, contact your service provider.

Activating and deactivating LEDs by using the HMC

Use this procedure to activate or deactivate LEDs using Service Focal Point for the Hardware Management Console (HMC).

Choose from the following:
- "Deactivating a system attention LED or partition LED"
- "Activating or deactivating an identify LED"

Deactivating a system attention LED or partition LED

You can deactivate a system attention LED or a logical partition LED. For example, you might determine that a problem is not a high priority and decide to repair the problem at a later time. However, you want to be alerted if another problem occurs, so you must deactivate the system attention LED so that it can be activated again if another problem occurs.

1. In the navigation area, open **Systems Management**.
2. Open **Servers** and select the appropriate system.
3. In the content area, check the box for the appropriate Partition.
4. Select **Tasks**, then **Operations**, and then **Manage Attention LED**.
5. Select the appropriate Partition.
6. Select **Deactivate System Attention LED** from the **Action** menu. A confirmation window is displayed that provides the following information:
   - A verification that the system attention LED was deactivated.
   - An indication that there still might be open problems within the system.
   - An indication that you cannot activate the system attention LED.
7. Select one of the logical partitions in the lower table, and select **Deactivate partition LED** from the **Partition Operations** menu. A confirmation window is displayed that provides the following information:
   - A verification that the logical partition LED was deactivated.
   - An indication that there still might be open problems within the logical partition.
   - An indication that you cannot activate the logical partition LED.

Activating or deactivating an identify LED

The system provides several LEDs that help identify various components, such as enclosures or field replaceable units (FRUs), in the system. For this reason, they are called *identify LEDs*.

You can activate or deactivate the following types of identify LEDs:
- **Identify LED for an enclosure** If you want to add an adapter to a specific drawer (enclosure), you need to know the machine type, model, and serial number (MTMS) of the drawer. To determine whether you have the correct MTMS for the drawer that needs the new adapter, you can activate the LED for a drawer and verify that the MTMS corresponds to the drawer that requires the new adapter.
- **Identify LED for a FRU associated with a specified enclosure** If you want to hook up a cable to a specific I/O adapter, you can activate the LED for the adapter which is a field replaceable unit (FRU), and then physically check to see where you should hook up the cable. This is especially useful when you have several adapters with open ports.

To activate or deactivate an identify LED for an enclosure or FRU, follow these steps:

1. In the navigation area, open **Systems Management**.
2. Select **Servers**.
3. In the content area, check the box for the appropriate System.
4. Select **Tasks**, then **Operations**, then **LED Status**, and then **Identify LED**.

5. To activate or deactivate an identify LED for an enclosure, select an enclosure from the table, and click either **Activate LED** or **Deactivate LED**. The associated LED is either turned on or off.

6. To activate or deactivate an identify LED for a FRU, select an enclosure from the table, select **Selected → List FRUs**.

7. Select one or more FRUs from the table, and click either **Activate LED** or **Deactivate LED**. The associated LED is either turned on or off.

Viewing serviceable events by using the HMC

Use this procedure to view a serviceable event, including details, comments, and service history.

To view serviceable events and other information about the events, you must be a member of one of the following roles:
- Super administrator
- Service representative
- Operator
- Product engineer
- Viewer

To view serviceable events, follow these steps:

1. In the navigation area, select **Service Management**.
2. Select **Manage Serviceable Events**.
3. Select the criteria for the serviceable events that you want to view, and click **OK**. The Serviceable Event Overview window opens. The list shows all serviceable events that match your selection criteria. You can use the menu options to perform actions on the serviceable events.
4. Select a line in the Serviceable Event Overview window, and select **Selected → View Details** The Serviceable Event Details window opens, showing detailed information about the serviceable event. The upper table shows information, such as problem number and reference code. The lower table shows the field replaceable units (FRUs) associated with this event.
5. Select the error for which you want to view comments and history, and follow these steps:
   a. Select **Actions → View Comments**.
   b. When you are finished viewing the comments, click **Close**.
   c. Select **Actions → View Service History**. The Service History window opens, showing service history associated with the selected error.
   d. When you are finished viewing the service history, click **Close**.
6. When you are finished, click **Cancel** twice to close the Serviceable Event Details window and the Serviceable Event Overview window.

Verifying the installed part by using Systems Director Management Console

If you installed or replaced a part, use the IBM Systems Director Management Console (SDMC) to update your SDMC records after you have completed a service action on your server. If you have reference codes, symptoms, or location codes that you used during the service action, locate the records for use during this procedure.

To verify the installed part, complete these steps:

1. From the SDMC, examine the service action event log for any open service action events. See "Viewing serviceable events by using the Systems Director Management Console" on page 218 for details.
2. Are there any service action events that are open?

No: If the system attention LED is still on, use the SDMC to turn off the LED. See "Activating and deactivating LEDs by using the Systems Director Management Console." **This ends the procedure.**

Yes: Continue with the next step.

3. Record the list of open service action events.

4. Examine the details of the open service action event. Is the error code associated with this service action event the same as you gathered earlier.

   - **No**: Select one of the following options:
     - Review the other serviceable events, find one that does match, and continue with the next step.
     - If the log does not match what you had gathered earlier, contact your service provider.
   - **Yes**: Continue with the next step.

5. Select and highlight the service action event from the Error Associated With This Serviceable Event window.

6. Click **Delete** or **Ignore**.

   Note: These options are only available from the problem event log.

Activating and deactivating LEDs by using the Systems Director Management Console

Use this procedure to activate or deactivate LEDs by using the IBM Systems Director Management Console (SDMC).

Choose from the following:
- "Deactivating a system attention LED or partition LED"
- "Activating or deactivating an identify LED by using the SDMC"

Deactivating a system attention LED or partition LED

You can deactivate a system attention LED or a logical partition LED. For example, you might determine that a problem is not a high priority and decide to repair the problem at a later time. However, you want to be alerted if another problem occurs, so you must deactivate the system attention LED so that it can be activated again if another problem occurs.

1. On the Resources tab, select the appropriate host or virtual server.

2. Select **Actions** → **Service and Support** → **Hardware** → **System Attention LED**.

3. Select **Deactivate System Attention LED**. A confirmation window is displayed that provides the following information:
   - A verification that the system attention LED was deactivated.
   - An indication that there still might be open problems within the system.
   - An indication that you cannot activate the system attention LED.

4. Select one of the virtual servers, and select **Deactivate System Attention LED**. A confirmation window is displayed that provides the following information:
   - A verification that the system attention LED was deactivated.
   - An indication that there still might be open problems within the logical partition.
   - An indication that you cannot activate the virtual server LED.

Activating or deactivating an identify LED by using the SDMC

The system provides several LEDs that help identify various components, such as enclosures or field replaceable units (FRUs). For this reason, they are called *identify LEDs*.

You can activate or deactivate the following types of identify LEDs:

- **Identify LED for an enclosure** If you want to add an adapter to a specific drawer (enclosure), you need to know the machine type, model, and serial number (MTMS) of the drawer. To determine whether you have the correct MTMS for the drawer that needs the new adapter, you can activate the LED for a drawer and verify that the MTMS corresponds to the drawer that requires the new adapter.
- **Identify LED for a FRU associated with a specified enclosure** If you want to hook up a cable to a specific I/O adapter, you can activate the LED for the adapter which is a field replaceable unit (FRU), and then physically check to see where you should hook up the cable. This is especially useful when you have several adapters with open ports.

To activate or deactivate an identify LED for an enclosure or FRU, follow these steps:

1. On the Resources tab, select the appropriate host or virtual server.
2. Select **Actions** ⟩ **Service and Support** ⟩ **Hardware** ⟩ **Identify LED**.
3. In the Identify LED, Select Enclosure window, select the system unit or enclosure.
4. To activate or deactivate an identify LED, click either **Activate LED** or **Deactivate LED**. The associated LED is either turned on or off.
5. To activate or deactivate an identify LED for a FRU, select a system or enclosure from the table, and then select **List FRUs...**.
6. Select one or more FRUs from the table, and click either **Activate LED** or **Deactivate LED**. The associated LED is either turned on or off.

Viewing serviceable events by using the Systems Director Management Console

Use this procedure to view a serviceable event, including details, comments, and service history.

To view serviceable events, follow these steps:

1. On the Resources tab, select the appropriate host or virtual server.
2. Select **Actions** ⟩ **System Status and Health** ⟩ **Event Log**.
3. Optional: You can narrow the event criteria using the Event filter menu.
4. Select a line in the Events window, and select **Actions** ⟩ **Properties** The Properties window opens, showing detailed information about the serviceable event. The table shows information, such as problem number, reference code, and the field replaceable units (FRUs) associated with this event.

Verifying an installed feature or replaced part on a system or logical partition by using Virtual I/O Server tools

If you installed feature or replaced a part, you might want to use the tools in Virtual I/O Server (VIOS) to verify that the feature or part is recognized by the system or logical partition.

To verify the operation of a newly installed feature or replacement part, select the appropriate procedure:
- Verify the installed feature using VIOS
- Verifying the replaced part using VIOS

Verify the installed feature by using VIOS:

1. Log in as root user.
2. At the command line, type `diagmenu` and press Enter.
3. Select **Advanced Diagnostics Routines** and press Enter.
4. From the **Diagnostic Mode Selection** menu, select **System Verification** and press Enter.
5. When the **Advanced Diagnostic Selection** menu appears, do one of the following:

- To test a single resource, select the resource that you just installed from the list of resources and press Enter.
- To test all the resources available to the operating system, select **All Resources** and press Enter.

6. Select **Commit**, and wait until the diagnostic programs run to completion, responding to any prompts that appear.

7. Did the diagnostics run to completion and display the message `No trouble was found`?
   - **No:** If a service request number (SRN) or other reference code is displayed, suspect a loose adapter or cable connection. Review the installation procedures to ensure that the new feature is installed correctly. If you cannot correct the problem, collect all SRNs or any other reference code information that you see. If the system is running in LPAR mode, note the logical partition in which you installed the feature. Contact your service provider for assistance.
   - **Yes:** The new device is installed correctly. Exit the diagnostic programs and return the system to normal operations.

Verify the replacement part by using VIOS:

To verify the operation of a newly installed feature or replacement part, follow these steps:

1. Did you replace the part by using either VIOS or the online diagnostics service aid's concurrent (hot-swap) service operation?

   No: Go to step 2.

   Yes: Go to step 5.

2. Is the system powered off?

   No: Go to step 4.

   Yes: If the system supports slow boot, set the system to perform a slow boot. For information, see Performing a slow boot.

3. Start the system and wait until the VIOS operating system login prompt displays or until apparent system activity on the operator panel or display has stopped.

   Did the VIOS login prompt display?
   - **No:** If an SRN or other reference code is displayed, suspect a loose adapter or cable connection. Review the procedures for the part that you replaced to ensure that the new part is installed correctly. If you cannot correct the problem, collect all SRNs or any other reference code information that you see. If the system does not start or you have no login prompt, see: Problems with loading and starting the operating system.

     If the system is partitioned, note the logical partition in which you replaced the part. Contact your service provider for assistance.
   - **Yes:** Go to step 4

4. At the command prompt, type `diag –a` and press Enter to check for missing resources. If you see a command prompt, go to step 5.

   If the **Diagnostic selection** menu is shown with **M** appearing next to any resource, follow these steps:

   a. Select the resource and press Enter.

   b. Select **Commit**.

   c. Follow any instructions that are shown.

   d. If a *Do you want to review the previously displayed error?* message is shown, select **Yes** and press Enter.

   e. If an SRN is shown, suspect a loose card or connection. If no obvious problem is shown, record the SRN and contact your service provider for assistance..

   f. If no SRN is shown, go to 5.

5. Test the part by doing the following:

a. At the command line, type `diagmenu` and press Enter.

b. From the **Function Selection** menu, select **Advanced Diagnostics Routines** and press Enter.

c. From the **Diagnostic Mode Selection** menu, select **System Verification** and press Enter.

d. Select **All Resources**, or select the diagnostics for the individual part to test only the part you replaced, and any devices that are attached to the part you replaced and press Enter.

Did the **Resource Repair Action** menu appear?

No: Go to step 6.

Yes: Go to step 7.

6. Did the *Testing Complete, No trouble was found* message appear?

- **No:** There is still a problem. Contact your service provider. **This ends the procedure.**

- **Yes:** Select **Log Repair Action**, if not previously logged, from the **Task Selection** menu to update the AIX error log. If the repair action was reseating a cable or adapter, select the resource associated with that repair action. If the resource associated with your action is not displayed on the Resource List, select **sysplanar0** and press Enter.

   Tip: This action changes the indicator light for the part from the fault state to the normal state. Go to step 9

7. Select the resource for the replaced part from the **Resource Repair Action** menu. When a test is run on a resource in system verification mode, and that resource has an entry in the AIX error log, if the test on the resource was successful, the **Resource Repair Action** menu appears. Complete the following steps to update the AIX error log to indicate that a system-detectable part has been replaced.

   Note: On systems with a indicator light for the failing part, this changes the indicator light to the normal state.

   a. Select the resource that has been replaced from the **Resource Repair Action** menu. If the repair action was reseating a cable or adapter, select the resource associated with that repair action. If the resource associated with your action does not appear on the Resource List, select **sysplanar0**. Press Enter.

   b. Select **Commit** after you make your selections. Did another **Resource Repair Action** display appear?

   No: If the **No Trouble Found** display appears, go to step 9

   Yes: Go to step 8.

8. Select the parent or child of the resource for the replaced part from the **Resource Repair Action** menu if necessary. When a test is run on a resource in system verification mode, and that resource has an entry in the AIX error log, if the test on the resource was successful, the **Resource Repair Action** menu appears. Complete the following steps to update the AIX error log to indicate that a system-detectable part has been replaced.

   Note: This changes the indicator light for the part from the fault state to the normal state.

   a. From the **Resource Repair Action** menu, select the parent or child of the resource that has been replaced. If the repair action was to reseat a cable or adapter, select the resource associated with that repair action. If the resource associated with your action does not appear on the Resource List, select **sysplanar0**. Press Enter.

   b. Select **Commit** after you make your selections.

   c. If the **No Trouble Found** display appears, go to step 9.

9. If you changed the service processor or network settings, as instructed in previous procedures, restore the settings to the values they had prior to servicing the system.

10. Did you do any hot-plug procedures before doing this procedure?

   No: Go to step 11 on page 221.

Yes: Go to step 12.

11. Start the operating system, with the system or logical partition in normal mode. Were you able to start the operating system?

   No: Contact your service provider. **This ends the procedure.**

   Yes: Go to step 12.

12. Are the indicator lights still on?

   • **No. This ends the procedure.**

   • **Yes.** Turn off the lights. See one of the following for instructions: Changing service indicators

Verifying a repair

Use these procedures to verify hardware operation after making repairs to the system.

Choose from the following options:
- To verify the repair of a system that is currently powered off, go to step 1.
- To verify the repair of a system that is currently powered on with no operating system loaded, go to step 3.
- To verify the repair of a system that is currently powered on and that has an operating system loaded, go to step 5.

1. Power on the server and all attached I/O enclosures.

Did all the enclosures power on?
Yes: Go to step 3.↓ Go to step 3.
No: Continue with the next step.

2. Choose from the following options:

- If the original problem was that an enclosure would not power on and you have another FRU to replace, locate and replace the next field-replaceable unit (FRU).
- If the next FRU in the FRU list is an isolation procedure, perform the isolation procedure.
- If the original problem was that an enclosure would not power on and you have an isolation procedure to complete, perform the isolation procedure.
- If the original problem was that an enclosure would not power on and there are no more FRUs or isolation procedures in the FRU list, contact your next level of support.
- If you have a new problem, perform problem analysis and repair the new problem.

3. Load the operating system.

Did the operating system load successfully?
Yes: Go to step 5.
No: Continue with the next step.

4. Choose from the following options:

- If the original problem was a failing disk drive that contained the operating system software, go to step 5.
- If the original problem was that the operating system would not load and you have another FRU to replace, go to your FRU locations section to locate the next FRU.
- If the next FRU in the FRU list is an isolation procedure, perform the isolation procedure.
- If the original problem was that the operating system would not load and you have an isolation procedure to complete, perform the isolation procedure.
- If the original problem was that the operating system would not load and there are no more FRUs or isolation procedures in the FRU list, contact your next level of support.
- If you have a new problem, perform problem analysis and repair the new problem.

5. Choose from the following options:
    - "Verifying the repair in AIX" on page 224
    - "Verifying the repair in Linux" on page 229
    - "Verifying a repair using an IBM i system or logical partition" on page 227

Verifying the repair in AIX

You can use this procedure to verify that a repair is complete using the AIX operating system.

Use this maintenance analysis procedure (MAP) to check out the server after a repair is completed.

1. Did you replace a disk drive in the root volume group?

No   Go to step 3.

Yes   Continue with the next step.

2. Run stand-alone diagnostics either from a CD or from a Network Installation Management (NIM) server.

Did you encounter any problems?

No   Reinstall the operating system and continue with step 5.

Yes   If the original problem still exists, replace the field-replaceable unit (FRU) or perform the isolation procedure that is next in the FRU list. If you have reached the end of the FRU list, contact your next level of support.

            If a new problem has occurred, go to Beginning problem analysis.

3. Did you replace a FRU with the power turned on and concurrently with system operations?

No   Go to step 5.

Yes   Continue with the next step.

4. Did you use an AIX diagnostics service aid hot-swap operation to change the FRU?

Yes   Go to step 6.

No   Go to step 7 on page 225.

Note: The AIX diagnostic service aid was used if a resource was removed using the **Hot Plug** task.

5.

     Note: If any FRUs have been removed that should be reinstalled, reinstall them now.

     Perform the following steps:

1. If the system is not powered on, power it on now.
2. Perform a slow boot.
3. Wait until the AIX operating system login prompt displays or until system activity on the operator panel or display apparently has stopped.
4. Did you encounter any problems?

No   Continue at step 6.

Yes   If the original problem still exists, replace the FRU or perform the isolation procedure that is next in the FRU list. If you have reached the end of the FRU list, contact your next level of support.

            If a new problem has occurred, go to Beginning problem analysis.

6. If the Resource Repair Action menu is already displayed, go to step 9 on page 225; otherwise, perform the following steps:

1. Log into the operating system either with root authority (if needed, ask the customer to enter the password) or use the CE login.

2. Enter the `diag -a` command and check for missing resources. Follow any instructions that display. If an SRN displays, suspect a loose card or connection. If no instructions display, no resources were detected as missing. Continue with the next step.

7. Perform the following steps:

1. Enter `diag` at the command prompt.
2. Press Enter.
3. Select the **Diagnostics Routines** option.
4. When the Diagnostic Mode Selection menu displays, select **System verification**.
5. When the Diagnostic Selection menu displays, select the **All Resources** option or test the FRUs you exchanged, and any devices that are attached to the FRU(s) you exchanged, by selecting the diagnostics for the individual FRU.

Did the Resource Repair Action menu (801015) display?

No Continue with the next step.

Yes Go to step 9.

8. Did the Testing Complete, no trouble was found menu (801010) display?

Yes Use the **Log Repair Action** option, if not previously logged, in the TASK SELECTION menu to update the AIX error log. If the repair action was reseating a cable or adapter, select the resource associated with that repair action.

   If the resource associated with your action is not displayed on the resource list, select **sysplanar0**.
   Note: If the system attention indicator is on, this action will set it back to the normal state.

   Go to step 11 on page 226.

No If the original problem still exists, replace the FRU or perform the isolation procedure that is next in the FRU list. If you have reached the end of the FRU list, contact your next level of support.

   If a new problem has occurred, go to Beginning problem analysis.

9. When a test is run on a resource in system verification mode, that resource has an entry in the AIX error log. If the test on that resource was successful, the Resource Repair Action menu displays.

   After replacing a FRU, you must select the resource for that FRU from the Resource Repair Action menu. This updates the AIX error log to indicate that a system-detectable FRU has been replaced.

   Note: If the system attention indicator is on, this action will set it back to the normal state.

   Perform the following steps:

1. Select the resource that has been replaced from the Resource Repair Action menu. If the repair action was reseating a cable or adapter, select the resource associated with that repair action. If the resource associated with your action is not displayed on the resource list, select **sysplanar0**.

2. Press **Commit** after you make your selections.

Did another Resource Repair Action (801015) display?

No   If the No Trouble Found menu displays, go to step 11.

Yes   Continue with the next step.

10. The parent or child of the resource you just replaced might also require that you run the Resource Repair Action service aid on it.

When a test is run on a resource in system verification mode, that resource has an entry in the AIX error log. If the test on the resource was successful, the Resource Repair Action menu displays.

After replacing that FRU, you must select the resource for that FRU from the Resource Repair Action menu. This updates the AIX error log to indicate that a system-detectable FRU has been replaced.

Note: If the system attention indicator is on, this action will set it back to the normal state.

Perform the following steps:

1. From the RESOURCE REPAIR ACTION menu, select the parent or child of the resource that has been replaced. If the repair action was reseating a cable or adapter, select the resource associated with that repair action. If the resource associated with your action is not displayed on the resource list, select **sysplanar0**.

2. Press COMMIT after you make your selections.

3. If the No Trouble Found menu displays, continue with the next step.

11. If you changed the service processor or network settings, as instructed in previous MAPs, restore the settings to the value they had prior to servicing the system. If you ran stand-alone diagnostics from CD-ROM, remove the stand-alone diagnostics CD-ROM from the system.

Did you perform service on a RAID subsystem involving changing of the PCI RAID adapter cache card or changing the configuration?

Note: This information does not apply to the PCI-X RAID adapter or cache.

No   Go to the close of call procedure.

Yes   Continue with the next step.

12. Use the **Recover Options** selection to resolve the RAID configuration. To do this, perform the following steps:

1. On the PCI SCSI Disk Array Manager display, select **Recovery options**.
2. If a previous configuration exists on the replacement adapter, this must be cleared. Select **Clear PCI SCSI Adapter Configuration** and press F3.
3. On the Recovery Options screen, select **Resolve PCI SCSI RAID Adapter Configuration**.
4. On the Resolve PCI SCSI RAID Adapter Configuration screen, select **Accept Configuration on Drives**.
5. On the PCI SCSI RAID Adapter selections menu, select the adapter that you changed.
6. On the next screen, press Enter.
7. When you see the Are You Sure selection menu, press Enter to continue.
8. If you see a `Failed` status message, verify that you selected the correct adapter, and then repeat this procedure. When the recovery is complete, exit the operating system.
9. Go to the close of call procedure.

Verifying a repair using an IBM i system or logical partition

Use this procedure to verify a repair using the IBM i operating system.

1. Was the system powered off during the repair?

   Yes: Continue with the next step.

   No: Continue with step 3.

2. Perform the following tasks:

   a. Verify that the power cable is plugged into the power outlet.

   b. Verify that power is available at the customer's power outlet.

3. Was the partition powered off during the repair?

   Yes: Continue with the next step.

   No: Continue with step 6.

4. Select the IPL type and mode for the system or logical partition that the customer uses (see IPL type mode and speed options in the Service functions).

5. Start an IPL by powering on the system or partition (see Powering on and powering off). Did the system complete the IPL?

   Yes: Continue with the next step.

   No: This might be a new problem. Go to the Start of call procedure. **This ends the procedure.**

6. Did the system or partition remain running throughout the repair, and was the I/O processor, I/O adapter, or storage device replaced?

   Yes: Continue with step 10.

   No: Continue with the next step.

7. Use the service action log or serviceable event view (if the system is managed by an HMC) to look for any reference codes that are related to this IPL (see Using the Service Action Log). Are there any reference codes that are related to this IPL?

   Yes: Continue with the next step.

   No: If the problem was related to removable media or communications, perform the verification procedures in the Service functions to verify that the problem is corrected. Then return the system to the customer and have the customer verify the system date and time. **This ends the procedure.**

8. Is the new reference code the same as the original reference code?

    Yes: Continue with the next step.

    No: A new symptom might have occurred. Go to the Start of call procedure. **This ends the procedure.**

9. Are there any other failing items that remain to be replaced?

    Yes: Replace the next failing item listed for this reference code. **This ends the procedure.**

    No: Contact your next level of support for assistance. **This ends the procedure.**

10. Was concurrent maintenance performed on an optical storage unit?

    Yes: The product activity log and service action log, in most cases, contain a reference code for the optical storage unit when concurrent maintenance is performed. You can ignore this reference code. Perform the following:

    - Perform the verification procedures in the Service functions topic to verify that the problem is corrected.

    - Return the system to the customer and have the customer verify the system date and time. **This ends the procedure.**

    No: Continue with the next step.

11. Use the service action log to look for any new reference codes (see Using the Service Action Log). Are there any new reference codes?

    Yes: Continue with the next step.

    No: Go to step 14.

12. Is the new reference code the same as the original reference code?

    Yes: Continue with the next step.

    No: A new symptom might have occurred. Go to the Start of call procedure to determine the cause of the problem. **This ends the procedure.**

13. Are there any other failing items that need to be replaced?

    Yes: Replace the next failing item listed for the reference code. **This ends the procedure.**.

    No: Contact your next level of support for assistance. **This ends the procedure.**

14. Are you working with a tape device?

    Yes: Perform the verification procedures in the Service functions to verify that the problem is corrected. After the verification test is complete, the tape device description will be set to the failed state because a resource change was detected. Perform the following tasks:

    - Vary the tape device description off and then on.

    - Return the system to the customer and have the customer verify the system date and time. Then go to Verifying the repair from the HMC. **This ends the procedure.**

    No: Continue with the next step.

15. Are you working with an IOP or an IOA?

    Yes: Use the display hardware configuration service function to check for any missing or failed hardware:

    - On the command line, enter the STRSST (Start System Service Tools command). If you cannot get to SST, select DST. Do not IPL the system or partition to get to DST.

    - On the Start Service Tools Sign On display, enter the user ID with the service authority and password.

    - Select **Start a service tool** → **Hardware service manager** → **Logical hardware resources** → **System bus resources**.

    - Select the function key for **Include nonreporting resources**.

    - If the IOP and IOA that you just replaced is a failed or non-reporting resource, the problem has not been fixed. Continue to the next failing item in the failing item list. **This ends the procedure.**

No: Perform the verification procedures in the Service functions topics to verify that the problem is corrected. Resources that usually vary on automatically during an IPL, or that were previously varied on manually, might need to be varied on again after the verification procedures are complete. Return the system to the customer and have the customer verify the system date and time. **This ends the procedure.**

Verifying the repair in Linux

You can use this procedure to verify that a repair is complete using the Linux operating system.

1. Run stand-alone diagnostics from either a CD or from a Network Installation Management (NIM) server. See Running the stand-alone diagnostics from CD-ROM.

Did you encounter any problems?

No Reboot the operating system and continue with the close of call procedure.

Yes If the original problem still exists, replace the field-replaceable unit (FRU) or perform the isolation procedure that is next in the FRU list. If you have reached the end of the FRU list, contact your next level of support.

   If a new problem has occurred, go to Beginning problem analysis and repair the new problem.

Verifying the repair from the management console

Perform these procedures to close problem numbers, clear hardware messages, and prepare the server to return to the customer using the management console.

Follow this checklist before performing the procedures:

- You return the server to the state that the customer normally uses such as IPL type, IPL mode, and the way the system is configured or partitioned.

   Attention: Before returning the system to the customer, remove the system from service mode. If the system is left in service mode, it automatically places a call for service every two hours.

- While you were performing the problem analysis on the original serviceable event, other serviceable-event numbers might have been opened. Close all serviceable events that were opened as a result of your service activity.

- Server verification has been performed and there are no problems that require additional service actions.

- If the repair was done using the HMC online repair procedures, ensure that the original serviceable event is now closed.

1. Is a management console used to manage the server that you are servicing?

- **Yes:** Continue with the next step.
- **No:** Return to the "Verifying a repair" on page 223. **This ends the procedure.**

2. Are you closing a service event that was a repair on the management console personal computer?

- **Yes:** Continue with the next step.
- **No:** Go to step 4 on page 230.

3. Power on the management console. Did the power-on process complete without errors?

- **Yes:** Ensure that the management console can be used to perform server management tasks, and return the management console to normal operations. Go to "Closing a service call" on page 231. **This ends the procedure.**
- **No**: Go to the *HMC isolation procedures*. **This ends the procedure.**

4.   Log into the management console as the service representative. If invalid user or invalid password displays, get the correct login information from the system administer.

1. If logged on the System Manager, select Exit from the Console, located on the System Manager window.
2. Login to the System Manager with the following: User identification service Password service mode

5.   View Serviceable Event Details.

1. In the navigation area, select the Service Applications icon.
2. In the navigation area, select the Service Focal Point icon.
3. In the Contents area, select Manage Serviceable Events.
4. Designate the set of Serviceable Events you want to view. When you are finished, click OK. The **Service Event** Overview window opens.

Note: Only the events that match all of the criteria you specify are shown.

6.   Close open or delayed events.

1. Select the problem to close, on the Service Event Overview window.
2. Select the menu Selected, located on the menu bar.
3. Click Close Event.
4. Enter your comments in the Serviceable Event Comments window, and click Close Event.
5. Close all events associated with the problem on which you were working.

7.   Did the Service Event Overview window contain the event or events on which you were working?

- **Yes:** Return the HMC to normal operations. Go to "Closing a service call" on page 231. **This ends the procedure.**
- **No:** Go to *Detecting problems*. **This ends the procedure.**

Closing a service call

Perform these procedures to close problem numbers, clear hardware messages, and prepare the server to return to the customer.

Follow this checklist before performing the procedures:
- Return the server to the state that the customer normally uses such as IPL type, IPL mode, and the way the system is configured or partitioned.

  Attention: Before returning the system to the customer, remove the system from service mode. If the system is left in service mode, it automatically places a call for service every two hours.
- While you were performing the problem analysis on the original serviceable event, other serviceable events might have been opened. Close all serviceable events that were opened as a result of your service activity.
- Ensure that server verification has been performed and no problems require additional service actions.
- If the repair was done using the management console online repair procedures, ensure that the original serviceable event is now closed.
  1. Record the system reference code (SRC) or symptom and the location code of the field-replaceable unit (FRU) you replaced, for future reference. Is the server managed by a management console?

- **Yes:** Continue with the next step.
- **No:** Do one of the following steps:
  - If the server is managed by Integrated Virtualization Manager (IVM), go to "Closing a service call using Integrated Virtualization Manager" on page 239.
  - If the server is not partitioned and is running the AIX or Linux operating system, go to "Closing a service call using AIX or Linux" on page 235.

  2. On the HMC, open **Manage Serviceable Events** and examine the service action event log for any open service action events.

  3. Are there any service action events that are open?

- **Yes:** Continue with the next step.
- **No:** If the system attention LED is still on, turn off the LED as described in "Activating and deactivating LEDs" on page 245. Return the system to the customer. **This completes the repair.**

  4. Record the list of open service action events.

  5. From the list of serviceable events recorded in step 4, perform the following step 6 through step 32 on page 234 for each open service action event.

  6. Determine the error class of the serviceable event. Record for future use.

  7. Examine the details of the open service action event.

Is the error code that is associated with this service action event the same as recorded in Step 1 on page 231?

- **Yes:** Go to step 11.
- **No:** Continue with the next step.

8. Examine the FRU list of the service action event. Are any FRUs listed for the service action event?

- **Yes:** Continue with the next step.
- **No:** Go to step 11.

9. Is the FRU list identical (same FRUs, same number of FRUs, and same order of FRUs) to the FRU list of the error code recorded in step 1 on page 231?

- **Yes:** Go to step 11.
- **No:** Continue with the next step.

10. The FRU list is different. Is the FRU you replaced and recorded in step 1 on page 231 in the list of FRUs for this service action event?

- **Yes:** Continue with the next step.
- **No:** Go to step 32 on page 234.
  Note: There are service action events that will remain open when you leave this MAP. Further service actions might be required to complete the repair.

11. Examine the details of this service action event, and record the partitions involved in this service action event for use in a later step.

12. Is the error code associated with this service action event of the form A11-xxx or A01-xxx?

- **Yes:** Continue with the next step.
- **No:** Go to step 17 on page 233.

13. Have you begun a list of Axx partitions from prior service action events that you processed in this maintenance analysis procedure (MAP)?

- **Yes:** Go to step 15.
- **No:** Continue with the next step.

14. Begin a new list of Axx partitions by copying the list of partitions obtained in step 11. Go to step 16.

15. Add the partition list obtained in step 11 to the existing list of Axx partitions obtained from processing previous service action events in this MAP.

16. Remove all entries in the list of all partitions you recorded in step 11. If you are referred to the list of partitions obtained in step 11 in future steps, the list is empty. Go to step 17 on page 233.

17. Select and highlight the service action event from the Error Associated With This Serviceable Event window.

___

18. Click **Close Event**.

___

19. Add comments for the serviceable event. Include any unique additional information. Click **OK**. The following steps will add or update FRU information.

___

20. Did you replace, add, or modify a FRU of the open service action event?

- **Yes:** Continue with the next step.
- **No:** Go to step 22.

21. From the FRU list, select a FRU that you need to update. Double-click the FRU, and update the FRU information. Go to step 23.

___

22. Select the **No FRU Replaced for this Serviceable Event** option.

___

23. Click **OK** to close the service action event.

___

24. Is the list of all partitions you recorded in step 11 on page 232 empty?

- **Yes:** Go to step 32 on page 234.
- **No:** Continue with the next step.

25. Does the list of all partitions you recorded in step 11 on page 232 contain more than one entry?

- **Yes:** Continue with the next step.
- **No:** Go to step 32 on page 234.

26. Is the error class recorded in step 25 AIX?

- **Yes:** Continue with the next step.
- **No:** Go to step 32 on page 234.

27. Perform the following steps for each entry in the list of all partitions you recorded in step 11 on page 232, except the partition you were using to debug the original problem.

___

28. From the HMC virtual terminal window of a partition in the list of all partitions, type `diag` at the AIX command prompt.

___

29. When the diagnostic operating instructions are displayed, do the following steps:

1. Press Enter.
2. Select the **Task Selection** option.
3. Select the **Log Repair** option.
4. Select the resource associated with the repair action. If the repair action was reseating a cable or adapter, select the resource associated with that repair action. If the resource associated with your repair action is not displayed on the Resource List, select **sysplanar0**.
5. Click **Commit** after you have made your selection.

Note: If the terminal type is not defined, you are prompted to define it before you can proceed.

30. Exit from diagnostics in this partition and return to the AIX command prompt.

31. Have all the partitions in the list of all the partitions you recorded in step 11 on page 232 been processed?

- **Yes:** Continue with the next step.
- **No:** Go to step 24 on page 233 to process the next partition in the list you recorded in step 11 on page 232.

32. Have all the serviceable events recorded in step 4 on page 231 been processed?

- **Yes:** Continue with the next step.
- **No:** Go to step 5 on page 231 and process the next service action event in the list of serviceable events recorded in step 4 on page 231.

33. While processing all service action events, were you directed to step 14 on page 232?

- **Yes:** Continue with the next step.
- **No:** If the system attention LED is still on, turn off the LED as described in "Activating and deactivating LEDs" on page 245. Return the system to the customer. **This completes the repair.**
  Note: If during the processing of the list of open service action events, some service action events remained open, further service actions might be required to complete the repair.

34. Perform the following steps for each entry in the list of A*xx* partitions you began recording in step 14 on page 232, except the partition you were using to debug the original problem.

35. From the management console virtual terminal window of a partition in the list of A*xx* partitions, type `diag` at the AIX command prompt.

36. When the diagnostic operating instructions are displayed, do the following steps:

1. Press Enter.
2. Select the **Task Selection** option.
   Note: If the terminal type is not defined, you are prompted to define it before you can proceed.
3. Select the **Log Repair** option.
4. Select the resource associated with the repair action. If the repair action was reseating a cable or adapter, select the resource associated with that repair action. If the resource associated with your repair action is not displayed on the Resource List, select **sysplanar0**.
5. Click **Commit** after you have made your selection.

37. Exit from diagnostics in this partition and return to the AIX command prompt.

38. Have all the partitions in the list of A*xx* partitions you began recording in step 14 on page 232 been processed?

- **Yes:** Continue with the next step.
- **No:** Go to step 34 on page 234 to process the next partition in the list you recorded in step 14 on page 232.

39. If the system attention LED is still on, turn off the LED as described in "Activating and deactivating LEDs" on page 245. This completes the repair. Return the system to the customer.

   Note: If during the processing of the list of open service action events, some service action events remained open, further service actions might be required to complete the repair.

Closing a service call using AIX or Linux

If the server is not connected to an management console and not using Integrated Virtualization Manager (IVM), perform these procedures to close problem numbers, clear hardware messages, and prepare the server to return to the customer.

Follow this checklist before performing the procedures:
- Return the server to the state that the customer normally uses, such as IPL type, IPL mode, and the way the system is configured or partitioned.
  Attention: Before returning the system to the customer, remove the system from service mode. If the system is left in service mode, it automatically places a call for service every two hours.
- While you were performing the problem analysis on the original serviceable event, other serviceable-event numbers might have been opened. Close all serviceable events that were opened as a result of your service activity.
- Ensure that server verification has been performed and that no problems require additional service actions.
- If the repair was done using the IVM online repair procedures, ensure that the original serviceable event is now closed.
  1. Did you use an AIX diagnostics service aid hot-swap operation to change the FRU?

- **Yes:** Go to step 4 on page 236
- **No:** Continue with the next step.

2. Do you have any field-replaceable units (FRUs) (for example cards, adapters, cables, or devices) that were removed during problem analysis that you want to put back into the system?

   Note: If the system planar or battery has been replaced and you are loading diagnostics from a server over a network, it might be necessary for the customer to set the network boot information for this system before diagnostics can be loaded. The system time and date information should also be set when the repair is completed.

- **Yes:** Reinstall all of the FRUs that were removed during problem analysis. Go to step 3
- **No:** Continue with the next step.

3. Is the system or logical partition that you are performing a repair action on running the AIX operating system?

- **Yes:** Continue with the next step.
- **No:** Go to step 5.

4. Does the system or logical partition you are performing a repair action on have AIX installed?

   Note: Answer no to this question if you have just replaced a hard disk in the root volume group.

- **Yes:** Go to step 7.
- **No:** Continue with the next step.

5. Run stand-alone diagnostics in problem determination mode from either a CD-ROM or from a Network Installation Management (NIM) server.

   Note: For instructions on running stand-alone diagnostics from a CD and not using an HMC, go to Running the stand-alone diagnostics from CD on a server without an HMC attached.

   For instructions on running stand-alone diagnostics from a NIM server, go to Running the stand-alone diagnostics from a Network Installation Management server.

   Did you encounter any problems?

- **Yes:** Go to problem analysis.
- **No:** Continue with the next step.

6. The system hardware is functioning correctly.

If the system attention LED is still on, turn off the LED as described in "Activating and deactivating LEDs" on page 245.

This completes the repair.
Note: If, during the processing of the list of open service action events, some service action events remained open, further service actions might be required to complete the repair.

Return the server to the state that the customer normally uses, such as IPL type, IPL mode, and the way the system is configured or partitioned. This might require you to reboot the operating system.

Attention: Before returning the system to the customer, remove the system from service mode. If the system is left in service mode, it automatically places a call for service every two hours.

7. Complete the following steps:

1. If the system supports slow boot (see Performing a slow boot), do a slow boot on the system. If the system does not support slow boot, do a normal boot.

2. Power on the system.

3. Wait until the AIX operating system login prompt displays or until system activity on the operator panel or display apparently has stopped.

Did the AIX Login Prompt display?

- **Yes:** Continue with the next step.
- **No:** Go to problem analysis.

8. If the Resource Repair Action menu is already displayed, go to 12 on page 238; otherwise, do the following steps:

1. Log into the operating system, either with root authority (if needed, ask the customer to enter the password) or use the CE login.

2. Enter the `diag -a` command and check for missing resources. Follow any instructions that display. If an system request number (SRN) displays, suspect a loose card or connection. If no instructions display, no resources were detected as missing. Continue with 9.

9. Complete the following steps:

1. Enter `diag` at the command prompt.
2. Press Enter.
3. Select the **Diagnostics Routines** option.
4. When the Diagnostic Mode Selection menu displays, select **Problem determination**.
5. When the Advanced Diagnostic Selection menu displays, select the **All Resources** option, or test the FRUs you exchanged, and any devices that are attached to the FRUs you exchanged, by selecting the diagnostics for the individual FRU.

Did the Resource Repair Action menu (801015) display?

- **Yes:** Go to step 13 on page 238.
- **No:** Continue with the next step.

10. Did the TESTING COMPLETE, no trouble was found menu (801010) display?

- **Yes:** Continue with the next step.
- **No:** There is still a problem. Go to problem analysis.

11. Use the **Log Repair Action** option, if not previously logged, in the TASK SELECTION menu to update the AIX error log. If the repair action was reseating a cable or adapter, select the resource associated with that repair action.

If the resource associated with your action is not displayed on the
resource list, select **sysplanar0**.
Note: If the system attention indicator is on, this will set it back to
the normal state. Go to step 14.

12. When a test is run on a resource in system verification mode, and that resource has an entry in the
    AIX error log, if the test on the resource was successful, the Resource Repair Action menu displays.

After replacing a FRU, you must select the resource for that FRU from the Resource Repair Action menu. This
updates the AIX error log to indicate that a system-detectable FRU has been replaced.
Note: If the system attention indicator is on, this action will set it back to the normal state.

Do the following steps:

1. Select the resource that has been replaced from the Resource Repair Action menu. If the repair action was
   reseating a cable or adapter, select the resource associated with that repair action. If the resource associated with
   your action is not displayed on the resource list, select **sysplanar0**.
2. Press **Commit** after you make your selections.

Did another Resource Repair Action (801015) display?

- **Yes:** Continue with the next step.
- **No:** If the No Trouble Found menu displays, go to step 14.

13. The parent or child of the resource you just replaced might also require that you run the Resource
    Repair Action service aid on it.

When a test is run on a resource in system verification mode, and
that resource has an entry in the AIX error log, if the test on the
resource was successful, the Resource Repair Action menu displays.

After replacing that FRU, you must select the resource for that FRU
from the Resource Repair Action menu. This updates the AIX error
log to indicate that a system-detectable FRU has been replaced.
Note: If the system attention indicator is on, this action will set it
back to the normal state.

Do the following steps:

1. From the Resource Repair Action menu, select the parent or child
   of the resource that has been replaced. If the repair action was
   reseating a cable or adapter, select the resource associated with
   that repair action. If the resource associated with your action is
   not displayed on the resource list, select **sysplanar0**.
2. Press COMMIT after you make your selections.

Did the No Trouble Found menu display?

- **Yes:** Continue with the next step.
- **No:** Go to problem analysis.

14. If you changed the service processor or network settings, as instructed in previous MAPs, restore the
    settings to the value they had prior to servicing the system. If you ran stand-alone diagnostics from
    CD-ROM, remove the stand-alone diagnostics CD-ROM from the system.

Did you perform service on a RAID subsystem involving changing of the PCI RAID adapter cache card or changing the configuration?
Note: This does not refer to the PCI-X RAID adapter or cache.

- **Yes:** Continue with the next step.
- **No:** Go to step 16.

15. Use the **Recover Options** selection to resolve the RAID configuration. To do this, do the following steps:

   1. On the PCI SCSI Disk Array Manager dialog, select **Recovery options**.
   2. If a previous configuration exists on the replacement adapter, this must be cleared. Select **Clear PCI SCSI Adapter Configuration** and press F3.
   3. On the Recovery Options dialog, select **Resolve PCI SCSI RAID Adapter Configuration**.
   4. On the Resolve PCI SCSI RAID Adapter Configuration dialog, select **Accept Configuration on Drives**.
   5. On the PCI SCSI RAID Adapter selections menu, select the adapter that you changed.
   6. On the next dialog, press Enter.
   7. When you see the Are You Sure selection menu, press Enter to continue.
   8. You should see an OK status message when the recover is complete. If you get a Failed status message, verify that you selected the correct adapter, and then repeat this procedure. When recover is complete, exit the operating system.
   9. Go to 16.

16. The system hardware is functioning correctly. Return the server to the state that the customer normally uses, such as IPL type, IPL mode, and the way the system is configured or partitioned.

Attention: Before returning the system to the customer, remove the system from service mode. If the system is left in service mode, it automatically places a call for service every two hours.

Closing a service call using Integrated Virtualization Manager

Perform these procedures to close problem numbers, clear hardware messages, and prepare the server to return to the customer.

Follow this checklist before performing the procedures:

- Return the server to the state that the customer normally uses, such as IPL type, IPL mode, and the way the system is configured or partitioned.

   Attention: Before returning the system to the customer, remove the system from service mode. If the system is left in service mode, it automatically places a call for service every two hours.

- While you were performing the problem analysis on the original serviceable event, other serviceable-event numbers might have been opened. Close all serviceable events that were opened as a result of your service activity.
- Ensure that server verification has been performed and there are no problems that require additional service actions.
- If the repair was done using the Integrated Virtualization Manager (IVM) online repair procedures, ensure that the original serviceable event is now closed.
   1. Record the system reference code (SRC) or symptom and the location code of the field-replaceable unit (FRU) you replaced, for future reference.

2. On the IVM, open **Manage Serviceable Events** and look at existing serviceable events.

3. Are there any service action events that are open?

- **Yes:** Continue with the next step.
- **No:** If the system attention LED is still on, turn off the LED as described in "Activating and deactivating LEDs" on page 245. Return the system to the customer. **This completes the repair.**

4. Record the list of open service action events.

5. From the list of serviceable events recorded in step 4, perform step 6 through step 30 on page 242 for each open service action event.

6. Determine the error class of the serviceable event. Record for future use.

7. Examine the details of the open service action event.

Is the error code associated with this service action event the same as recorded in step 1 on page 239?

- **Yes:** Go to step 11.
- **No:** Continue with the next step.

8. Examine the FRU list of the service action event. Are any FRUs listed for the service action event?

- **Yes:** Continue with the next step.
- **No:** Go to step 11.

9. Is the FRU list identical (same FRUs, same number of FRUs, and same order of FRUs) to the FRU list of the error code recorded in step 1 on page 239?

- **Yes:** Go to step 11.
- **No:** Continue with the next step.

10. Is the FRU you replaced and recorded in step 1 on page 239 in the list of FRUs for this service action event?

- **Yes:** Continue with the next step.
- **No:** Go to step 30 on page 242.
  Note: There are service action events that will remain open when you leave this MAP. Further service actions might be required to complete the repair.

11. Examine the details of this service action event, and record the partitions involved in this service action event for use in a later step.

12. Is the error code associated with this service action event of the form A11-xxx or A01-xxx?

- **Yes:** Continue with the next step.
- **No:** Go to step 17.

13. Have you begun a list of A*xx* partitions from prior service action events that you processed in this maintenance analysis procedure (MAP)?

- **Yes:** Go to step 15.
- **No:** Continue with the next step.

14. Begin a new list of A*xx* partitions by copying the list of partitions obtained in step 11 on page 240. Go to step 16.

15. Add the partition list obtained in step 11 on page 240 to the existing list of A*xx* partitions obtained from processing previous service action events in this MAP.

16. Remove all entries in the list of all partitions you recorded in step 11 on page 240. If you are referred to the list of partitions obtained in step 11 on page 240 in future steps, the list is empty. Go to step 17.

17. Select and highlight the service action event from the Manage Serviceable Events window.

18. Click **Close Event**.

19. Add comments for the serviceable event. Include any unique additional information. Click **OK**.

20. Add or update FRU information:

Did you replace, add, or modify a FRU of the open service action event?

- **Yes:** Continue with the next step.
- **No:** Go to step 22.

21. Click **OK** to close the service action event.

22. Is the list of all partitions you recorded in step 11 on page 240 empty?

- **Yes:** Go to step 30 on page 242.
- **No:** Continue with the next step.

23. Does the list of all partitions you recorded in step 11 on page 240 contain more than one entry?

- **Yes:** Continue with the next step.
- **No:** Go to step 30.

24. Is the error class recorded in step 23?

- **Yes:** Continue with the next step.
- **No:** Go to step 30.

25. Perform the following steps for each entry in the list of all partitions you recorded in step 11 on page 240, except the partition you were using to debug the original problem.

26. From the IVM virtual terminal window of a partition in the list of all partitions, type `diag` at the AIX command prompt.

27. When the diagnostic operating instructions are displayed, do the following steps:

1. Press Enter.
2. Select the **Task Selection** option.
3. Select the **Log Repair** option.
4. Select the resource associated with the repair action. If the repair action was reseating a cable or adapter, select the resource associated with that repair action. If the resource associated with your repair action is not displayed on the Resource List, select **sysplanar0**.
5. Click **Commit** after you have made your selection.

Note: If the terminal type is not defined, you are prompted to define it before you can proceed.

28. Exit from diagnostics in this partition and return to the AIX command prompt.

29. Have all the partitions in the list of all partitions you recorded in step 11 on page 240 been processed?

- **Yes:** Continue with the next step.
- **No:** Go to step 25 to process the next partition in the list you recorded in step 11 on page 240.

30. Have all the serviceable events recorded in step 4 on page 240 been processed?

- **Yes:** Continue with the next step.
- **No:** Go to step 5 on page 240 and process the next service action event in the list of serviceable events recorded in step 4 on page 240.

31. While processing all service action events, were you directed to step 14 on page 241?

- **Yes:** Continue with the next step.
- **No:** If the system attention LED is still on, turn off the LED as described in "Activating and deactivating LEDs" on page 245. Return the system to the customer. **This completes the repair.**
  Note: If during the processing of the list of open service action events, some service action events remained open, further service actions might be required to complete the repair.

32. Perform the following steps for each entry in the list of A*xx* partitions you began recording in step 14 on page 241, except the partition you were using to debug the original problem.

33. From the IVM virtual terminal window of a partition in the list of A*xx* partitions, type `diag` at the AIX command prompt.

34. When the diagnostic operating instructions are displayed, do the following steps:

1. Press Enter.
2. Select the **Task Selection** option.
   Note: If the terminal type is not defined, you are prompted to define it before you can proceed.
3. Select the **Log Repair** option.
4. Select the resource associated with the repair action. If the repair action was reseating a cable or adapter, select the resource associated with that repair action. If the resource associated with your repair action is not displayed on the Resource List, select **sysplanar0**.
5. Click **Commit** after you have made your selection.

35. Exit from diagnostics in this partition and return to the AIX command prompt.

36. Have all the partitions in the list of A*xx* partitions you began recording in step 14 on page 241 been processed?

- **Yes:** Continue with the next step.
- **No:** Go to step 32 to process the next partition in the list you recorded in step 14 on page 241.

37. If the system attention LED is still on, turn off the LED as described in "Activating and deactivating LEDs" on page 245. This completes the repair. Return the system to the customer.

Note: If, during the processing of the list of open service action events, some service action events remained open, further service actions might be required to complete the repair.

Activating and deactivating LEDs

You can use these procedures to activate or deactivate light-emitting diodes (LEDs) using the management console or the Advanced System Management Interface (ASMI).

For IBM Power Systems servers that contain the POWER7 processor, the LEDs can be used to identify or verify a part that you are servicing. The error and identify function (amber) LED indicates an error and corresponds to the location code in the system reference code (SRC). The LED is activated and deactivated automatically.

Additionally, the following procedures can also be used to activate and deactivate LEDs.
- "Deactivating a system attention LED or partition LED using the management console"
- "Activating or deactivating an identify LED using the management console" on page 246
- "Deactivating a system attention LED or logical partition LED using the Advanced System Management Interface" on page 246
- "Activating or deactivating an identify LED using the Advanced System Management Interface" on page 247

Deactivating a system attention LED or partition LED using the management console

You can deactivate a system attention LED or a logical partition LED if you decide that a problem is not a high priority and you decide to repair the problem at a later time. You can do this task from the Hardware Management Console (HMC) or the IBM Systems Director Management Console (SDMC).

If you want to be alerted if another problem occurs, you must deactivate the system attention LED so that it can be activated again if another problem occurs.

To deactivate a system attention LED by using HMC, complete the following steps:
1. In the navigation area, open **Systems management**.
2. Select the server you are working on by checking the box next to its name.
3. Open **Operations**.
4. Open **LED Status**.
5. Select **View System Attention**. The system attention LED window opens. The selected system and its LED state are displayed in the upper part of the window. The logical partition and its LED state are displayed in the lower part of the window. From the system attention LED window, you can deactivate both the system attention LED and the logical partition LED.
6. Select **Deactivate System Attention LED** from the Action menu. A confirmation window is displayed that provides the following information:
   - A verification that the system attention LED was deactivated.
   - An indication that there still might be open problems within the system.
   - An indication that you cannot activate the system attention LED.
7. Select one of the logical partitions in the lower table, and select **Deactivate partition LED** from the Partition Operations menu. A confirmation window is displayed that provides the following information:
   - A verification that the logical partition LED was deactivated.
   - An indication that there still might be open problems within the logical partition.
   - An indication that you cannot activate the logical partition LED.

To deactivate a system attention LED by using SDMC, complete the following steps:

1. On the **Welcome** page, under the **Resources** tab, select the server.
2. Click **Actions** > **Service and Support**> **Hardware**> **System Attention LED**.
3. Click **OK**.

Activating or deactivating an identify LED using the management console

You can activate or deactivate an identify LED for components attached to the system from the Hardware Management Console (HMC) or the IBM Systems Director Management Console (SDMC).

The system provides several LEDs that help identify various components, such as enclosures or field-replaceable units (FRUs), in the system. For this reason, they are called *identify LEDs*.

You can activate or deactivate the following types of identify LEDs:

- **Identify LED for an enclosure** If you want to add an adapter to a specific drawer (enclosure), you need to know the machine type, model, and serial number (MTMS) of the drawer. To determine whether you have the correct MTMS for the drawer that needs the new adapter, you can activate the LED for a drawer and verify that the MTMS corresponds to the drawer that requires the new adapter.
- **Identify LED for a FRU associated with a specified enclosure** If you want to hook up a cable to a specific I/O adapter, you can activate the LED for the adapter, which is a field replaceable unit (FRU), and then physically check to see where you should hook up the cable. This is especially useful when you have several adapters with open ports.

To activate or deactivate an identify LED for an enclosure or FRU by using the HMC, follow these steps:

1. In the navigation area, open **Systems management**.
2. Select the server you are working on.
3. Click **Operations** › **LED Status** › **Identify LED**. The Identify LED, Select Enclosure window opens.
4. To activate or deactivate an identify LED for an enclosure, select an enclosure from the table, and click either **Activate LED** or **Deactivate LED**. The associated LED is either turned on or off.
5. To activate or deactivate an identify LED for a FRU, select an enclosure from the table, and then select **Selected** › **List FRUs**.
6. Select one or more FRUs from the table, and click either **Activate LED** or **Deactivate LED**. The associated LED is either turned on or off.

To activate or deactivate an identify LED for an enclosure or FRU by using the SDMC, complete these steps:

1. On the **Welcome** page, under the **Resources** tab, select the server.
2. Click **Actions** > **Service and Support**> **Hardware**> **Identify LED**.
3. To activate or deactivate an identify LED for an enclosure, select an enclosure from the table, and click either **Activate LED** or **Deactivate LED**. The associated LED is either turned on or off.
4. To activate or deactivate an identify LED for a FRU, select an enclosure from the table, and then click **List FRUs**.
5. Select one or more FRUs from the table, and then click either **Activate LED** or **Deactivate LED**. The associated LED is either turned on or off.

Deactivating a system attention LED or logical partition LED using the Advanced System Management Interface

You can deactivate a system attention LED or a logical partition LED using the Advanced System Management Interface (ASMI).

The system attention indicator provides a visual signal that the system as a whole requires attention or service. Each system has a single system attention indicator. When an event occurs that either needs your intervention or that of service and support, the system attention indicator lights continuously. The system attention indicator is turned on when an entry is made in the service processor error log. The error entry is transmitted to the system error log and the operating system error log.

To perform this operation, your authority level must be one of the following levels:
- Administrator
- Authorized service provider

To turn off the system attention indicator, do the following steps:
1. On the ASMI Welcome pane, specify your user ID and password, and click **Log In**.
2. In the navigation area, expand **System Configuration** ▸ **Service Indicators** ▸ **System Attention Indicator**.
3. In the right pane, click **Turn off system attention indicator**. If the attempt is unsuccessful, an error message is displayed.

Activating or deactivating an identify LED using the Advanced System Management Interface

You can activate or deactivate an identify LED using the Advanced System Management Interface (ASMI).

You can specify the location code of any indicator to view or modify its current state. If you provide the wrong location code, the advanced system manager attempts to go to the next higher level of the location code.

The next level is the base-level location code for that field replaceable unit (FRU). For example, a user types the location code for the FRU located on the second I/O slot of the third enclosure in the system. If the location code for the second I/O slot is incorrect (the FRU does not exist at this location), an attempt to set the indicator for the third enclosure is initiated. This process continues until a FRU is located or no other level is available.

To perform this operation, your authority level must be one of the following levels:
- Administrator
- Authorized service provider

To change the current state of an indicator, do the following steps:
1. On the ASMI Welcome pane, specify your user ID and password, and click **Log In**.
2. In the navigation area, expand **System Configuration** ▸ **Service Indicators** ▸ **Indicators by Location code**.
3. In the right pane, enter the location code of the FRU and click **Continue**.
4. Select the preferred state from the list.
5. Click **Save settings**.

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Electronic emission notices

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

Class A Notices

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Federal Communications Commission (FCC) statement

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment

generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense.

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

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

Industry Canada Compliance Statement

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

Avis de conformité à la réglementation d'Industrie Canada

Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.

European Community Compliance Statement

This product is in conformity with the protection requirements of EU Council Directive 2004/108/EC on the approximation of the laws of the Member States relating to electromagnetic compatibility. IBM cannot accept responsibility for any failure to satisfy the protection requirements resulting from a non-recommended modification of the product, including the fitting of non-IBM option cards.

This product has been tested and found to comply with the limits for Class A Information Technology Equipment according to European Standard EN 55022. The limits for Class A equipment were derived for commercial and industrial environments to provide reasonable protection against interference with licensed communication equipment.

European Community contact:
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Technical Regulations, Department M456
IBM-Allee 1, 71139 Ehningen, Germany
Tele: +49 7032 15-2937
email: tjahn@de.ibm.com

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

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Japanese Electronics and Information Technology Industries Association (JEITA) Confirmed Harmonics Guideline (products less than or equal to 20 A per phase)

高調波ガイドライン適合品

Japanese Electronics and Information Technology Industries Association (JEITA) Confirmed Harmonics Guideline with Modifications (products greater than 20 A per phase)

高調波ガイドライン準用品

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

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求採取某些適當的對策。

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IBM Taiwan Contact Information:

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台灣國際商業機器股份有限公司
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電話：0800-016-888

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Deutschland: Einhaltung des Gesetzes über die elektromagnetische Verträglichkeit von Geräten

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

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

Der verantwortliche Ansprechpartner des Herstellers in der EU ist:
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Technical Regulations, Abteilung M456
IBM-Allee 1, 71139 Ehningen, Germany
Tel: +49 7032 15-2937
email: tjahn@de.ibm.com

Generelle Informationen:

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

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Federal Communications Commission (FCC) statement

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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

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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

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高調波ガイドライン準用品

IBM Taiwan Contact Information

台灣IBM 產品服務聯絡方式：
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Deutschland: Einhaltung des Gesetzes über die elektromagnetische Verträglichkeit von Geräten

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

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

Der verantwortliche Ansprechpartner des Herstellers in der EU ist:
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Technical Regulations, Abteilung M456
IBM-Allee 1, 71139 Ehningen, Germany
Tel: +49 7032 15-2937
email: tjahn@de.ibm.com

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