

Power Systems

Installing the 5887 disk drive enclosure



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Note

Before using this information and the product it supports, read the information in “Safety notices” on page v, “Notices” on page 71, the *IBM Systems Safety Notices* manual, G229-9054, and the *IBM Environmental Notices and User Guide*, Z125-5823.

This edition applies to IBM Power Systems™ servers that contain the POWER8 processor and to all associated models.

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Safety notices

Safety notices may be printed throughout this guide:

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

World Trade safety information

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

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

German safety information

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

Laser safety information

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

Laser compliance

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

DANGER

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

Electrical voltage and current from power, telephone, and communication cables are hazardous. To avoid a shock hazard:

- 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)



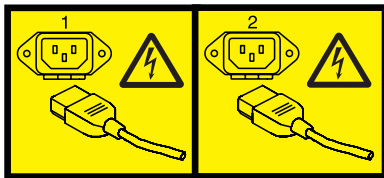
DANGER: Hazardous voltage, current, or energy levels are present inside any component that has this label attached. Do not open any cover or barrier that contains this label. (L001)

(L002)

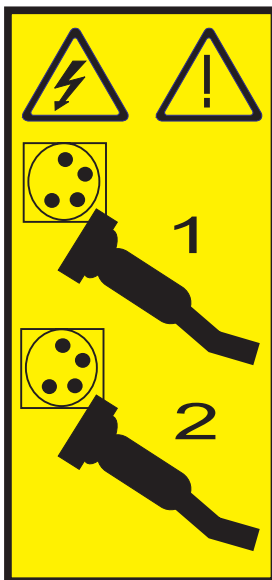


DANGER: Rack-mounted devices are not to be used as shelves or work spaces. (L002)

(L003)



or



or



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

(L007)



CAUTION: A hot surface nearby. (L007)

(L008)



CAUTION: Hazardous moving parts nearby. (L008)

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

CAUTION:

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

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

(C026)

CAUTION:

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

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

Installing the 5887 disk drive enclosure or setting up a preinstalled 5887 disk drive enclosure

Learn how to install a 5887 disk drive enclosure (IBM EXP24S SFF Gen2-bay Drawer) and how to set up a preinstalled 5887 disk drive enclosure (IBM EXP24S SFF Gen2-bay Drawer).

Select from the following options:

- To install a 5887 disk drive enclosure into a rack, go to “Installing the 5887 disk drive enclosure.”
- To complete the installation of a 5887 disk drive enclosure that was preinstalled in the rack, go to “Setting up a preinstalled 5887 disk drive enclosure” on page 22.

Installing the 5887 disk drive enclosure

Learn how to install the 5887 disk drive enclosure (IBM EXP24S SFF Gen2-bay Drawer) into a rack and learn how to cable it to a system or to an adapter in a system or an expansion unit.

Installing the disk drive enclosure into a rack is a customer task. You can complete this task yourself, or contact a service provider to complete the task for you. You might be charged a fee by the service provider for this service.

If your 5887 disk drive enclosure was preinstalled, refer to “Setting up a preinstalled 5887 disk drive enclosure” on page 22.

Preparing to install your 5887 disk drive enclosure

Learn about the prerequisites for installing your 5887 disk drive enclosure and determine whether you can install the enclosure concurrently

To prepare to set up your enclosure, complete the following steps:

1. Review the following information:

The SAS disk drive enclosure can hold up to 24 disk drives. The enclosure can be split logically into one, two, or four independent groups. The SAS disk drive enclosure is supported by the following operating systems:

- AIX®
 - IBM i
 - Linux
 - VIOS
2. Determine the level of software that you need to support the enclosure. For instructions, see the IBM Prerequisite website (http://www-912.ibm.com/e_dir/eServerPrereq.nsf).
 3. Ensure that you have the following items before you start your installation:
 - Phillips screwdrivers
 - Flat-head screwdriver
 - Rack with two Electronic Industries Alliance (EIA) units of contiguous space.

Note: If you do not have a rack that is installed, install the rack. For instructions, see Installing the rack (http://www.ibm.com/support/knowledgecenter/POWER8/p8hbf/p8hbf_8xx_kickoff.htm).

4. Determine whether you can add your 5887 disk drive enclosure concurrently by reviewing the following information. You can add your expansion units concurrently (with the system powered on and partitions active) if you have one of the following configurations:

- Your system is managed by an IBM Hardware Management Console (HMC).
- Your system is not managed by an HMC, but has only one partition, and that partition is running the IBM i operating system.

Note: If you do not have one of these configurations, you must power off the system to add enclosures.

Completing inventory for the 5887 disk drive enclosure

Learn how to complete inventory for the 5887 disk drive enclosure.

To complete inventory, complete the following steps:

1. Refer to the inventory list, and verify that you received all of the parts that you ordered. At a minimum, each order contains the following items:
 - Left and right rack-mounting hardware
 - Mounting screws
 - Power supply cables
2. If your shipment contains parts that are not required to complete the installation procedure, store those parts in case they are needed in the future.
3. If you have incorrect, missing, or damaged parts, consult any of the following resources:
 - Your IBM reseller.
 - IBM Rochester manufacturing automated information at 1-800-300-8751 (United States only).
 - See the Directory of worldwide contacts website (<http://http://www.ibm.com/planetwide>). Select your location to view the service and support contact information.

Determining and marking the location in the rack

Learn how to determine where to install the disk drive enclosure into the rack.

Read the Rack safety notices (<http://www.ibm.com/support/knowledgecenter/POWER8/p8hbf/racksafety.htm>).

To determine where to install the disk drive enclosure into a rack, complete the following steps:

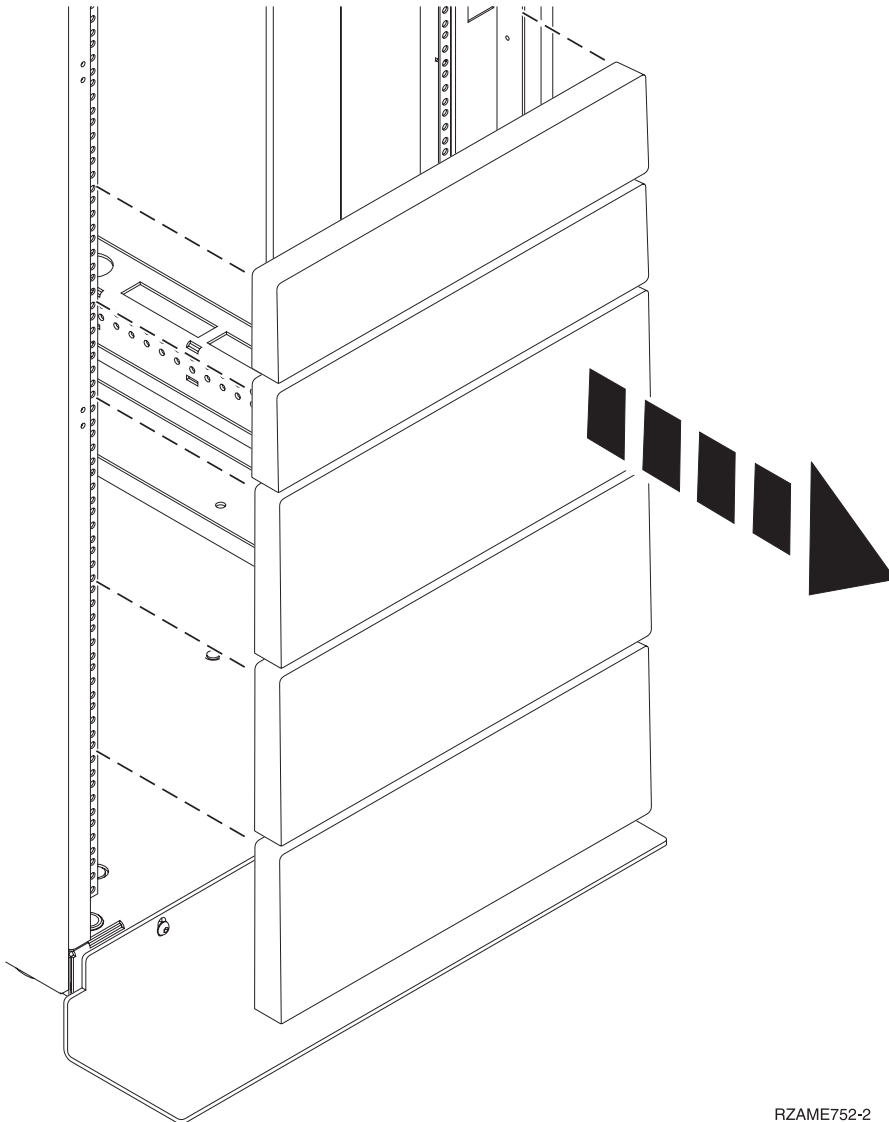
1. Determine where in the rack to place the enclosure in relation to other system hardware. As you plan for installing the enclosure in a rack, keep in mind the following information:
 - Organize larger and heavier units into the lower part of the rack.
 - Plan to install units into the lower part of the rack first.
 - Record the Electronic Industries Alliance (EIA) locations in your plan.

Note: The 5887 disk drive enclosure is two EIA units high. An EIA unit is 44.50 mm (1.75 in) in height. The rack contains three mounting holes for each EIA unit of height. This enclosure, therefore, is 89 mm (3.5 in) high and covers six mounting holes in the rack.

2. If necessary, open or remove the front and rear rack doors.
3. Attach the electrostatic discharge (ESD) wrist strap.

Attention:

- Attach an electrostatic discharge (ESD) wrist strap to an unpainted metal surface of your hardware to prevent the electrostatic discharge from damaging your hardware.
 - When using an ESD wrist strap, follow all electrical safety procedures. An ESD wrist strap is used for static control. It does not increase or decrease your risk of receiving electric shock when using or working on electrical equipment.
 - If you do not have an ESD wrist strap, just prior to removing the product from ESD packaging and installing or replacing hardware, touch an unpainted metal surface of the system for a minimum of 5 seconds.
4. If necessary, remove the filler panels to allow access to the inside of the rack enclosure where you plan to place the enclosure. See Figure 1.



RZAME752-2

Figure 1. Removing the filler panels

5. If necessary, open or remove the front and rear rack doors.
6. Face the front of the rack and work from the left side to complete the following steps:
- a. Make a note of the lowest EIA unit to be used for the enclosure.
 - b. Use tape, a marker, or a pencil to mark the top mounting hole (A) of the lowest EIA unit.

Note: Mark the rack so that these marks can also be seen from the rear of the rack.

- c. Count up two holes and place another mark beside that mounting hole (**B**).

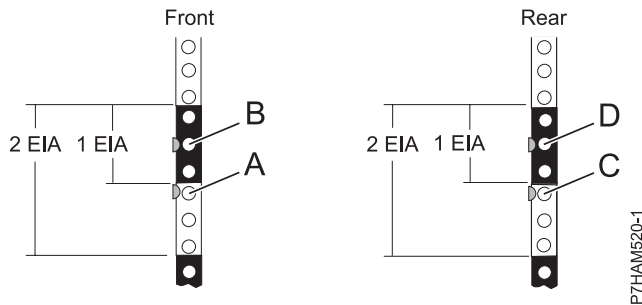


Figure 2. Marking the installation locations

7. Repeat step 6 on page 3 to place two marks on the corresponding mounting holes on the front-right side of the rack.
8. Go to the rear of the rack and work from the left side to complete the following steps:
 - a. Find the EIA unit that corresponds to the lowest EIA unit marked on the front of the rack.
 - b. Use tape, a marker, or a pencil to mark the top mounting hole (**C**) of the lowest EIA unit.
 - c. Count up two holes and place another mark beside that mounting hole (**D**).
9. Repeat step 8 to place two marks on the corresponding mounting holes on the rear-right side of the rack.

Attaching the mounting hardware to the rack

Learn how to attach the mounting hardware to the rack and then install the rails into the rack. The information is intended to promote safety and reliable operation, and includes illustrations of the related hardware components and shows how these components relate to each other.

Attention: To avoid rail failure and potential danger to yourself and to the unit, ensure that you have the correct rails and fittings for your rack. If your rack has square support flange holes or screw-thread support flange holes, ensure that the rails and fittings match the support flange holes that are used on your rack. Do not install mismatched hardware by using washers or spacers. If you do not have the correct rails and fittings for your rack, contact your IBM reseller.

Important: The rail installation can be completed by one person. However, the installation is easier if one person is positioned at the front of the rack and one person is positioned at the rear of the rack.

To install the mounting hardware into the rack, complete the following steps:

1. Ensure that you have the electrostatic discharge (ESD) wrist strap attached. If not, attach it now.
2. Select a rail and remove any parts that were taped to it for shipping.
3. Install the spring to the rail by hooking one end to the spring bracket (**A**) and the other end around the circular standoff (**B**) as shown in Figure 3 on page 5.

Note: If your rack has the square mounting holes, remove the rail pins from the rail. Install the larger rail pins that are provided with the rack installation kit.

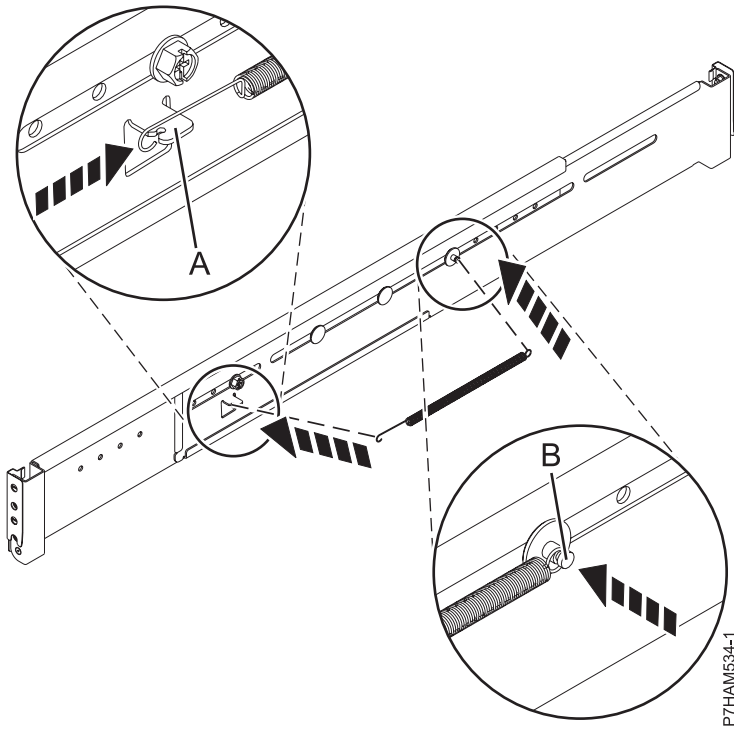


Figure 3. Installing the spring to the rail

4. Open the hinge bracket on each end of the rail.
5. Identify the side of the rack where the rail must be mounted by holding the rail inside of the open space of the rack as follows:
 - The rail points from front to rear.
 - The support ledge (A) is at the bottom and points toward the center of the open space.
 - The enclosure stop (B) points toward the rear of the rack.

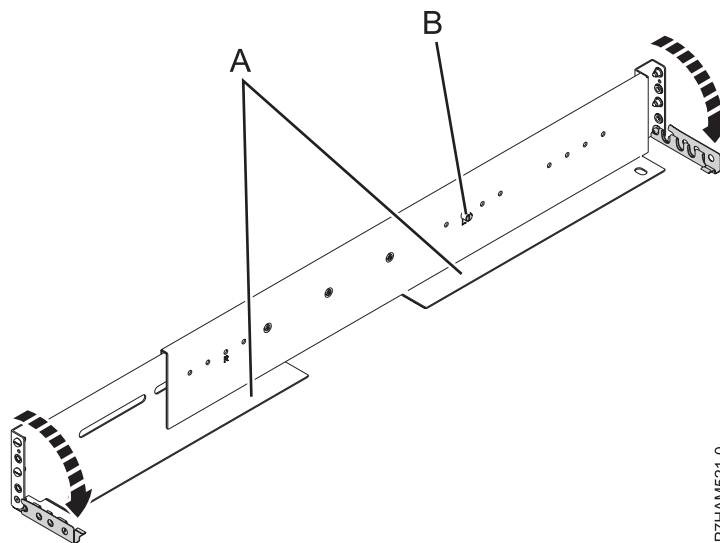


Figure 4. Opening the rail hinge bracket

6. Locate the two marks that were made previously on the Electronic Industries Alliances (EIA) strips.

7. Align the rail bracket inside the rack cabinet beside the marks, and seat the rail bracket pins in the mounting holes. The bottom of the rail support ledge appears slightly higher than the U mark on the rack flange.

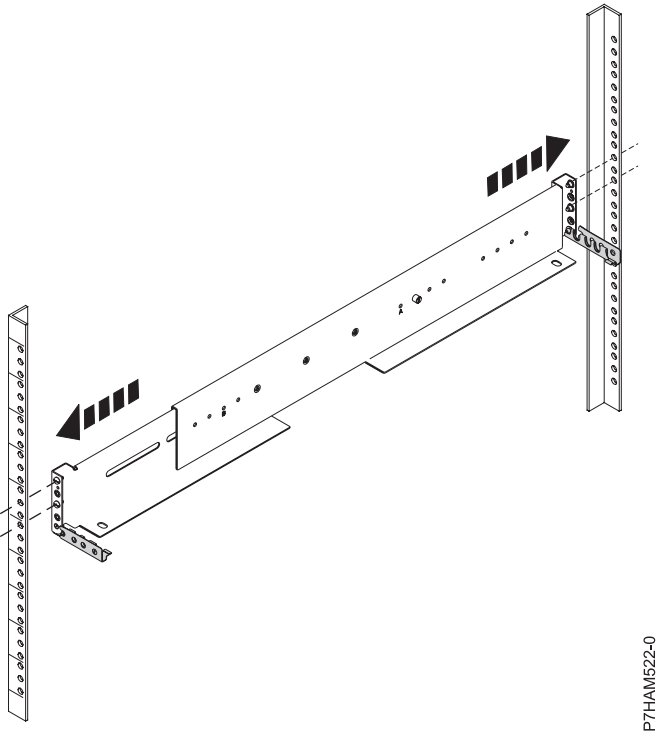
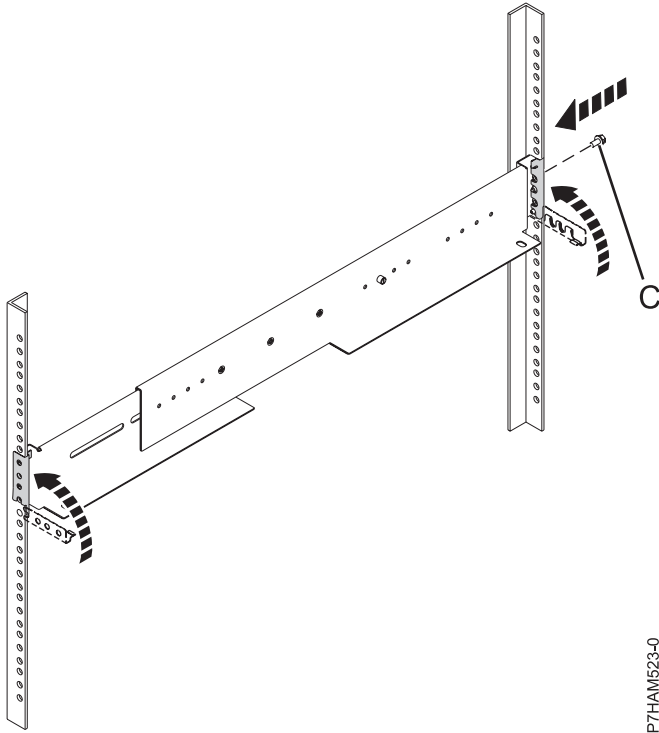


Figure 5. Mounting the rail on the rack

8. At the front of the rail, close the front hinge bracket to secure the rail to the rack cabinet flange.



P7HAM523-0

Figure 6. Securing the rail to the rack

9. While you hold the rail bracket in place, carefully expand the rail until the other end reaches the opposite rack flange.
10. Seat the pins of the opposite rail bracket in the marked mounting holes.
11. At the rear of the rail, close the rear hinge bracket to secure the rail to the rack cabinet flange.
12. Install one M5 screw in the open hole in the bracket between the two alignment pins (C).
13. Repeat steps 6 on page 5 - 12 for the other rail.

Installing the 5887 disk drive enclosure into the rack

Learn how to install the 5887 disk drive enclosure into the rack. In addition to related safety information, illustrations of the related hardware components are provided.

Important: Two people are required to safely lift the enclosure. Using fewer than two people to lift the enclosure can result in injury.

To install the disk drive enclosure into the rack, complete the following steps:

1. Ensure that you have the electrostatic discharge (ESD) wrist strap attached. If not, attach it now.
2. Remove the left side cover (A) and right cover (B) to show the mounting brackets.
3. Pinch the release to rotate the cover up and off from the chassis flange as shown in Figure 7 on page 8.

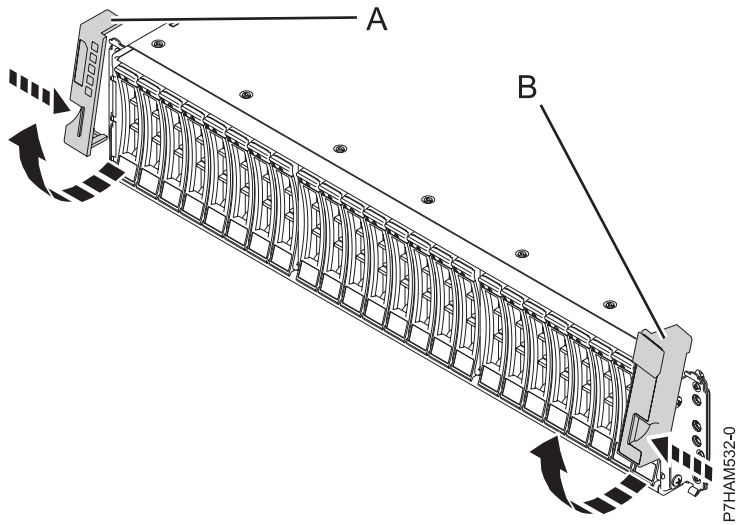


Figure 7. Removing the side covers

4. Using two people, lift the enclosure and position it over the front of the rails.

Attention: Two people are required to safely lift the enclosure. Using fewer than two people to lift the enclosure can result in injury.
5. Slide the disk drive enclosure into the rack cabinet.

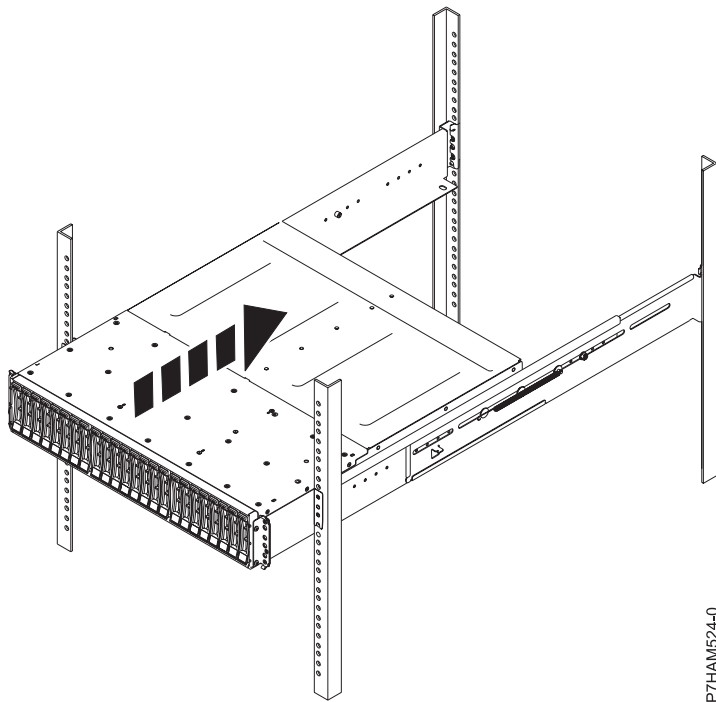
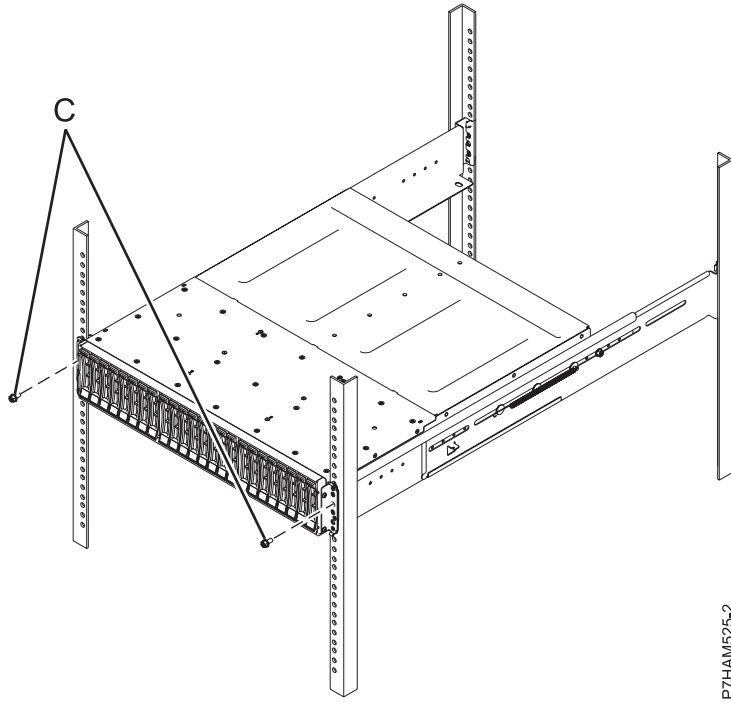


Figure 8. Sliding the disk drive enclosure into the rack

6. Secure the front of the disk drive enclosure to the rack flanges with one M5 screw (C) in the bottom open holes in each bracket.



P7HAM525-2

Figure 9. Securing the front of the disk drive enclosure to the rack

Optional: Install disk drives in the 5887 disk drive enclosure

Learn about the disk drives and details on how to install them.

To install disk drives, complete the following steps:

1. Ensure that you have the electrostatic discharge (ESD) wrist strap attached. If not, attach it now.
2. Remove the drive from the static-protective package.
Attention: Drives are fragile. Handle with care.
3. With the handle in the unlocked position, support the bottom of the disk drive as you align it with the guide rails in the disk drive enclosure. See Figure 10 on page 10

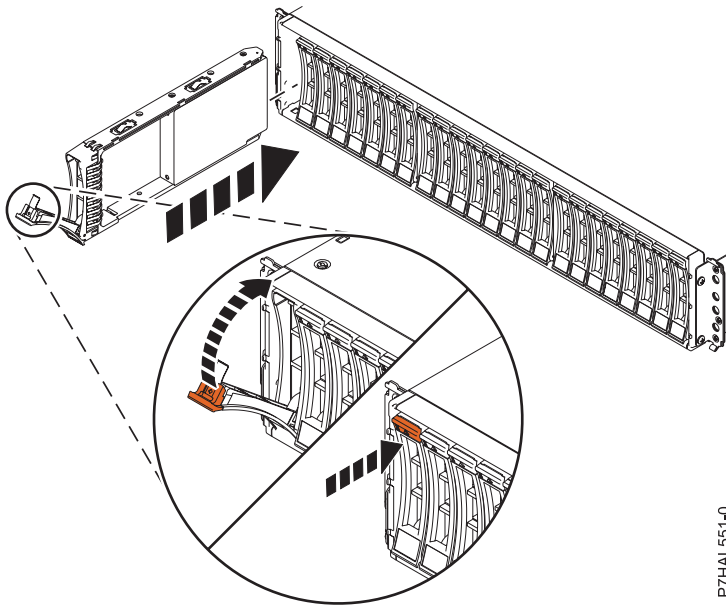


Figure 10. Installing a disk drive in the disk drive enclosure

Note: Do not hold the disk drive only by the handle.

4. Slide the disk unit into the disk drive enclosure until the drive stops.
5. Rotate the handle (A) to the locked position.
6. If you are installing more than one drive, repeat the steps in this procedure until all drives are installed.
7. Review the following information that is related to connecting this device:

The SAS disk drive enclosure can hold up to 24 disk drives. The enclosure can be split logically into one, two, or four independent groups.

The SAS disk drive enclosure supports the following operating systems:

- AIX
- IBM i
- Linux
- VIOS

If you are planning to configure RAID arrays, ensure that you have the minimum number of available disks for each RAID level:

RAID 0
Minimum of one drive per array

RAID 5
Minimum of three drives per array

RAID 6
Minimum of four drives per array

RAID 10
Minimum of two drives per array

Connecting the 5887 disk drive enclosure to your system

Learn how to connect the 5887 disk drive enclosure to your system.

To connect the 5887 disk drive enclosure to a system with support for a serial-attached SCSI (SAS) disk enclosure, complete the following steps.

For more information about SAS cabling and cabling configurations, see Serial-attached SCSI cable planning (http://www.ibm.com/support/knowledgecenter/POWER8/p8had/p8had_sascablng.htm).

1. Ensure that you have the electrostatic discharge (ESD) wrist strap attached. If not, attach it now.
2. Confirm the factory-set mode of the enclosure by using information that is printed on stickers at the rear of the enclosure. Stickers are attached to the lower-left shelf of the chassis (A) and the center support between the enclosure services manager modules (B). The stickers indicate whether the enclosure is set to mode 1, mode 2, or mode 4. For details, see Figure 11.

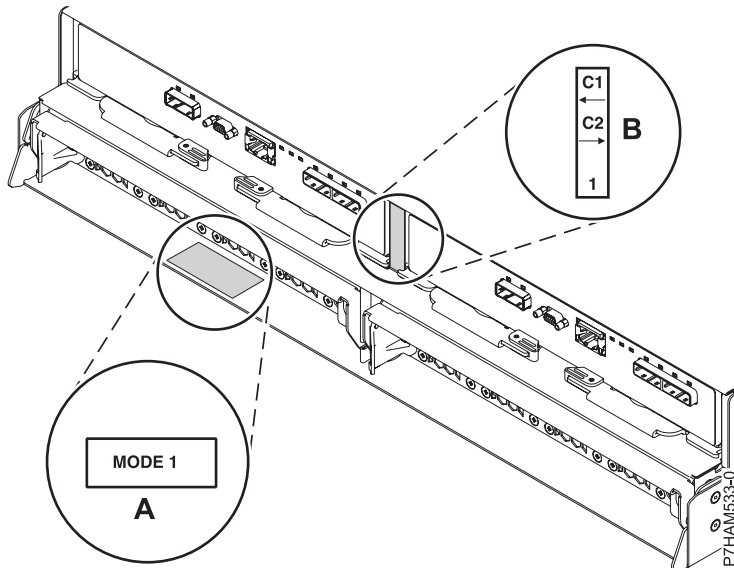


Figure 11. Mode sticker locations at the rear of the 5887 disk drive enclosure

3. Ensure that all adapters that you need to connect to the 5887 disk drive enclosure are installed in the system or expansion unit. If the adapters are not installed, complete the adapter installation procedure for your system or expansion unit before you continue with this task.
4. If the system requires an internal cable to be installed to produce an external SAS port for connection with the enclosure, confirm that the installation was completed.

Remember: When you install or confirm the use of an external SAS port, record the location of the external SAS port on the system. Later in this procedure, you are instructed to install the external SAS cable to this system connector location.

5. Determine the configuration that you will use to cable the SAS adapter to the 5887 disk drive enclosure. The following list shows some of the common connections, but not all possible connection options. For more configuration options, see Planning for serial-attached SCSI cables (http://www.ibm.com/support/knowledgecenter/POWER8/p8had/p8had_sascablng.htm).
 - A mode 1 connection of one 5887 disk drive enclosure by using a YO cable to a single SAS adapter.
 - A mode 1 connection of two 5887 disk drive enclosures by using YO cables to a single SAS adapter.
 - A mode 1 connection of one 5887 disk drive enclosure by using YO cables to a SAS adapter pair.
 - A mode 1 connection of two 5887 disk drive enclosures by using YO cables to a SAS adapter pair.
 - A mode 2 connection of one 5887 disk drive enclosure by using YO cables to two independent SAS adapters.
 - A mode 2 connection of one 5887 disk drive enclosure by using X cables to two SAS adapter pairs.
 - A mode 4 connection of one 5887 disk drive enclosure by using X cables to four independent SAS adapters.

6. Locate the connection for each adapter for which you are using an external SAS cable to connect the enclosure. Adapter cables attach to ports at the rear of the systems in which the adapters are installed. To identify the SAS port location for the system in your configuration, see Connector locations and select the appropriate model.
7. Select from the following options:
 - If the server or expansion unit that you are attaching your 5887 disk drive enclosure to is powered off, continue with step 12.
 - If the system is powered on, you must do one of the following actions, depending on the supported functions of your operating system:
 - Unconfigure the adapters to which you are connecting the enclosure.
 - Power off the adapters to which you are connecting the enclosure.
 - Power off the logical partitions or systems that own the adapters to which you are connecting the enclosure.To do one of these required actions, continue with step 8.
8. Do the following conditions apply to your situation?
 - Your system model does not support slot power control.
 - Your adapters are not in an I/O enclosure that supports slot power control.
 - You are unable to tolerate a temporary loss of access to other disk devices that might exist on the same adapters.
 - **Yes:** Power off the system or the logical partitions that own the adapters by completing the steps in “Stopping a system or logical partition” on page 47. Then, continue with step 12.
 - **No:** Continue with step 9.
9. Select from the following options:
 - If you can unconfigure the SAS adapters, go to step 10.
 - If you can not unconfigure the SAS adapters, you will need to power off the SAS adapters. Go to step 11.
10. To unconfigure the SAS adapters, complete these steps:
 - a. Unconfigure the SAS adapters.
 - b. Ensure that you have the electrostatic discharge (ESD) wrist strap attached. If not, attach it now.
 - c. Connect the SAS cables from the enclosure to the SAS adapters.
 - d. Reconfigure the SAS adapters.
 - e. Continue with step 12.
11. To power off the SAS adapters, complete these steps:
 - a. Power off the SAS adapters.
 - b. Ensure that you have the electrostatic discharge (ESD) wrist strap attached. If not, attach it now.
 - c. Connect the SAS cables from the enclosure to the SAS adapters.
 - d. Power on the SAS adapters.
 - e. Configure the SAS adapters and devices.
 - f. Continue with step 12.
12. Choose one of the following options to cable the SAS adapter:

Note: The configuration figures show the use of adapters to represent the external server or expansion unit connections. The adapter can represent one of the following connection types:

- The external port of an adapter that you confirmed in step 3 on page 11.
- The external port of an internal adapter cable that you confirmed in step 4 on page 11.

Note: Adapters are cabled to the enclosure by using ports at the rear of the enclosure. To learn about the enclosure ports that are used in the following options, see Connector locations.

- To complete a mode 1 connection of one 5887 disk drive enclosure by using a YO cable to a single SAS adapter, go to step 13.
- To complete a mode 1 connection of two 5887 disk drive enclosures by using YO cables to a single SAS adapter, go to step 14.
- To complete a mode 1 connection of one 5887 disk drive enclosure by using YO cables to a SAS adapter pair, go to step 15 on page 14.
- To complete a mode 1 connection of two 5887 disk drive enclosures by using YO cables to a SAS adapter pair, go to step 16 on page 15.
- To complete a mode 2 connection of one 5887 disk drive enclosure by using YO cables to two independent SAS adapters, go to step 17 on page 16.
- To complete a mode 2 connection of one 5887 disk drive enclosure by using X cables to two SAS adapter pairs, go to step 18 on page 17.
- To complete a mode 4 connection of one 5887 disk drive enclosure by using X cables to four independent SAS adapters, go to step 19 on page 18.

If your SAS configuration requirements are not supported by any of these options, go to step 20 on page 20.

13. Perform the mode 1 connection of one enclosure (A) by using a YO cable (B) to a single SAS adapter (C). See Figure 12.

Note: The single SAS adapter (C) has access to all 24 drive bays.

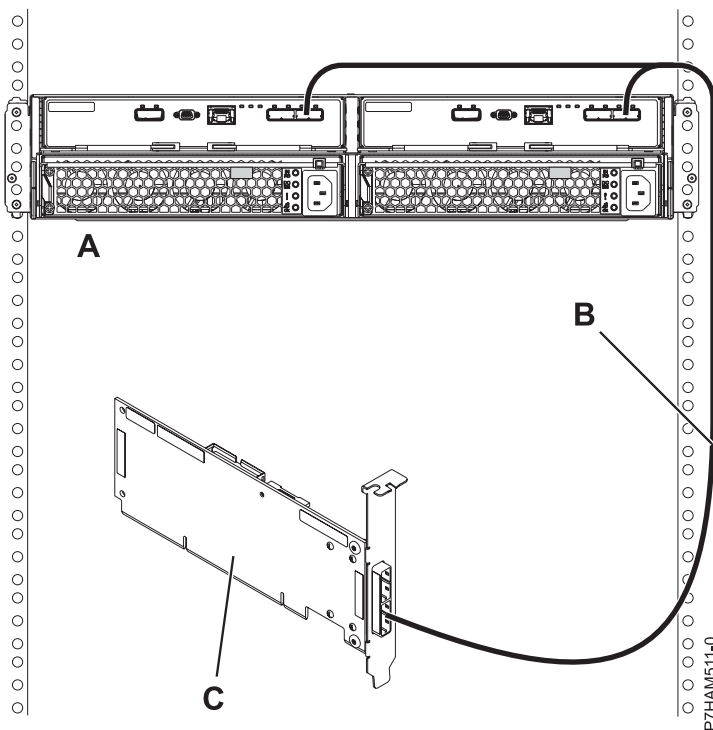


Figure 12. Mode 1 connection of one 5887 disk drive enclosure by using a YO cable to a single SAS adapter

Continue with “Connecting cables, power cords, and installing covers” on page 20.

14. Perform the mode 1 connection of two enclosures (A and B) by using YO cables (C and D) to a single SAS adapter (E). See Figure 13 on page 14.

Note: The single SAS adapter (E) has access to all 48 drive bays.

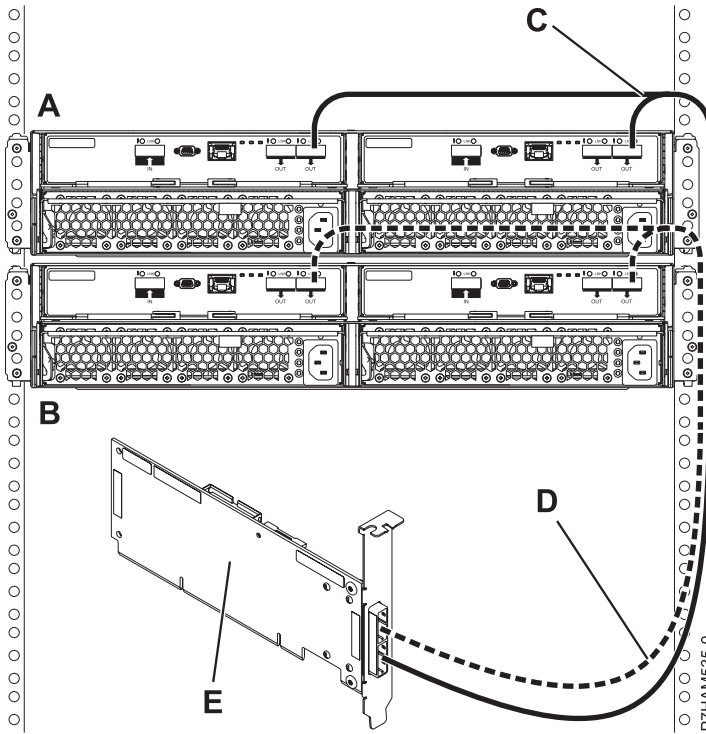


Figure 13. Mode 1 connection of two 5887 disk drive enclosures by using YO cables to a single SAS adapter

Continue with “Connecting cables, power cords, and installing covers” on page 20.

15. Perform the mode 1 connection of one enclosure (A) by using YO cables (B) to a SAS adapter pair (C). See Figure 14 on page 15.

Notes:

- Each adapter in the SAS adapter pair (C) has access to the other adapter and to all 24 drive bays.
- If 6 Gb SAS adapters are being used, they must be cabled by using 6 Gb SAS cables.
- For SAS adapter pairs, you can attach the cables to any adapter port when you use the same port in both adapters.

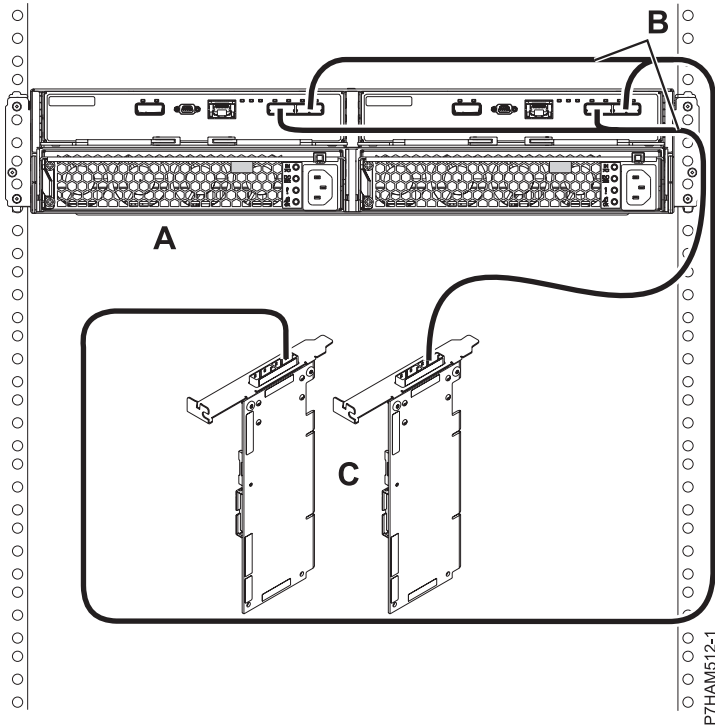


Figure 14. Mode 1 connection of one 5887 disk drive enclosure by using YO cables to a SAS adapter pair

Continue with “Connecting cables, power cords, and installing covers” on page 20.

16. Perform the mode 1 connection of two enclosures (A and B) by using YO cables (C and D) to a SAS adapter pair (E). See Figure 15 on page 16.

Notes:

- Each adapter in the SAS adapter pair (C) has access to the other adapter and to all 48 drive bays.
- If 6 Gb SAS adapters are being used, they must be cabled by using 6 Gb SAS cables.
- For SAS adapter pairs, you can attach the cables to any adapter port when you use the same port in both adapters.

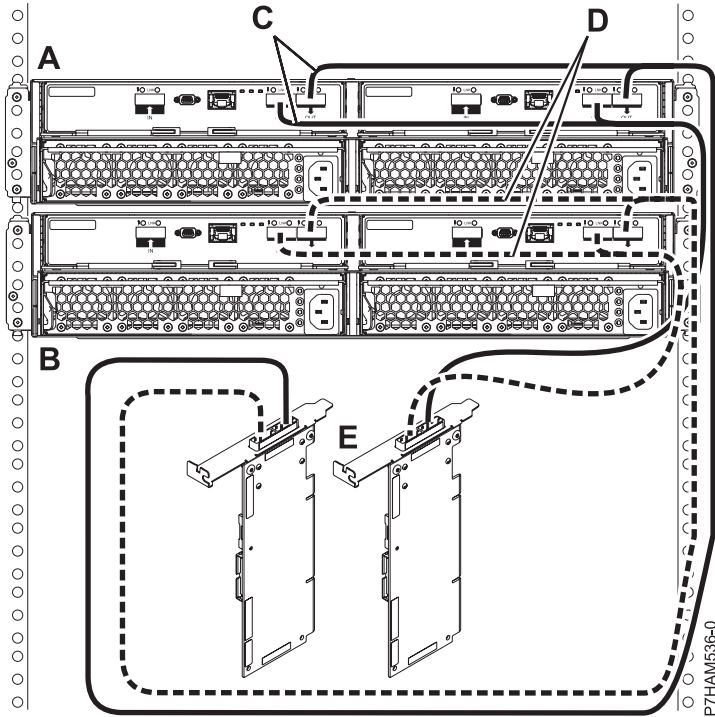


Figure 15. Mode 1 connection of two 5887 disk drive enclosures by using YO cables to a SAS adapter pair

Continue with “Connecting cables, power cords, and installing covers” on page 20.

17. Perform the mode 2 connection of one enclosure (A) by using YO cables (B) to two independent SAS adapters. See Figure 16 on page 17.

Notes:

- Independent SAS adapter 1 (C) does not have access to the other independent adapter and has access only to drive bays D1 - D12.
- Independent SAS adapter 2 (D) does not have access to the other independent adapter and has access only to drive bays D13 - D24.

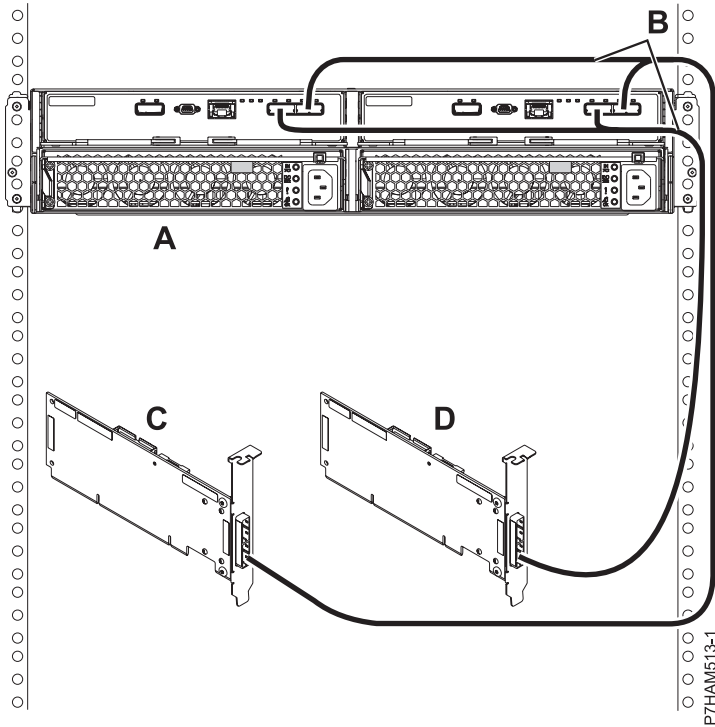


Figure 16. Mode 2 connection of one 5887 disk drive enclosure by using YO cables to two independent SAS adapters

Continue with “Connecting cables, power cords, and installing covers” on page 20.

18. Perform the mode 2 connection of one enclosure (A) by using X cables (B) to two SAS adapter pairs. See Figure 17 on page 18.

Notes:

- Each adapter in the SAS adapter pair 1 (C) has access to the other adapter and to drive bays D1 - D12.
- Each adapter in the SAS adapter pair 2 (D) has access to the other adapter and to drive bays D13 - D24.
- If 6 Gb SAS adapters are being used, they must be cabled by using 6 Gb SAS cables.
- For SAS adapter pairs, you can attach the cables to any adapter port when you use the same port in both adapters.

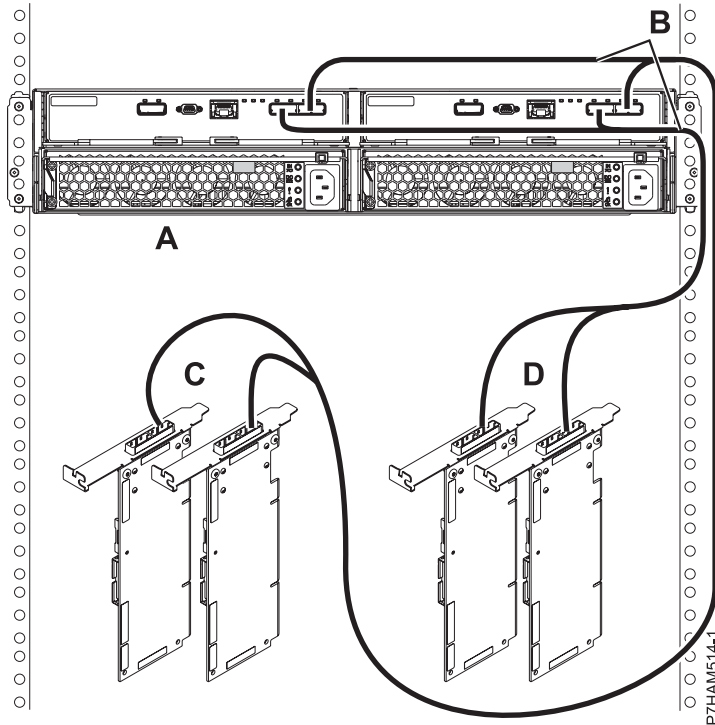


Figure 17. Mode 2 connection of one 5887 disk drive enclosure by using X cables to two SAS adapter pairs

Continue with “Connecting cables, power cords, and installing covers” on page 20.

19. Perform the mode 4 connection of one enclosure (A) by using X cables (B) to four independent SAS adapters. See Figure 18 on page 19.

Note: Refer to Figure 19 on page 19 for examples of these connections.

- The cable that plugs into independent SAS adapter 1 (C) contains a label with the P1 identifier (G). This adapter does not have access to any other independent adapter and has access only to drive bays D1 - D6.
- The cable that plugs into independent SAS adapter 2 (D) contains a label with the P2 identifier (G). This adapter does not have access to any other independent adapter and has access only to drive bays D7 - D12.
- The cable that plugs into independent SAS adapter 3 (E) contains a label with the P1 identifier (G). This adapter does not have access to any other independent adapter and has access only to drive bays D13 - D18.
- The cable that plugs into independent SAS adapter 4 (F) contains a label with the P2 identifier (G). This adapter does not have access to any other independent adapter and has access only to drive bays D19 - D24.

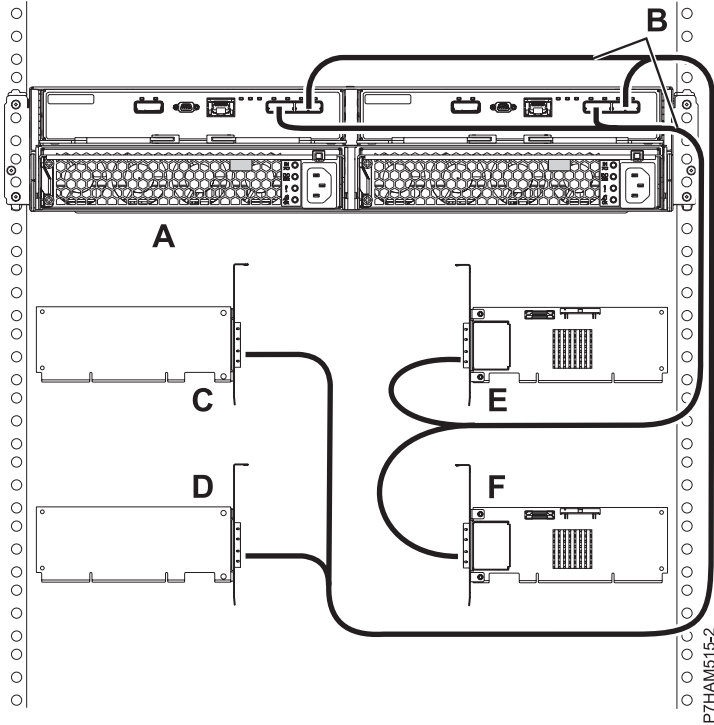


Figure 18. Mode 4 connection of one 5887 disk drive enclosure by using X cables to four independent SAS adapters

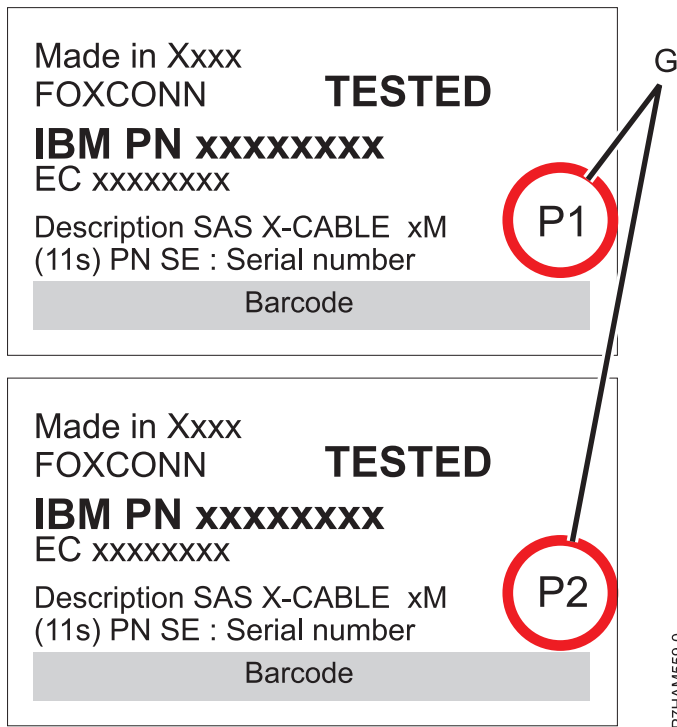


Figure 19. Labels for SAS adapter cables that show P1 and P2 identifiers

20. For more information about SAS cabling and cabling configurations, see Serial-attached SCSI cable planning (http://www.ibm.com/support/knowledgecenter/POWER8/p8had/p8had_sascablng.htm).

Connecting cables, power cords, and installing covers

Use this procedure to reconnect cables, power cords, and install the side covers.

To reconnect cables, attach power cords, and install the side covers, complete the following steps:

1. Ensure that you have the electrostatic discharge (ESD) wrist strap attached. If not, attach it now.
2. If your installation requirements included the removal of the SAS cables from the ESMs, review the labeling that you completed and reinstall the cables.

Note: Do not apply power until instructed to do so.

3. Route the power cords through the power cord retention brackets (**D**) for strain relief, as shown in the following figure.

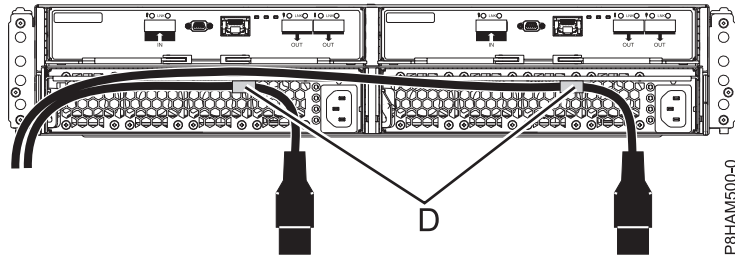
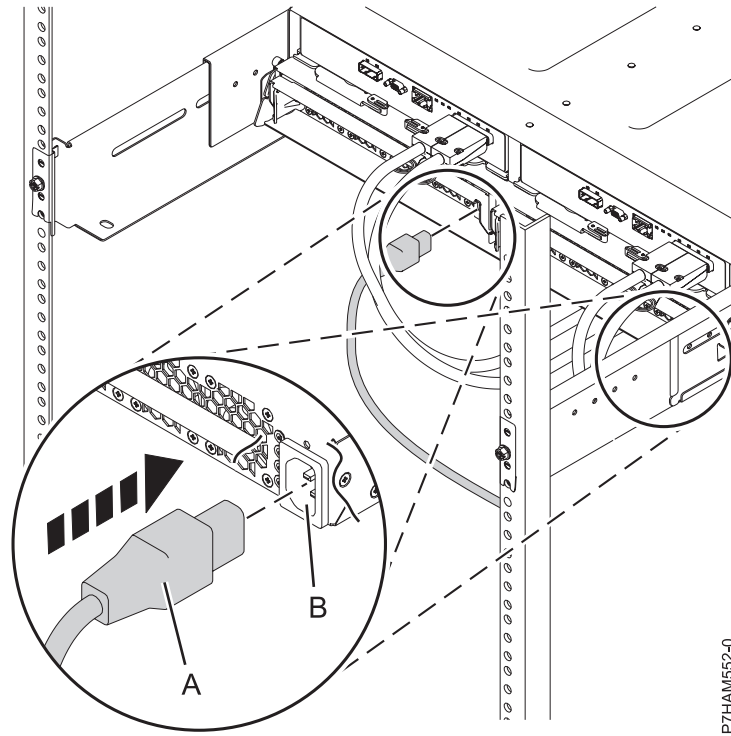


Figure 20. Routing the power cords through the cord retention brackets

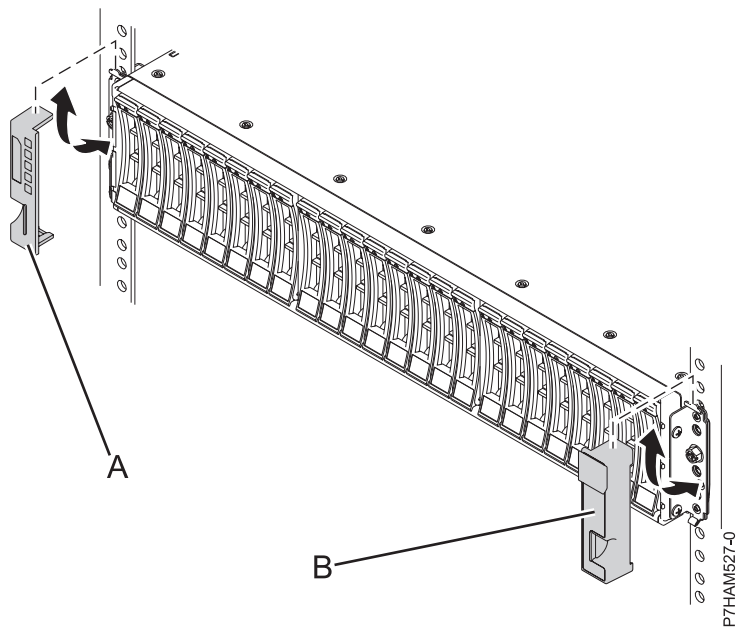
4. Connect the power cords to the left and right power supplies.



P7HAM552-0

Figure 21. Connecting the power cords

5. Reinstall the left cover (A), which contains the service indicators, and the right cover (B).
6. Fit the slot on the top of the cover over the tab on the chassis flange.
7. Rotate the cover down until it snaps into place. Make sure that the inside surface of the cover is flush with the chassis.



P7HAM527-0

Figure 22. Attaching the side covers

8. Connect the other end of the power cables to the power distribution units (PDUs).

9. If you powered down either the system or the partition before you connected the disk drive enclosure cables to it, power on the system or partition. If you did not power down the system or partition, depending on the option you chose in the beginning of this procedure, you might need to reconfigure the adapters.

Completing the 5887 disk drive enclosure installation

Learn how to complete the installation process.

To complete the installation process, complete the following steps:

1. To learn how to add the disk drives to the operating system, see the following information:
 - To configure a disk drive or SSD for use by AIX, see [Configuring a disk drive or solid-state drive for use in an AIX system or AIX logical partition](http://www.ibm.com/support/knowledgecenter/POWER8/p8hal/pxhal_configdrive_aix.htm) (http://www.ibm.com/support/knowledgecenter/POWER8/p8hal/pxhal_configdrive_aix.htm).
 - To configure a disk drive or SSD for use by IBM i, see [Configuring a disk drive or solid-state drive for use in an IBM i system or IBM i logical partition](http://www.ibm.com/support/knowledgecenter/POWER8/p8hal/pxhal_configdrive_ibmi.htm) (http://www.ibm.com/support/knowledgecenter/POWER8/p8hal/pxhal_configdrive_ibmi.htm).
 - To configure a disk drive or SSD for use by Linux, see [Configuring a disk drive or solid-state drive for use in an Linux system or Linux logical partition](http://www.ibm.com/support/knowledgecenter/POWER8/p8hal/pxhal_configdrive_linux.htm) (http://www.ibm.com/support/knowledgecenter/POWER8/p8hal/pxhal_configdrive_linux.htm).
2. To verify that the system or logical partition recognizes the disk drive enclosure, see [Verifying the installed part](http://www.ibm.com/support/knowledgecenter/POWER8/p8haj/pxhaj_hsmverify.htm) (http://www.ibm.com/support/knowledgecenter/POWER8/p8haj/pxhaj_hsmverify.htm).
3. You have completed the steps to install your 5887 disk drive enclosure. If you were directed here from another procedure, return to that procedure now.

Setting up a preinstalled 5887 disk drive enclosure

Learn about the steps to set up a preinstalled 5887 disk drive enclosure.

Preparing to set up your preinstalled 5887 disk drive enclosure

Learn about the prerequisites for installing your 5887 disk drive enclosure and determine whether you can install the enclosure concurrently

To prepare to set up your enclosure, complete the following steps:

1. Review the following information:

The SAS disk drive enclosure can hold up to 24 disk drives. The enclosure can be split logically into one, two, or four independent groups. The SAS disk drive enclosure is supported by the following operating systems:

 - AIX
 - IBM i
 - Linux
 - VIOS
2. Determine the level of software that you need to support the enclosure. For instructions, see the [IBM Prerequisite website](http://www-912.ibm.com/e_dir/eServerPrereq.nsf) (http://www-912.ibm.com/e_dir/eServerPrereq.nsf).
3. Ensure that you have the following items before you start your installation:
 - #1 and #2 Phillips screwdriver
 - Flat-head screwdriver
4. Determine whether you can add your 5887 disk drive enclosure concurrently by reviewing the following information. You can add your expansion units concurrently (with the system powered on and partitions active) if you have one of the following configurations:

- Your system is managed by an IBM Hardware Management Console (HMC).
- Your system is not managed by an HMC, but has only one partition, and that partition is running the IBM i operating system.

Note: If you do not have one of these configurations, you must power off the system to add enclosures.

Removing the shipping bracket on a preinstalled enclosure

Learn how to remove the shipping bracket that is used to brace the preinstalled enclosure.

There are three parts in the bracket assembly that is used to stabilize the 5887 disk drive enclosure during shipment of the rack that contains the enclosure. The bracket assembly consists of a large bracket that attaches to the rack frame and two smaller brackets that secure the two enclosure services manager (ESM) units.

Prerequisite: A medium size screwdriver is required to complete this task.

To remove the shipping bracket, complete the following steps:

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

Attention:

- Attach an electrostatic discharge (ESD) wrist strap to an unpainted metal surface of your hardware to prevent the electrostatic discharge from damaging your hardware.
 - When using an ESD wrist strap, follow all electrical safety procedures. An ESD wrist strap is used for static control. It does not increase or decrease your risk of receiving electric shock when using or working on electrical equipment.
 - If you do not have an ESD wrist strap, just prior to removing the product from ESD packaging and installing or replacing hardware, touch an unpainted metal surface of the system for a minimum of 5 seconds.
2. To clear the shipping bracket installation area of cables and cords, complete the following steps:
 - a. Find the slotted opening in the small front bracket (**A**) below the left enclosure services manager (ESM) and loosen the power supply cord (**B**) that is visible in the opening.
 - b. Carefully pull up the power supply cord through the small front bracket opening.
 - c. After you remove the connector end of the power cord from the opening (**C**), hang the loose length of cable to one side so that it does not interfere with your workspace in the shipping bracket installation area.
 - d. Using the same technique, remove and hang the right power supply cord. Do not disconnect or detach the power supply cords from their attachments to the rack or to other cables.

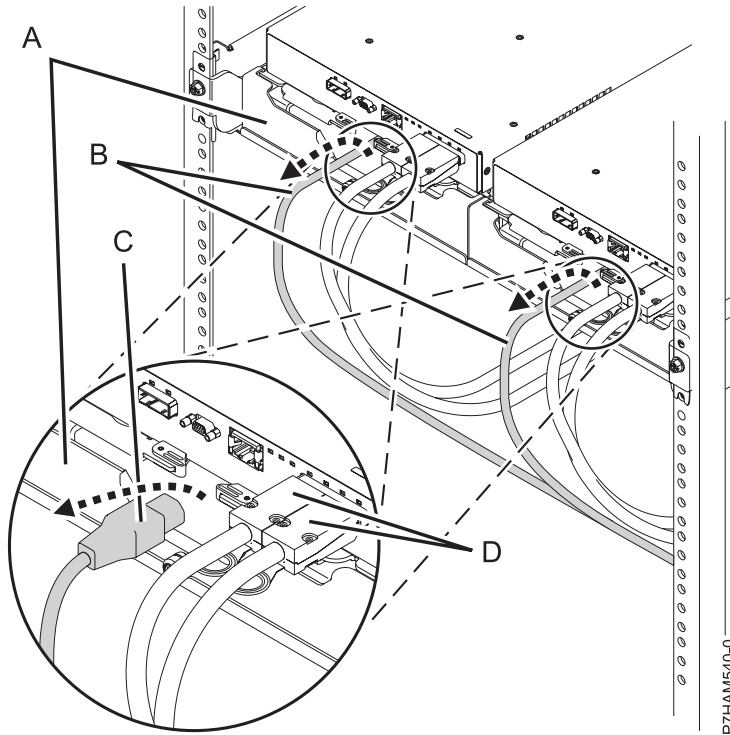


Figure 23. Removing the power supply cords from their shipping position

3. To remove the small and large brackets, complete the following steps:
 - a. Loosen the two thumbscrews (A) on the small front brackets below the ESM units. Remove the brackets by lifting them up and away from the ESM units.

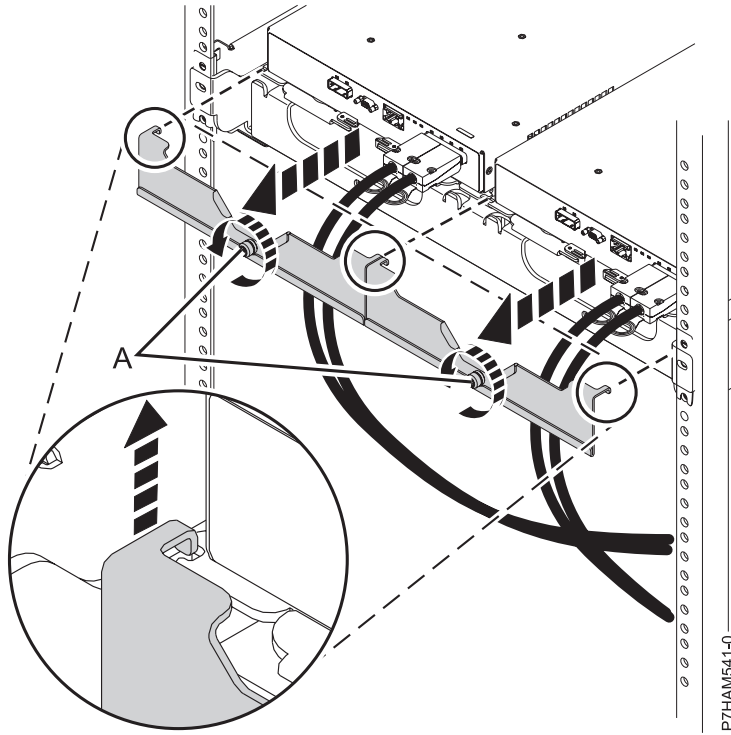
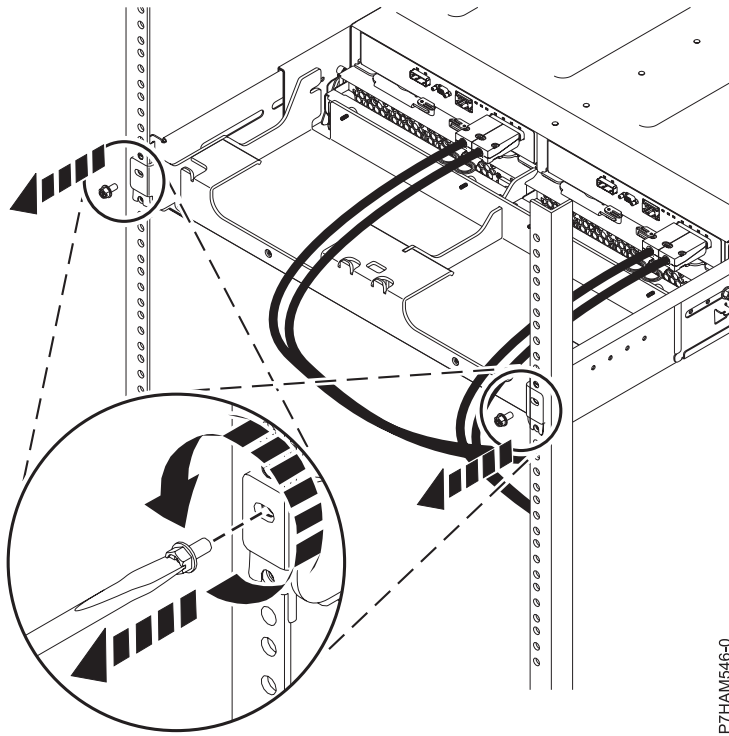


Figure 24. Removing the small front brackets

- b. Using a screwdriver, remove the screw that attaches the large bracket to the left flange of the rack frame. Then, remove the screw that attaches the bracket to right flange.

Note: Keep the screws that you remove for later in the procedure.

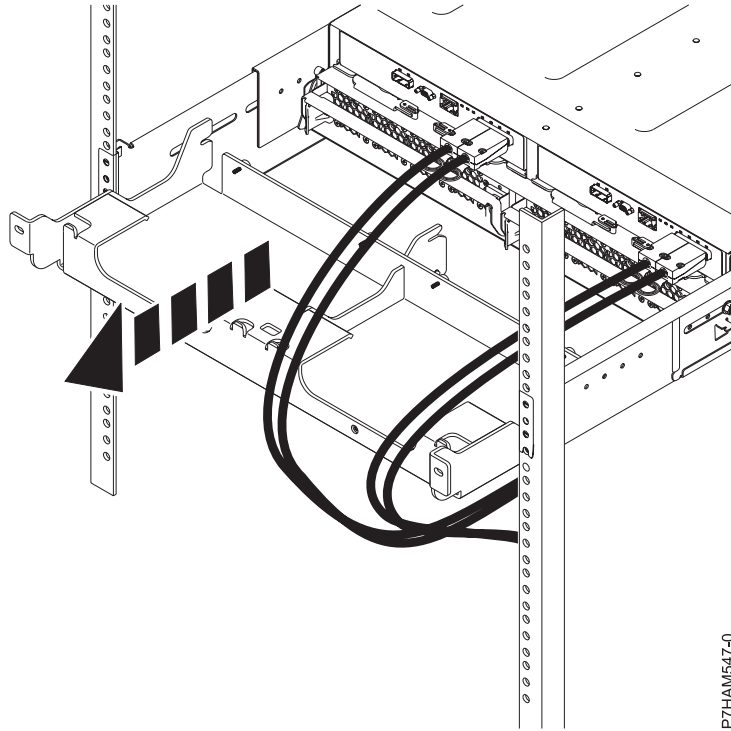


P7HAM546-0

Figure 25. Removing the screws from the bracket and rack flanges

- c. Slide the large bracket toward the rear of the rack. Lift the bracket with two hands to remove it from the side rails.

Tip: Save all of the brackets that you remove for future reinstallation and for shipping of the enclosure that might be required.



P7HAM547-0

Figure 26. Removing the shipping bracket

- d. Reinstall the screws that you removed by inserting them into the same holes in the rack frame and side rails from which you removed them. Tighten the screws with a screwdriver.
4. To dock and secure the ESM units, complete the following steps:
- a. Moving one ESM at a time, slide the unit approximately 75 mm (3 in) toward the chassis.
 - b. For one ESM at a time, place your forefingers under the release levers and pinch the terracotta lever tips. Release the levers and swing them into their fully open position.

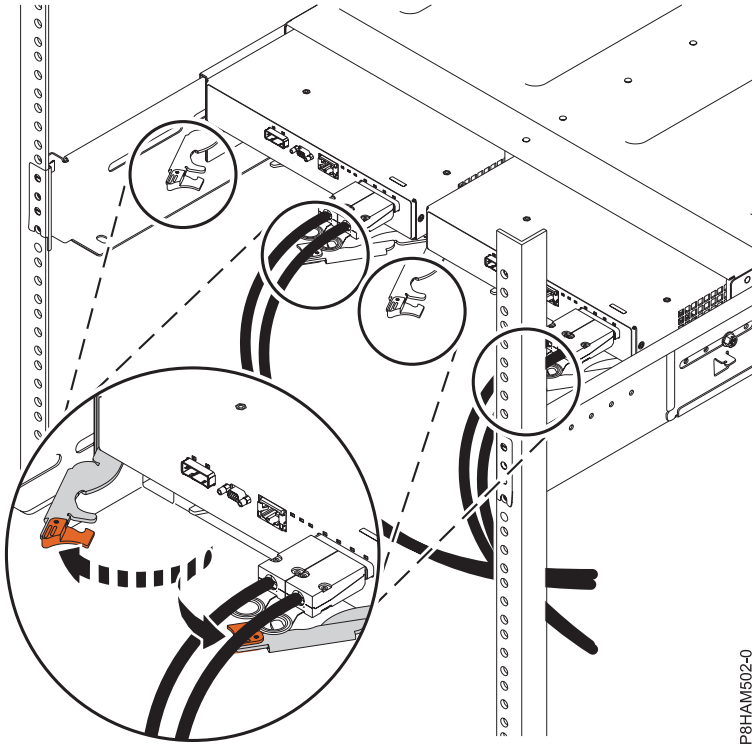


Figure 27. Opening the ESM release levers

- c. Moving one ESM at a time, slide the unit into the chassis until it stops.

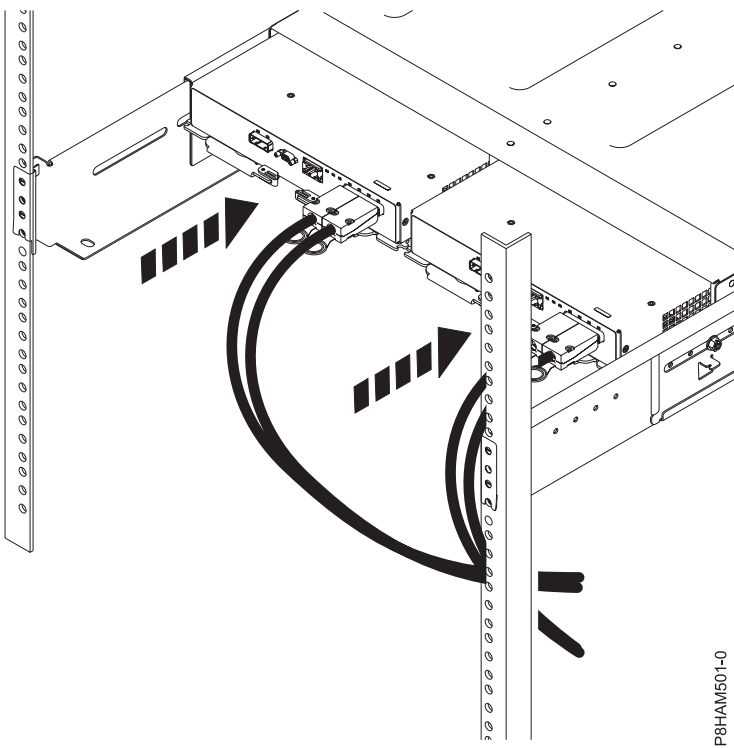


Figure 28. Docking the ESM units

- d. For one ESM at a time, place your thumbs on the tips of the terracotta ESM levers and swing the levers into their fully closed and latched position.

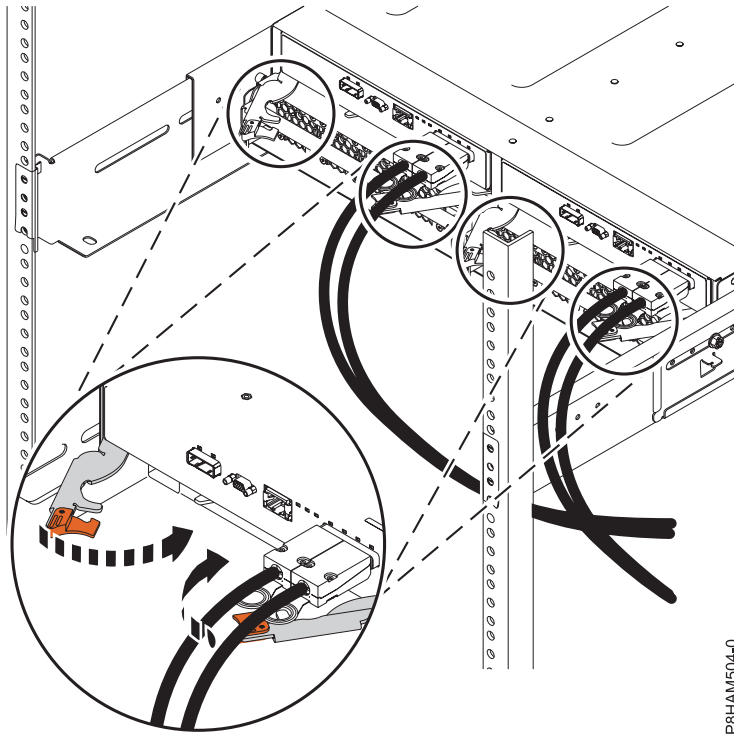
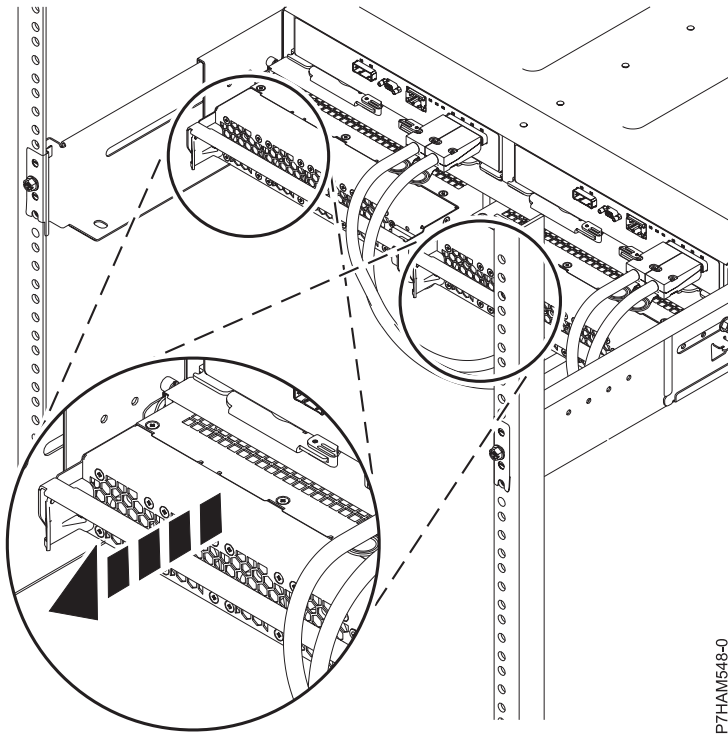


Figure 29. Closing the ESM release levers

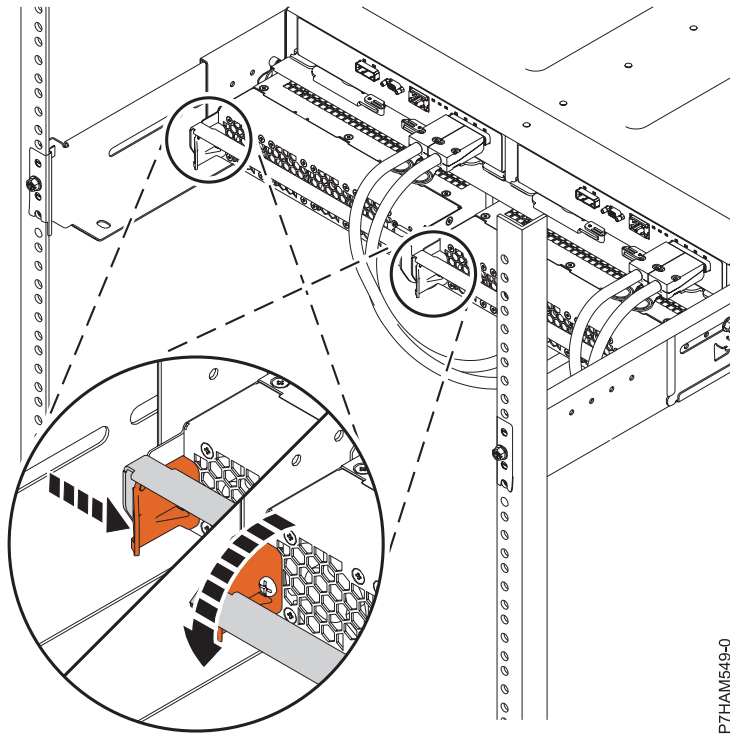
5. To dock and secure the power supplies, complete the following steps:
 - a. Moving one power supply at a time, slide the unit approximately 75 mm (3 in) away from the chassis.



P7HAM548-0

Figure 30. Sliding the power supplies toward the chassis

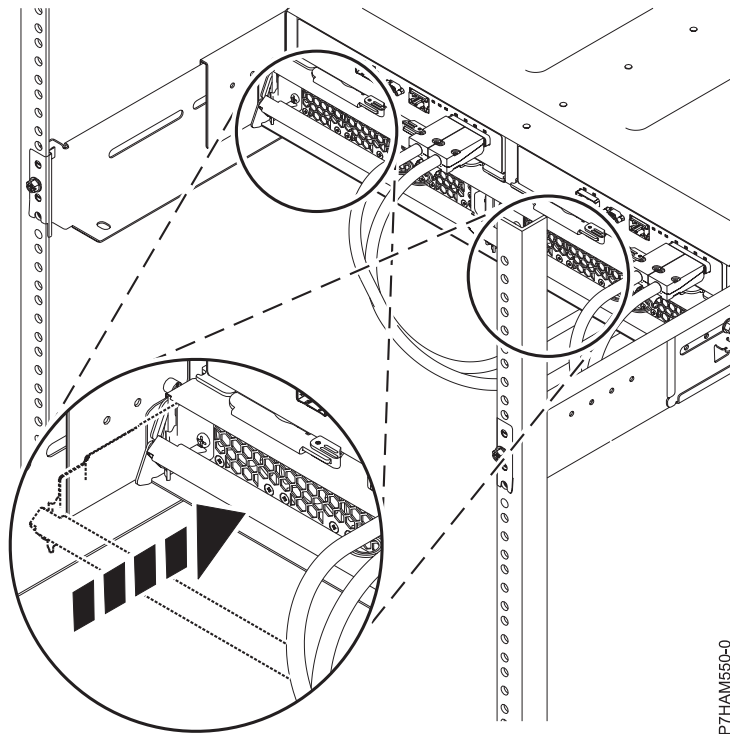
- b. For one power supply at a time, rest your right thumb on the terracotta release latch beside the unit handle and your fingertips on the handle. In one motion, squeeze the release latch to the right and swing the handle down into its fully open position.



P7HAM549-0

Figure 31. Opening the power supply release handle

- c. Moving one power supply at a time, slide the unit into the chassis until it stops.



P7HAM550-0

Figure 32. Docking the power supplies

- d. Moving one power supply at a time, swing the unit handle up and into its fully closed position on the release latch.

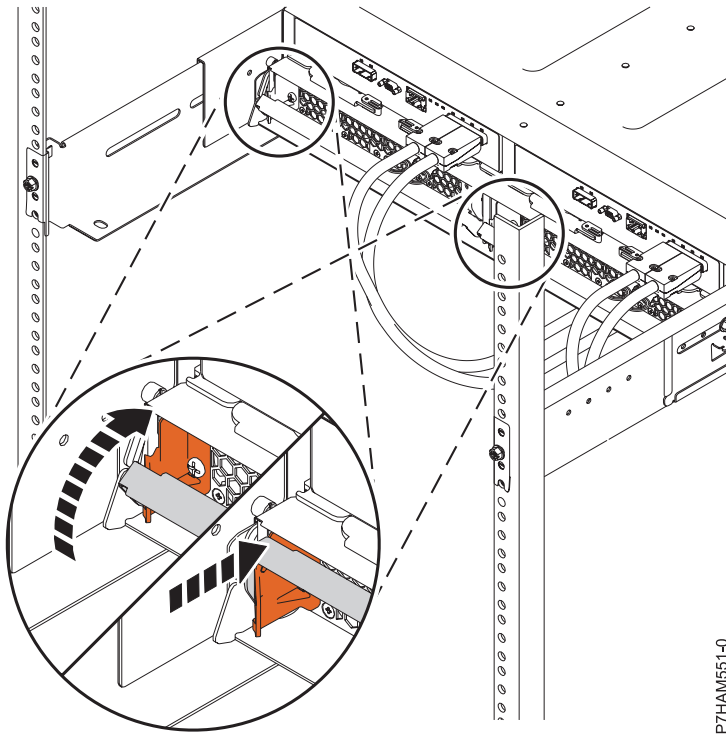


Figure 33. Closing the power supply release handle

Optional: Install disk drives in the preinstalled 5887 disk drive enclosure

Learn about the disk drives and details on how to install them.

To install disk drives, complete the following steps:

1. Ensure that you have the electrostatic discharge (ESD) wrist strap attached. If not, attach it now.
2. Remove the drive from the static-protective package.

Attention: Drives are fragile. Handle with care.

3. With the handle in the unlocked position, support the bottom of the disk drive as you align it with the guide rails in the disk drive enclosure. For an example, see Figure 34 on page 33.

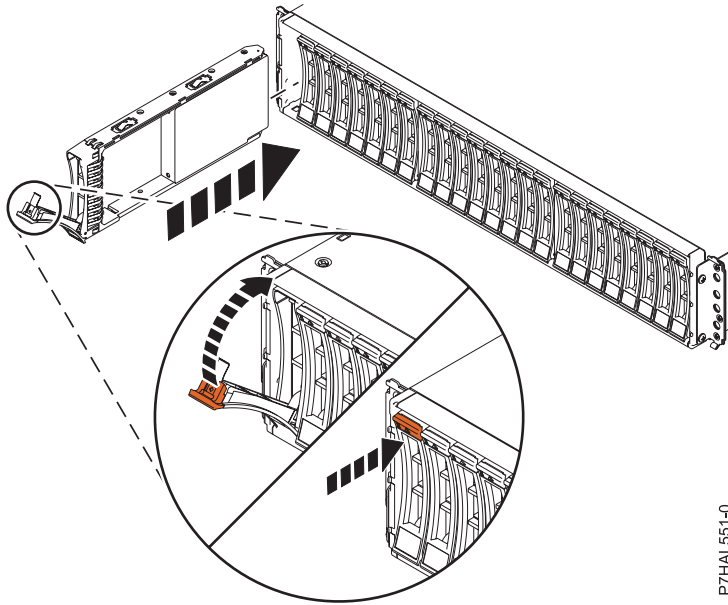


Figure 34. Installing a disk drive in the disk drive enclosure

Note: Do not hold the disk drive only by the handle.

4. Slide the disk unit into the disk drive enclosure until the drive stops.
5. Rotate the handle (A) to the locked position.
6. If you are installing more than one drive, repeat the steps in this procedure until all drives are installed.
7. Review the following information that is related to connecting this device:

The SAS disk drive enclosure can hold up to 24 disk drives. The enclosure can be split logically into one, two, or four independent groups.

The SAS disk drive enclosure supports the following operating systems:

- AIX
- IBM i
- Linux
- VIOS

If you are planning to configure RAID arrays, ensure that you have the minimum number of available disks for each RAID level:

RAID 0
Minimum of one drive per array

RAID 5
Minimum of three drives per array

RAID 6
Minimum of four drives per array

RAID 10
Minimum of two drives per array

Connecting the preinstalled 5887 disk drive enclosure to your system

Learn how to connect the 5887 disk drive enclosure to your system.

To connect the 5887 disk drive enclosure to a system with support for a serial-attached SCSI (SAS) disk enclosure, complete the following steps.

For more information about SAS cabling and cabling configurations, see Serial-attached SCSI cable planning (http://www.ibm.com/support/knowledgecenter/POWER8/p8had/p8had_sascabbling.htm).

1. Ensure that you have the electrostatic discharge (ESD) wrist strap attached. If not, attach it now.
2. Confirm the factory-set mode of the enclosure by using information that is printed on stickers at the rear of the enclosure. Stickers are attached to the lower-left shelf of the chassis (A) and the center support between the enclosure services manager modules (B). The stickers indicate whether the enclosure is set to mode 1, mode 2, or mode 4. For details, see Figure 35.

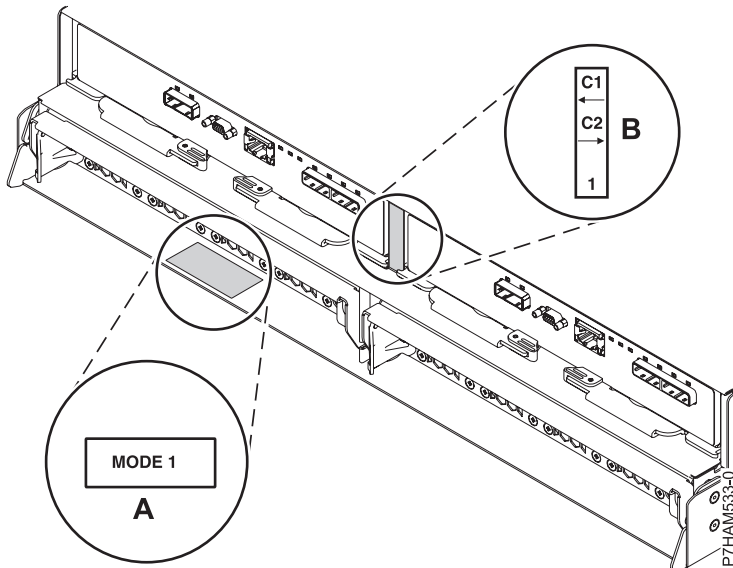


Figure 35. Mode sticker locations at the rear of the 5887 disk drive enclosure

3. Ensure that all adapters that you need to connect to the 5887 disk drive enclosure are installed in the system or expansion unit. If the adapters are not installed, complete the adapter installation procedure for your system or expansion unit before you continue with this task.
4. If the system requires an internal cable to be installed to produce an external SAS port for connection with the enclosure, confirm that the installation was completed.

Remember: When you install or confirm the use of an external SAS port, record the location of the external SAS port on the system. Later in this procedure, you are instructed to install the external SAS cable to this system connector location.

5. Determine the configuration that you will use to cable the SAS adapter to the 5887 disk drive enclosure. The following list shows some of the common connections, but not all possible connection options. For more configuration options, see Planning for serial-attached SCSI cables (http://www.ibm.com/support/knowledgecenter/POWER8/p8had/p8had_sascabbling.htm).
 - A mode 1 connection of one 5887 disk drive enclosure by using a YO cable to a single SAS adapter.
 - A mode 1 connection of two 5887 disk drive enclosures by using YO cables to a single SAS adapter.
 - A mode 1 connection of one 5887 disk drive enclosure by using YO cables to a SAS adapter pair.
 - A mode 1 connection of two 5887 disk drive enclosures by using YO cables to a SAS adapter pair.
 - A mode 2 connection of one 5887 disk drive enclosure by using YO cables to two independent SAS adapters.
 - A mode 2 connection of one 5887 disk drive enclosure by using X cables to two SAS adapter pairs.
 - A mode 4 connection of one 5887 disk drive enclosure by using X cables to four independent SAS adapters.

6. Locate the connection for each adapter for which you are using an external SAS cable to connect the enclosure. Adapter cables attach to ports at the rear of the systems in which the adapters are installed. To identify the SAS port location for the system in your configuration, see Connector locations and select the appropriate model.
7. Select from the following options:
 - If the system is not powered on, continue with step 12.
 - If the system is powered on, you must do one of the following actions, depending on the supported functions of your operating system:
 - Unconfigure the adapters to which you are connecting the enclosure.
 - Power off the adapters to which you are connecting the enclosure.
 - Power off the logical partitions or systems that own the adapters to which you are connecting the enclosure.

To do one of these required actions, continue with step 8.
8. Do the following conditions apply to your situation?
 - Your system model does not support slot power control.
 - Your adapters are not in an I/O enclosure that supports slot power control.
 - You are unable to tolerate a temporary loss of access to other disk devices that might exist on the same adapters.
 - **Yes:** Power off the system or the logical partitions that own the adapters by completing the steps in “Stopping a system or logical partition” on page 47. Then, continue with step 12.
 - **No:** Continue with step 9.
9. Select from the following options:
 - If you can unconfigure the SAS adapters, go to step 10.
 - If you can not unconfigure the SAS adapters, you will need to power off the SAS adapters. Go to step 11.
10. To unconfigure the SAS adapters, complete these steps:
 - a. Unconfigure the SAS adapters.
 - b. Ensure that you have the electrostatic discharge (ESD) wrist strap attached. If not, attach it now.
 - c. Connect the SAS cables from the enclosure to the SAS adapters.
 - d. Reconfigure the SAS adapters.
 - e. Continue with step 12.
11. To power off the SAS adapters, complete these steps:
 - a. Power off the SAS adapters.
 - b. Ensure that you have the electrostatic discharge (ESD) wrist strap attached. If not, attach it now.
 - c. Connect the SAS cables from the enclosure to the SAS adapters.
 - d. Power on the SAS adapters.
 - e. Configure the SAS adapters and devices.
 - f. Continue with step 12.
12. Choose one of the following options to cable the SAS adapter:

Note: The configuration figures show the use of adapters to represent the external server or expansion unit connections. The adapter can represent one of the following connection types:

- The external port of an adapter that you confirmed in step 3 on page 34.
- The external port of an internal adapter cable that you confirmed in step 4 on page 34.

Note: Adapters are cabled to the enclosure by using ports at the rear of the enclosure. To learn about the enclosure ports that are used in the following options, see Connector locations.

- To complete a mode 1 connection of one 5887 disk drive enclosure by using a YO cable to a single SAS adapter, go to step 13.
- To complete a mode 1 connection of two 5887 disk drive enclosures by using YO cables to a single SAS adapter, go to step 14.
- To complete a mode 1 connection of one 5887 disk drive enclosure by using YO cables to a SAS adapter pair, go to step 15 on page 37.
- To complete a mode 1 connection of two 5887 disk drive enclosures by using YO cables to a SAS adapter pair, go to step 16 on page 38.
- To complete a mode 2 connection of one 5887 disk drive enclosure by using YO cables to two independent SAS adapters, go to step 17 on page 39.
- To complete a mode 2 connection of one 5887 disk drive enclosure by using X cables to two SAS adapter pairs, go to step 18 on page 40.
- To complete a mode 4 connection of one 5887 disk drive enclosure by using X cables to four independent SAS adapters, go to step 19 on page 41.

If your SAS configuration requirements are not supported by any of these options, go to step 20 on page 43.

13. Perform the mode 1 connection of one enclosure (A) by using a YO cable (B) to a single SAS adapter (C). See Figure 36.

Note: The single SAS adapter (C) has access to all 24 drive bays.

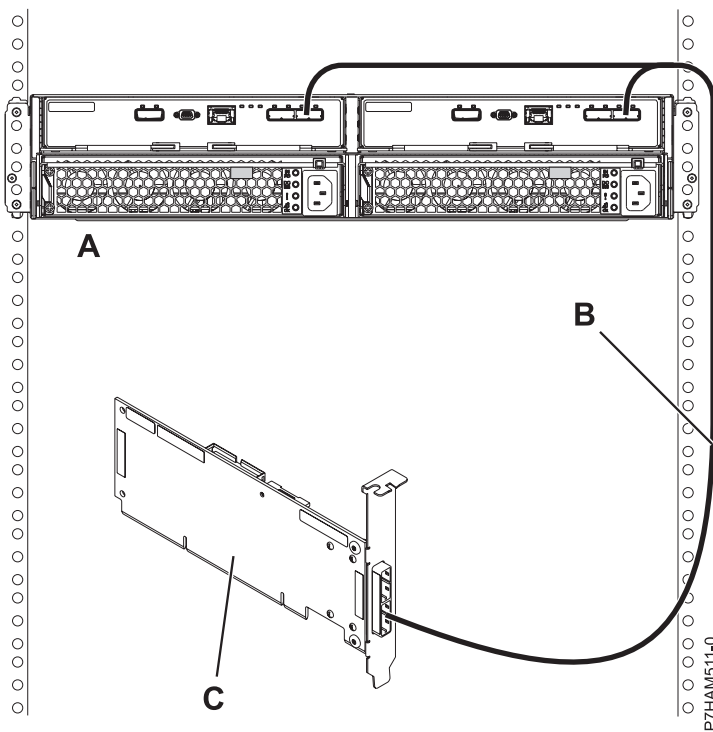


Figure 36. Mode 1 connection of one 5887 disk drive enclosure by using a YO cable to a single SAS adapter

Continue with “Connecting cables, power cords, and installing side covers on your preinstalled enclosure” on page 43.

14. Perform the mode 1 connection of two enclosures (A and B) by using YO cables (C and D) to a single SAS adapter (E). See Figure 37 on page 37.

Note: The single SAS adapter (E) has access to all 48 drive bays.

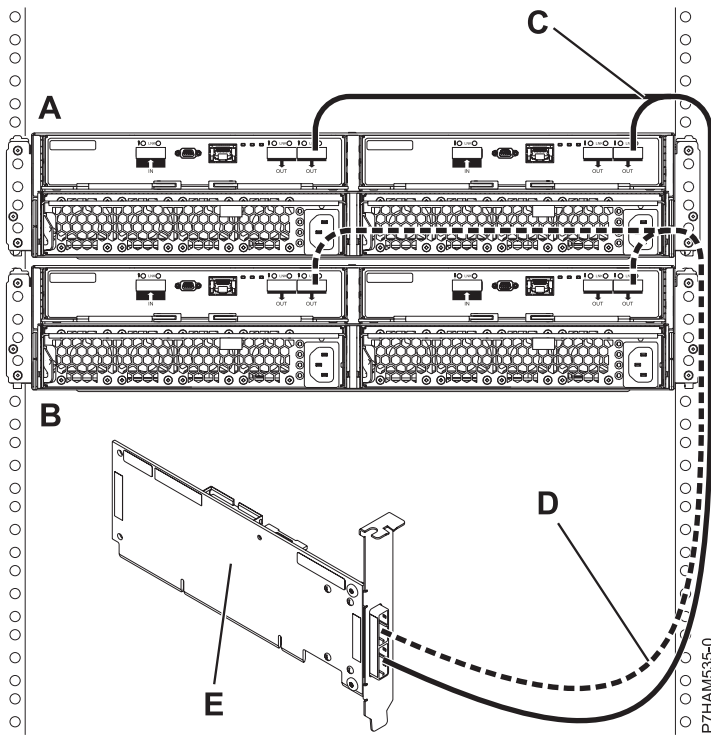


Figure 37. Mode 1 connection of two 5887 disk drive enclosures by using YO cables to a single SAS adapter

Continue with “Connecting cables, power cords, and installing side covers on your preinstalled enclosure” on page 43.

15. Perform the mode 1 connection of one enclosure (A) by using YO cables (B) to a SAS adapter pair (C). See Figure 38 on page 38.

Notes:

- Each adapter in the SAS adapter pair (C) has access to the other adapter and to all 24 drive bays.
- If 6 Gb SAS adapters are being used, they must be cabled by using 6 Gb SAS cables.
- For SAS adapter pairs, you can attach the cables to any adapter port when you use the same port in both adapters.

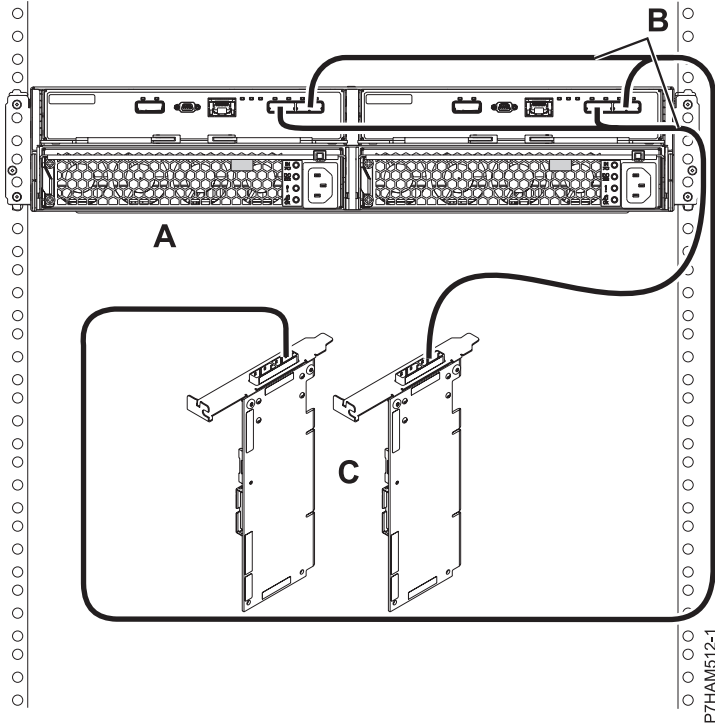


Figure 38. Mode 1 connection of one 5887 disk drive enclosure by using YO cables to a SAS adapter pair

Continue with “Connecting cables, power cords, and installing side covers on your preinstalled enclosure” on page 43.

16. Perform the mode 1 connection of two enclosures (A and B) by using YO cables (C and D) to a SAS adapter pair (E). See Figure 39 on page 39.

Notes:

- Each adapter in the SAS adapter pair (C) has access to the other adapter and to all 48 drive bays.
- If 6 Gb SAS adapters are being used, they must be cabled by using 6 Gb SAS cables.
- For SAS adapter pairs, you can attach the cables to any adapter port when you use the same port in both adapters.

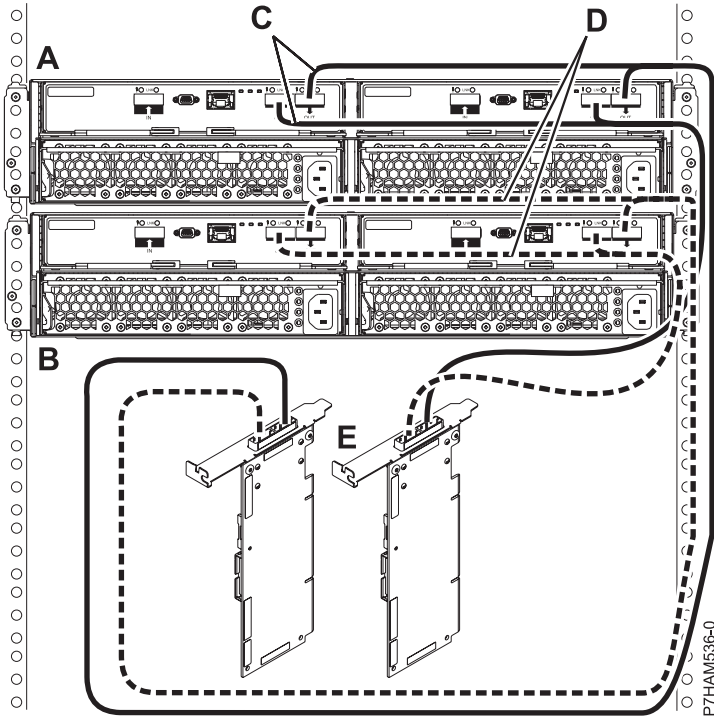


Figure 39. Mode 1 connection of two 5887 disk drive enclosures by using YO cables to a SAS adapter pair

Continue with “Connecting cables, power cords, and installing side covers on your preinstalled enclosure” on page 43.

17. Perform the mode 2 connection of one enclosure (A) by using YO cables (B) to two independent SAS adapters. See Figure 40 on page 40.

Notes:

- Independent SAS adapter 1 (C) does not have access to the other independent adapter and has access only to drive bays D1 - D12.
- Independent SAS adapter 2 (D) does not have access to the other independent adapter and has access only to drive bays D13 - D24.

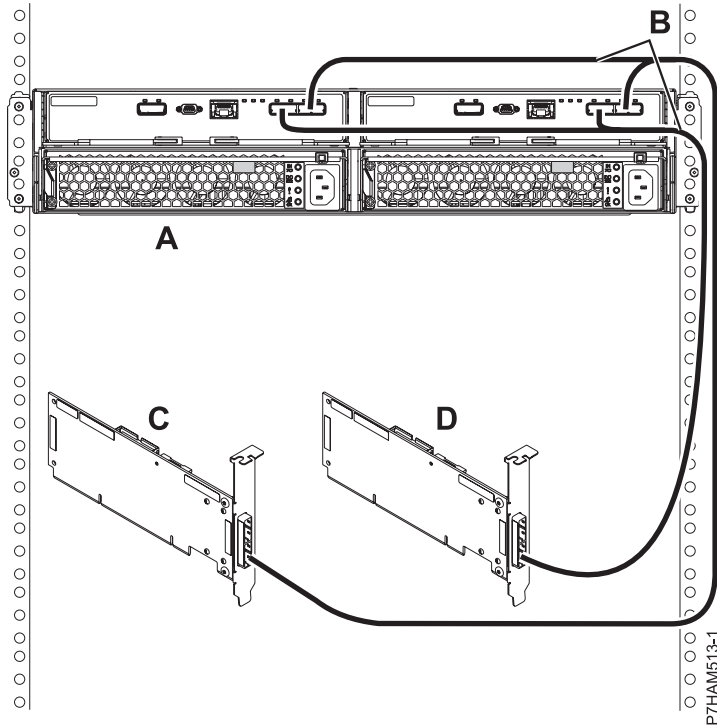


Figure 40. Mode 2 connection of one 5887 disk drive enclosure by using YO cables to two independent SAS adapters

Continue with “Connecting cables, power cords, and installing side covers on your preinstalled enclosure” on page 43.

18. Perform the mode 2 connection of one enclosure (A) by using X cables (B) to two SAS adapter pairs. See Figure 41 on page 41.

Notes:

- Each adapter in the SAS adapter pair 1 (C) has access to the other adapter and to drive bays D1 - D12.
- Each adapter in the SAS adapter pair 2 (D) has access to the other adapter and to drive bays D13 - D24.
- If 6 Gb SAS adapters are being used, they must be cabled by using 6 Gb SAS cables.
- For SAS adapter pairs, you can attach the cables to any adapter port when you use the same port in both adapters.

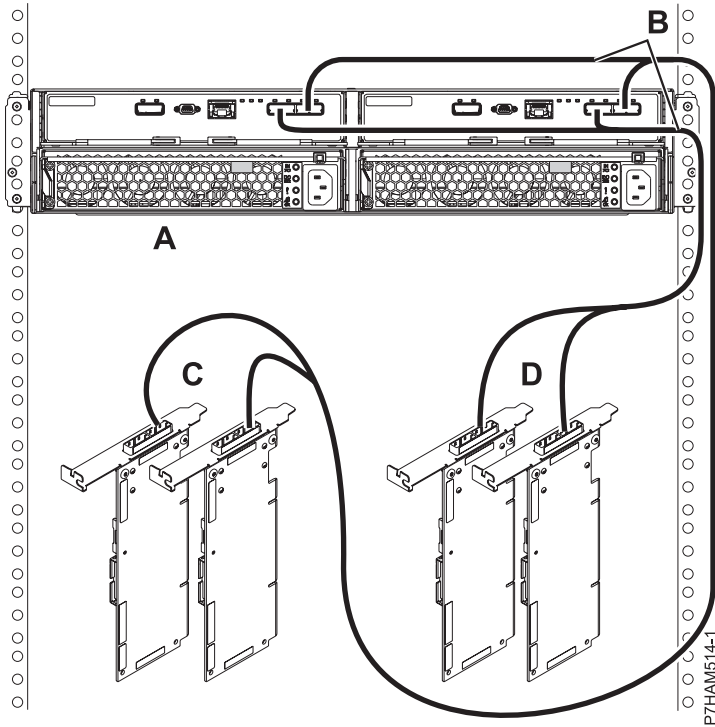


Figure 41. Mode 2 connection of one 5887 disk drive enclosure by using X cables to two SAS adapter pairs

Continue with “Connecting cables, power cords, and installing side covers on your preinstalled enclosure” on page 43.

19. Perform the mode 4 connection of one enclosure (A) by using X cables (B) to four independent SAS adapters. See Figure 42 on page 42.

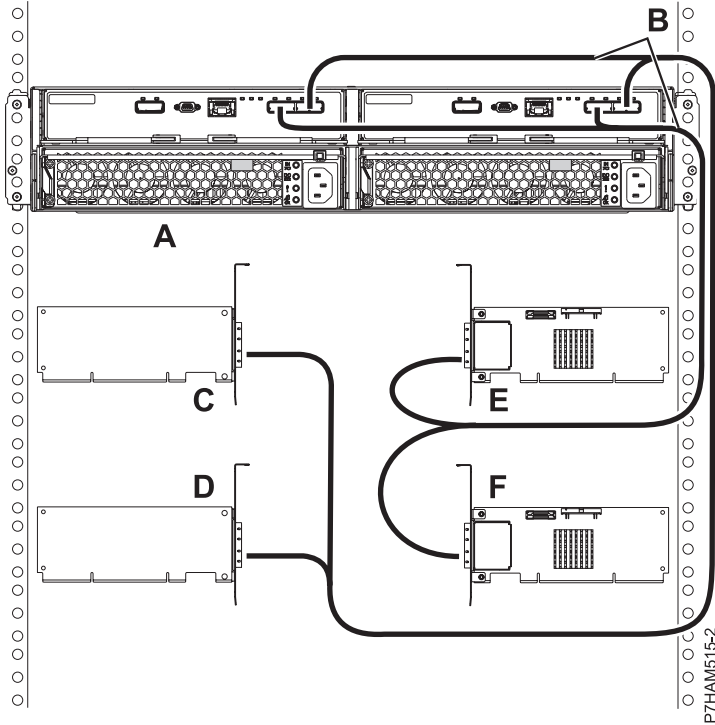


Figure 42. Mode 4 connection of one 5887 disk drive enclosure by using X cables to four independent SAS adapters

Note: Refer to Figure 43 on page 43 for examples of these connections:

- The cable that plugs into independent SAS adapter 1 (C) contains a label with the P1 identifier (G). This adapter does not have access to any other independent adapter and has access only to drive bays D1 - D6.
- The cable that plugs into independent SAS adapter 2 (D) contains a label with the P2 identifier (G). This adapter does not have access to any other independent adapter and has access only to drive bays D7 - D12.
- The cable that plugs into independent SAS adapter 3 (E) contains a label with the P1 identifier (G). This adapter does not have access to any other independent adapter and has access only to drive bays D13 - D18.
- The cable that plugs into independent SAS adapter 4 (F) contains a label with the P2 identifier (G). This adapter does not have access to any other independent adapter and has access only to drive bays D19 - D24.

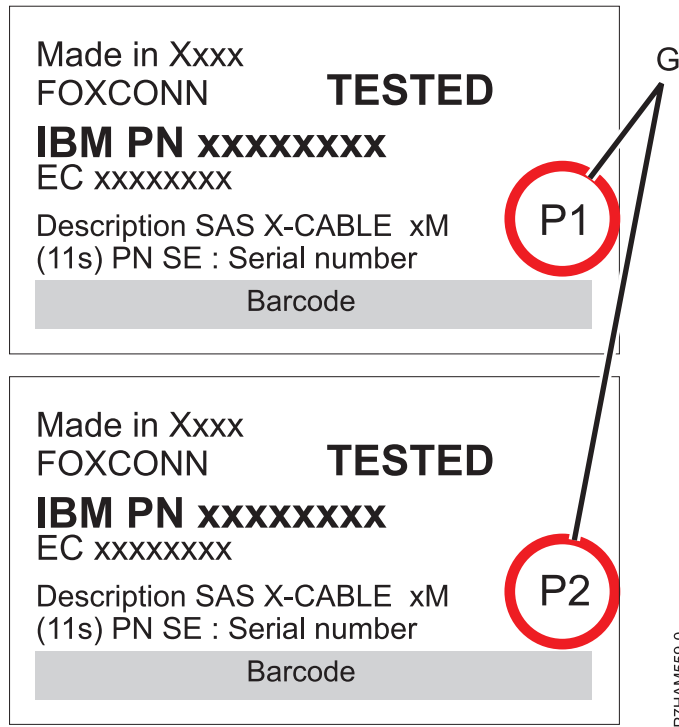


Figure 43. Labels for SAS adapter cables that show P1 and P2 identifiers

20. For more information about SAS cabling and cabling configurations, see Serial-attached SCSI cable planning (http://www.ibm.com/support/knowledgecenter/POWER8/p8had/p8had_sascabling.htm).

Connecting cables, power cords, and installing side covers on your preinstalled enclosure

Use this procedure to reconnect cables, power cords, and install the side covers on your preinstalled disk drive enclosure.

To reconnect cables, attach power cords, and install the side covers, complete the following steps:

1. Ensure that you have the electrostatic discharge (ESD) wrist strap attached. If not, attach it now.
2. If your installation requirements included the removal of the SAS cables from the ESMs, review the labeling that you completed and reinstall the cables.

Note: Do not apply power until instructed to do so.

3. Reinstall the left cover (A), which contains the service indicators, and the right cover (B).
4. Fit the slot on the top of the cover over the tab on the chassis flange.
5. Rotate the cover down until it snaps into place. Make sure that the inside surface of the cover is flush with the chassis.

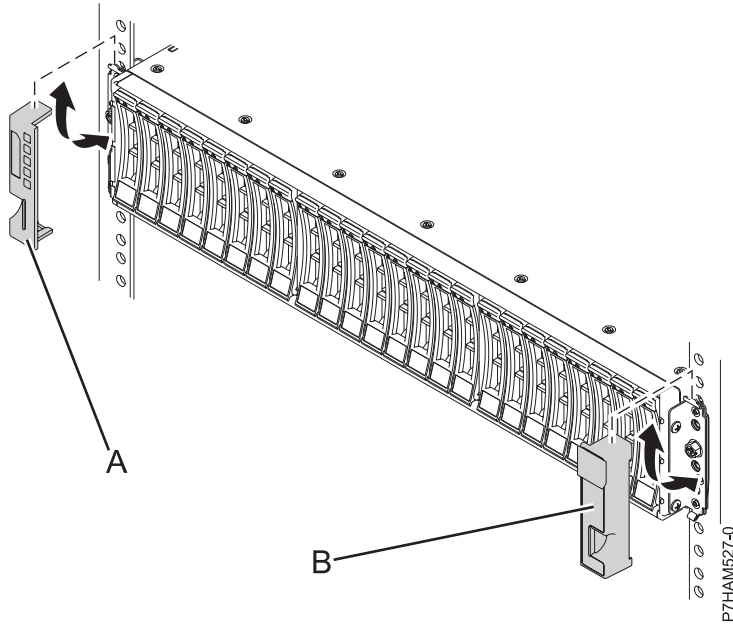


Figure 44. Attaching the side covers

6. Route the power cords through the power cord retention brackets (**D**) for strain relief as shown in the following figure. Connect the power cables and apply power to the disk drive enclosure.

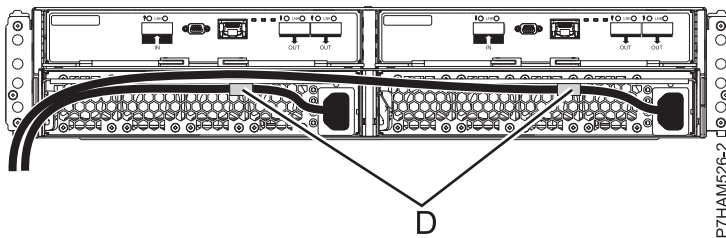


Figure 45. Routing the power cords through the cord retention brackets

7. If you powered down either the system or the partition before you connected the disk drive enclosure cables to it, power on the system or partition. If you did not power down the system or partition, depending on the option you chose in the beginning of this procedure, you might need to reconfigure the adapters.

Completing the 5887 disk drive enclosure installation

Learn how to complete the installation process.

To complete the installation process, complete the following steps:

1. To learn how to add the disk drives to the operating system, see the following information:
 - To configure a disk drive or SSD for use by AIX, see [Configuring a disk drive or solid-state drive for use in an AIX system or AIX logical partition](http://www.ibm.com/support/knowledgecenter/POWER8/p8hal/pxhal_configdrive_aix.htm) (http://www.ibm.com/support/knowledgecenter/POWER8/p8hal/pxhal_configdrive_aix.htm).
 - To configure a disk drive or SSD for use by IBM i, see [Configuring a disk drive or solid-state drive for use in an IBM i system or IBM i logical partition](http://www.ibm.com/support/knowledgecenter/POWER8/p8hal/pxhal_configdrive_ibmi.htm) (http://www.ibm.com/support/knowledgecenter/POWER8/p8hal/pxhal_configdrive_ibmi.htm).

- To configure a disk drive or SSD for use by Linux, see [Configuring a disk drive or solid-state drive for use in an Linux system or Linux logical partition \(http://www.ibm.com/support/knowledgecenter/POWER8/p8hal/pxhal_configdrive_linux.htm\)](http://www.ibm.com/support/knowledgecenter/POWER8/p8hal/pxhal_configdrive_linux.htm).
2. To verify that the system or logical partition recognizes the disk drive enclosure, see [Verifying the installed part \(http://www.ibm.com/support/knowledgecenter/POWER8/p8haj/pxhaj_hsmverify.htm\)](http://www.ibm.com/support/knowledgecenter/POWER8/p8haj/pxhaj_hsmverify.htm).
 3. You have completed the steps to install your 5887 disk drive enclosure. If you were directed here from another procedure, return to that procedure now.

Reference information

Use the information in this section as needed to complete enclosure installation and configuration tasks.

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

You might need to stop the system to complete another task. If your system is not managed by the Hardware Management Console (HMC), use these instructions to stop the system by using the power button or the Advanced System Management Interface (ASMI).

Before you stop the system, follow these steps:

1. Ensure that all jobs are completed and end all applications.
2. 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 by using an alternative method.

Stopping a system by using the control panel

You might need to stop the system to complete another task. If your system is not managed by the Hardware Management Console (HMC), use these instructions to stop the system by using the power button.

The following procedure describes how to stop a system that is not managed by the HMC.

1. Log in to the host partition as a user with the authority to run the **shutdown** or **pwrdownsys** (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 **PWRDWN SYS**. If your system is partitioned, use the **PWRDWN SYS** command to power down each of the secondary partitions. Then, use the **PWRDWN SYS** command to power down the primary partition.

The command stops the operating system. The system power turns off, the power-on light begins to slowly flash, and the system goes into a standby state.

3. Record the IPL type and the IPL mode from the control panel display to help you return the system to this state when the installation or replacement procedure is completed.
4. Set the power switches of any devices that are connected to the system to off.

Stopping a system by using the ASMI

You might need to stop the system to complete another task. If your system is not managed by the Hardware Management Console (HMC), use these instructions to stop the system by using the Advanced System Management Interface (ASMI).

To stop a system by using the ASMI, complete the following steps:

1. On the ASMI Welcome pane, specify your user ID and password, and click **Log In**.
2. In the navigation area, click **Power/Restart Control > Power On/Off System**. The power state of the system is displayed.
3. Specify the settings as required and click **Save setting and power off**.

Stopping a system by using the HMC

You can use the Hardware Management Console (HMC) to stop the system or 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: Ensure that you shut down the running logical partitions on the managed system before you power 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 by using an alternative 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

Note: If you are a product engineer, verify that the customer has shut down all active partitions and has powered off the managed system. Continue with the procedure only after the status of the server changes to **Power Off**.

Stopping a system by using the HMC Classic or HMC Enhanced interface

Learn how to stop a system by using the HMC Classic or HMC Enhanced interface.

To stop the system or logical partition by using the HMC Classic or HMC Enhanced interface, complete the following steps:

1. In the navigation area, click **Systems Management > Servers**.
2. In the content pane, select the managed system.
3. In the Tasks area, click **Operations > Power Off**.
4. Select the appropriate power-off mode and click **OK**.

Related information:

 Shutting down and restarting logical partitions


Stopping a system by using the HMC Enhanced + Tech Preview (Pre-GA) or HMC Enhanced+ interface

Learn how to stop a system by using the HMC Enhanced + Tech Preview (Pre-GA) or HMC Enhanced+ interface.


To stop the system or logical partition by using the HMC Enhanced + Tech Preview (Pre-GA) or HMC Enhanced+ interface, complete the following steps:

1. You must deactivate all the active logical partitions before powering off the system. To deactivate logical partitions for a specific system, complete the following steps:



- a. In the navigation area, click the **Resources** icon  , and then click **All Systems**.
 - b. Click the system name for which you want to deactivate partitions.
 - c. In the navigation area, click **Partitions > View Partitions**.
 - d. Select the logical partitions that you want to deactivate.
 - e. In the content pane, click **Actions > Deactivate**.
 - f. Click **OK**.
2. To power off the system, complete the following steps:



- a. In the navigation area, click the **Resources** icon  , and then click **All Systems**.
- b. Select the system that you want to power off.
- c. In the content pane, click **Actions > View All Actions > Power Off**.
- d. Click **OK**.

Stopping an IBM PowerKVM system

You can use the Intelligent Platform Management Interface (IPMI) to stop an IBM PowerKVM system.

To stop an IBM PowerKVM system, complete the following steps:

1. Log in to the host as a root user or with sudo authority.
2. To power off each of the guests, complete the following steps.
 - a. To obtain a list of all guests, type **virsh list**.
 - b. For each guest in the list, type **virsh shutdown domain name** or type **virsh shutdown domain ID**.

Note:

Type **virsh list** to verify whether all the guests are powered off. If any guest is not powered off, type **virsh destroy domain name** or type **virsh destroy domain ID** to power off the guest.

3. Run the **ipmitool -I lanplus -H FSP IP -P ipmipassword chassis power off** command from a remote system.

Starting the system or logical partition

Learn how to start a system or logical partition after performing a service action or system upgrade.

Starting a system that is not managed by an HMC

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

Starting a system by using the control panel

You can use the power button on the control panel to start a system that is not managed by a Hardware Management Console (HMC).

To start a system that by using the control panel, complete the following 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 flashing.

- 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.

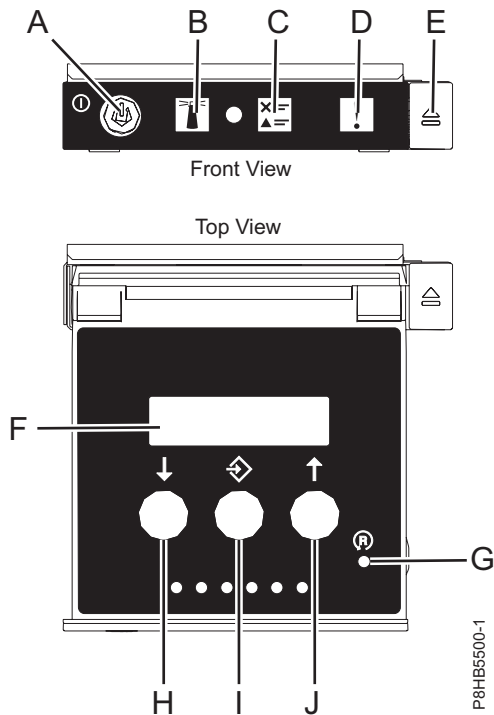


Figure 46. Control panel

- **A:** Power-on button
 - A constant light indicates full system power to the unit.
 - A flashing light indicates standby power to the unit.
 - There is approximately a 30-second transition period from the time the power-on button is pressed to when the power LED goes from flashing to solid. During the transition period, the LED might flash faster.
 - **B:** 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.
 - **C:** System information light
 - No light indicates that the system is operating normally.
 - Light on indicates that the system requires attention.
 - **D:** Enclosure fault roll-up light
 - A constant light indicates a fault in the enclosure.
 - No light indicates that the system is operating normally.
 - **E:** Eject button
 - **F:** Function/Data display
 - **G:** Pinhole reset button
 - **H:** Decrement button
 - **I:** Enter button
 - **J:** Increment button
4. Observe the following aspects after pressing the power button:

- The power-on light begins to flash 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 flashing and remains on, indicating that the system power is on.

Tip: If pressing the power button does not start the system, then contact your next level of support or your service provider.

Starting a system by using the ASMI

You can use the Advanced System Management Interface (ASMI) to start a system that is not managed by a Hardware Management Console (HMC).

To start a system by using the ASMI, complete the following steps:

1. On the ASMI Welcome pane, specify your user ID and password, and click **Log In**.
2. In the navigation area, click **Power/Restart Control > Power On/Off System**. The power state of the system is displayed.
3. Specify the settings as required and click **Save setting and power on**.

Starting a system or logical partition by using the HMC

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

Starting a system or logical partition by using the HMC Classic or HMC Enhanced interface

Learn how to start a system or logical partition by using the HMC Classic or HMC Enhanced interface.

To start the system by using the HMC Classic or HMC Enhanced interface, complete the following steps:

1. Verify that the logical partition start policy is set to **User-Initiated** by completing the following steps:
 - a. In the navigation area, expand **Systems Management > Servers**.
 - b. In the content pane, select the managed system.
 - c. In the Tasks area, click **Properties**.
 - d. Click the **Power-On Parameters** tab. Ensure that the **Partition start policy** field is set to **User-Initiated**.
2. Power on the managed system by completing the following steps:
 - a. In the navigation area, expand **Systems Management > Servers**.
 - b. In the content pane, select the managed system.
 - c. Click **Operations > Power on**.
 - d. Select the power-on option and click **OK**.


Starting a system or logical partition by using the HMC Enhanced + Tech Preview (Pre-GA) or HMC Enhanced+ interface

Learn how to start a system or logical partition by using the HMC Enhanced + Tech Preview (Pre-GA) or HMC Enhanced+ interface.


To start a system or logical partition by using the HMC Enhanced + Tech Preview (Pre-GA) or HMC Enhanced+ interface, complete the following steps:

1. To power on the managed system, complete the following steps:




- a. In the navigation area, click the **Resources** icon  , and then click **All Systems**.
 - b. Select the system that you want to power on.
 - c. In the content pane, click **Actions > View All Actions > Power On**.
 - d. Click **OK**.
2. To activate a logical partition, complete the following steps:




- a. In the navigation area, click the **Resources** icon  , and then click **All Partitions**.
 - b. Click the logical partition name that you want to activate.
 - c. In the navigation area, click **Partition Actions > Operations > Activate**.
 - d. Click **OK**.
3. To activate a logical partition for a specific system, complete the following steps:



- a. In the navigation area, click the **Resources** icon  , and then click **All Systems**.
 - b. Click the system name in which you want to activate the logical partition.
 - c. In the navigation area, click **Partitions > View Partitions**.
 - d. Select logical partitions that you want to activate.
 - e. In the content pane, click **Actions > Activate**.
 - f. Click **OK**.
4. To verify that the logical partition start policy is set to **User-Initiated**, complete the following steps:



- a. In the navigation area, click the **Resources** icon  , and then click **All Systems**.
- b. Click the system name to view details.
- c. In the navigation area, click **Properties > Other Properties**.
- d. Click the **Power-On Parameters** tab. Ensure that the **Partition start policy** field is set to **User-Initiated**.

Starting an IBM PowerKVM system

You can use the Intelligent Platform Management Interface (IPMI) to start an IBM PowerKVM system.

To start an IBM PowerKVM system, run the `ipmitool -I lanplus -H FSP IP -P ipmipassword chassis power on` command from a remote system.

Connector locations

Learn about connector locations for servers and enclosures and expansion units.

Enclosure and expansion unit connectors

Learn about connector locations for enclosures and expansion units.

Connector locations for the 5887 disk drive enclosure

Learn about connector locations for the 5887 disk drive enclosure.

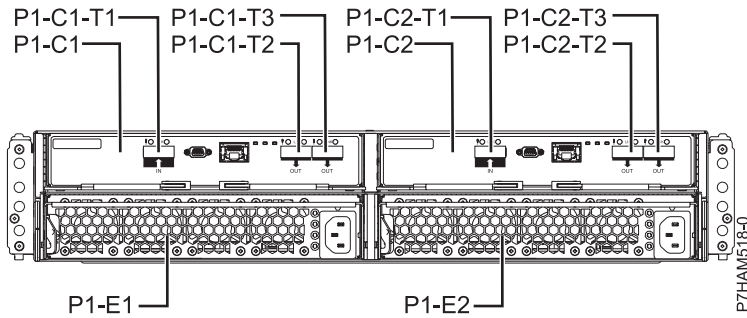


Figure 47. Connector locations for the 5887 disk drive enclosure

Connector locations for the PCIe Gen3 I/O expansion drawer

Learn about connector locations for the PCIe Gen3 I/O expansion drawer (PCIe3 expansion drawer).

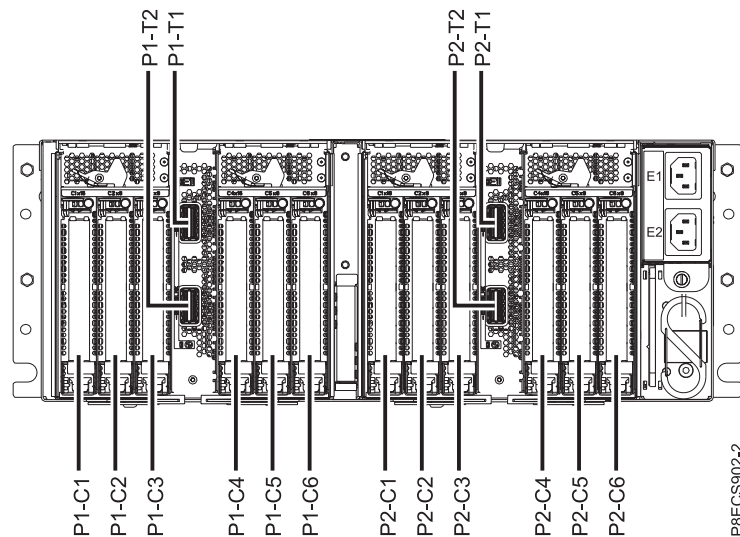


Figure 48. PCIe Gen3 I/O expansion drawer showing the PCIe3 6-slot fanout module

For more information about the PCIe3 expansion drawer locations, see PCIe Gen3 I/O expansion drawer locations (http://www.ibm.com/support/knowledgecenter/POWER8/p8ecs/p8ecs_emx0_loccodes.htm).

Connector locations for POWER8 servers

Learn about connector locations for POWER8™ servers.

Connector locations for the 8247-21L, 8247-22L, and 8284-22A systems

Learn about connector locations for the 8247-21L, 8247-22L, and 8284-22A systems.

The expanded function 8247-21L, 8247-22L, and 8284-22A servers provide cable connector locations via a SAS port for disk drive enclosures.

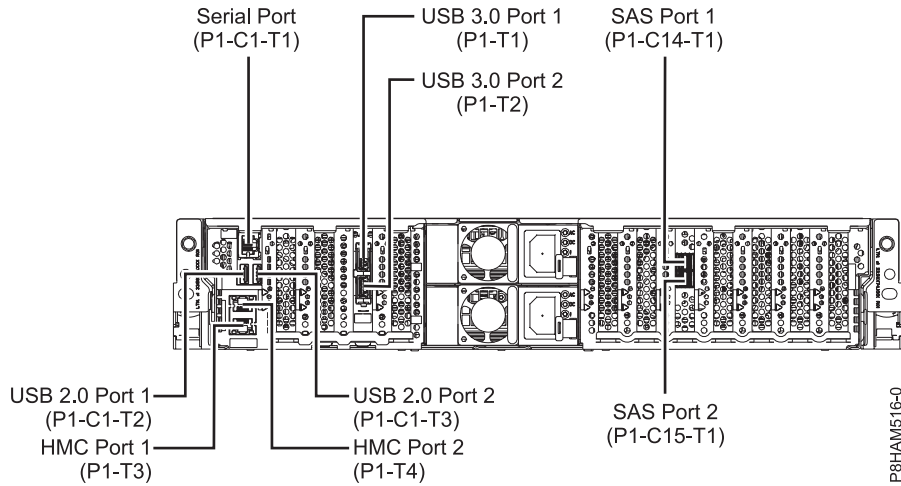


Figure 49. Connector locations for the expanded function 8247-21L, 8247-22L, and 8284-22A systems

Connector locations for the 8286-41A system

Learn about connector locations for the 8286-41A rack-mounted and stand-alone models.

The 8286-41A server provides cable connector locations via a SAS port for disk drive enclosures.

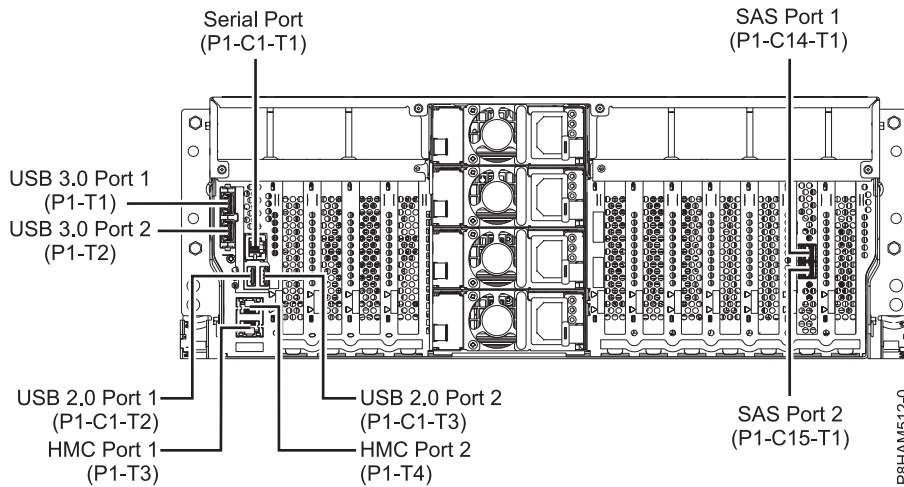


Figure 50. Connector locations for the rack-mounted 8286-41A (expanded function) system

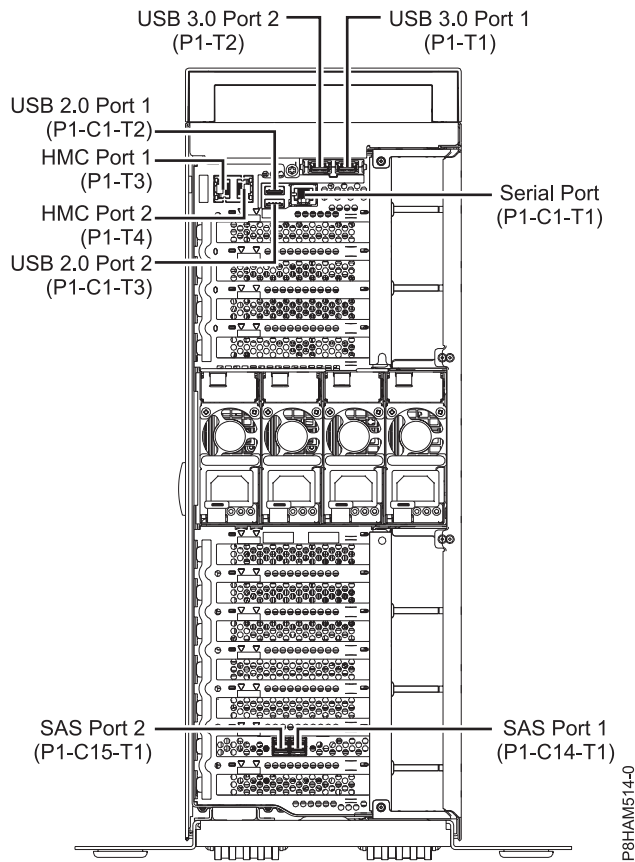


Figure 51. Connector locations for the stand-alone 8286-41A (expanded function) system

Connector locations for the 8286-42A system

Learn about connector locations for the 8286-42A rack-mounted models.

The 8286-42A (expanded function) server provides cable connector locations via a SAS port for disk drive enclosures.

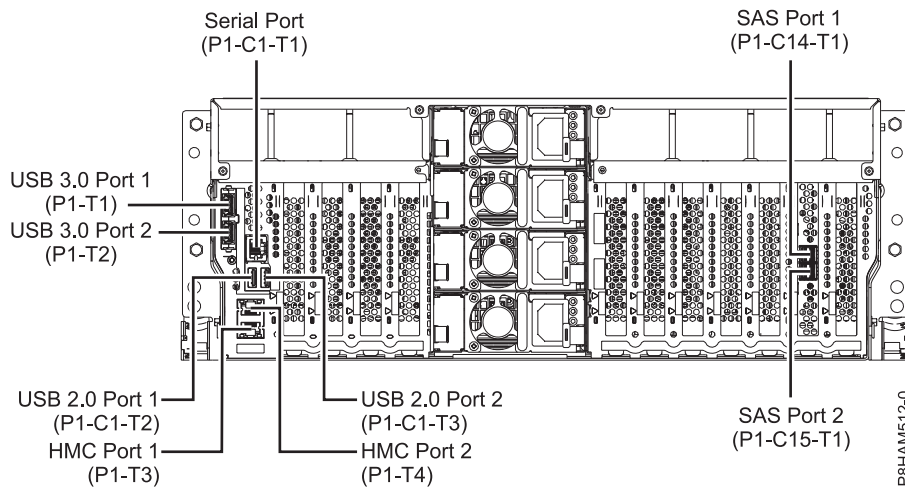


Figure 52. Connector locations for the 8286-42A (expanded function) system

Connector locations for the 8408-E8E system

Learn about connector locations for the 8408-E8E system.

The 8408-E8E server provides cable connector locations via a SAS port (P1-C5-T3) for disk drive enclosures and cable ports (P1-C5-T1 and P1-C5-T2) for the PCIe3 expansion drawer.

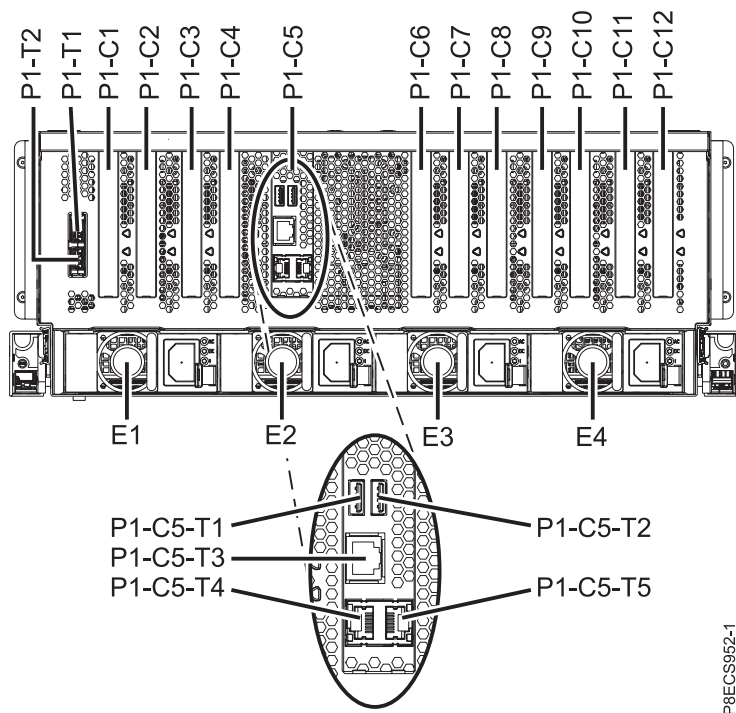


Figure 53. Connector locations for an 8408-E8E system

Connector locations for the 9119-MHE and 9119-MME systems

Learn about connector locations for the 9119-MHE and 9119-MME systems.

The 9119-MHE and 9119-MME servers provide cable connector locations for the PCIe Gen3 I/O expansion drawer.

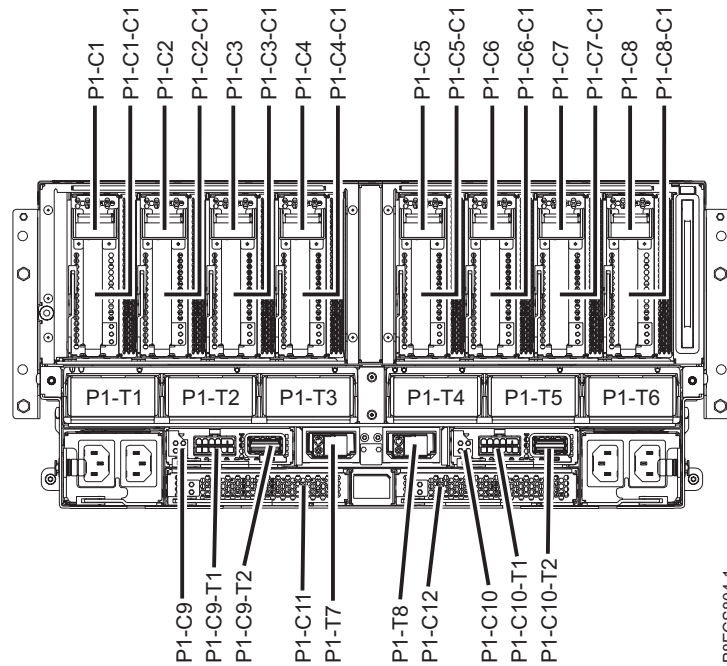


Figure 54. Connector locations for the 9119-MHE and 9119-MME systems

Connector locations for POWER7 servers

Learn about connector locations for POWER7® servers.

Model 8202-E4B connector locations

Learn about connector locations on rack-mounted and stand-alone models.

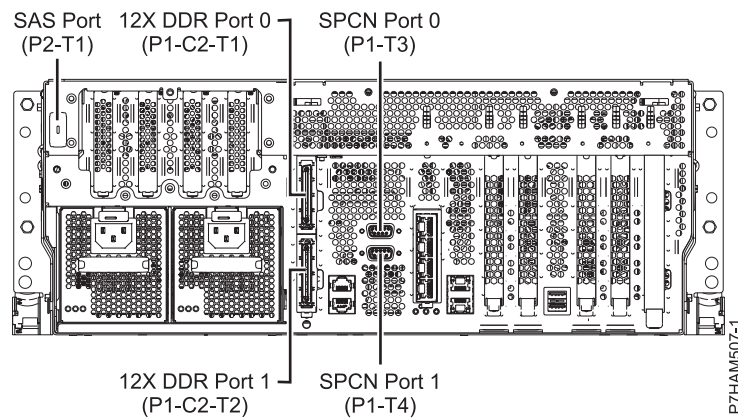


Figure 55. Model 8202-E4B connector locations on a rack-mounted model

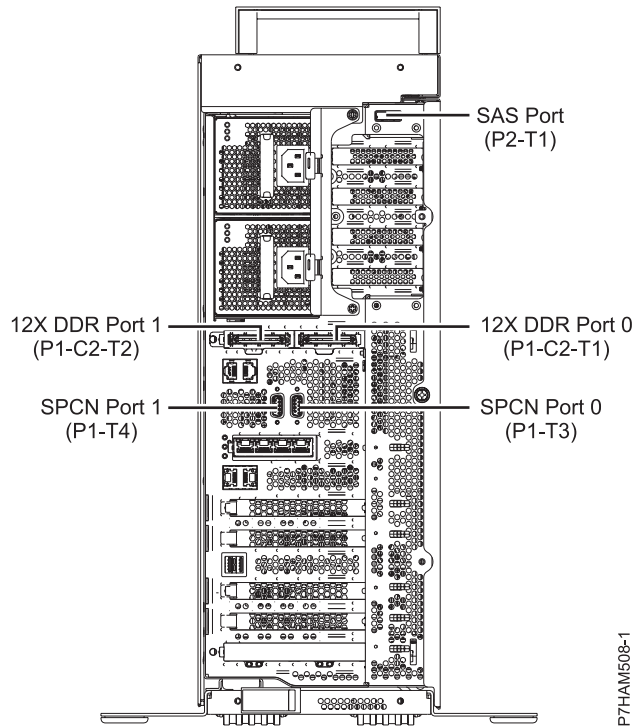


Figure 56. Model 8202-E4B connector locations on a stand-alone model

Model 8202-E4C connector locations

Learn about connector locations on rack-mounted models.

The 8202-E4C server provides cable connector locations for the following enclosures:

- Support for expansion units, as shown in the following figure, is as follows:
 - The card installed in the C1 slot can contain two 12X double data rate (DDR) cable ports. However, the C1 slot cannot provide both 12X DDR and PCIe cable ports.
 - The server contains a serial-attached SCSI (SAS) port.
- Support for disk drive enclosures, as shown in the following figure, is as follows:
 - The server contains a SAS port.
- Support for PCIe storage enclosures, as shown in the following figure, is as follows:
 - The card installed in the C1 slot can contain two PCIe cable ports. However, the C1 slot cannot provide both PCIe and 12X DDR cable ports.
 - The server contains a SAS port.

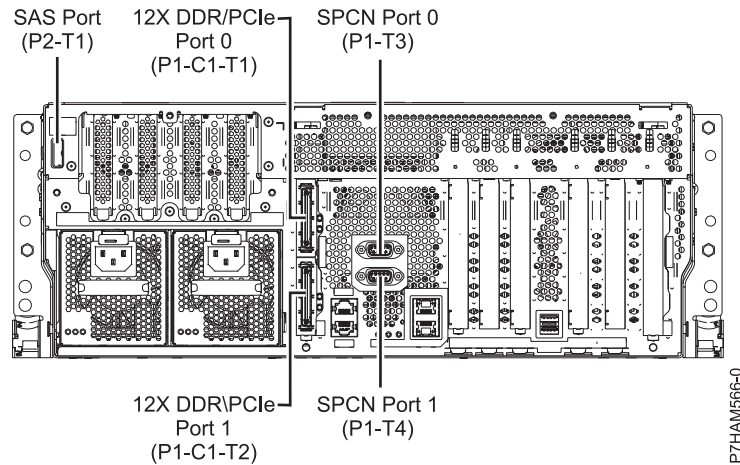


Figure 57. Model 8202-E4C connections for expansion units, disk drive enclosures, and PCIe storage enclosures

Model 8202-E4D connector locations

Learn about connector locations on rack-mounted models.

The 8202-E4D server provides cable connector locations for the following enclosures:

- Support for expansion units, as shown in the following figure, is as follows:
 - The card installed in the C1 slot can contain two 12X double data rate (DDR) cable ports. However, the C1 slot cannot provide both 12X DDR and PCIe cable ports.
 - The server contains a serial-attached SCSI (SAS) port.
- Support for disk drive enclosures, as shown in the following figure, is as follows:
 - The server contains a SAS port.
- Support for PCIe storage enclosures, as shown in the following figure, is as follows:
 - The card installed in the C1 slot can contain two PCIe cable ports. However, the C1 slot cannot provide both PCIe and 12X DDR cable ports.
 - The server contains a SAS port.

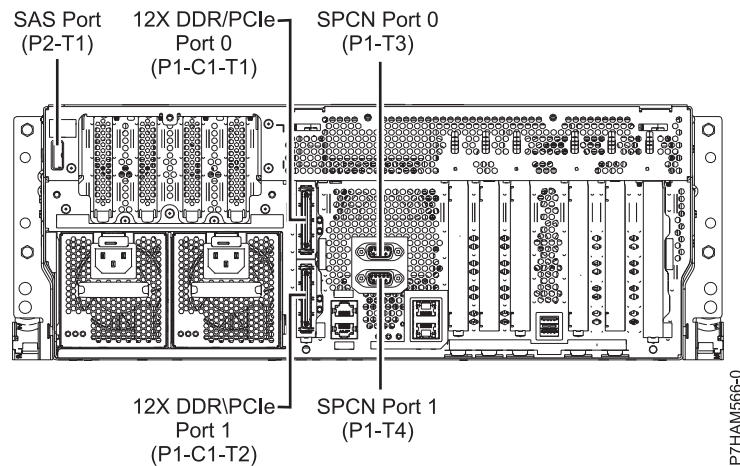


Figure 58. Model 8202-E4D connections for expansion units, disk drive enclosures, and PCIe storage enclosures

Model 8205-E6B connector locations

Learn about connector locations on rack-mounted and stand-alone models.

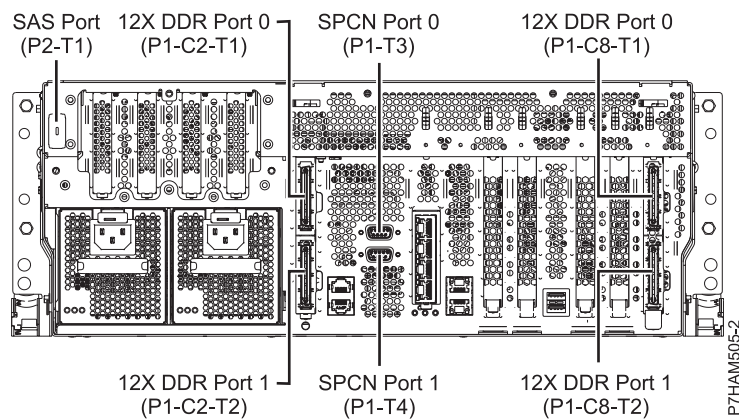


Figure 59. Model 8205-E6B connector locations on a rack-mounted model

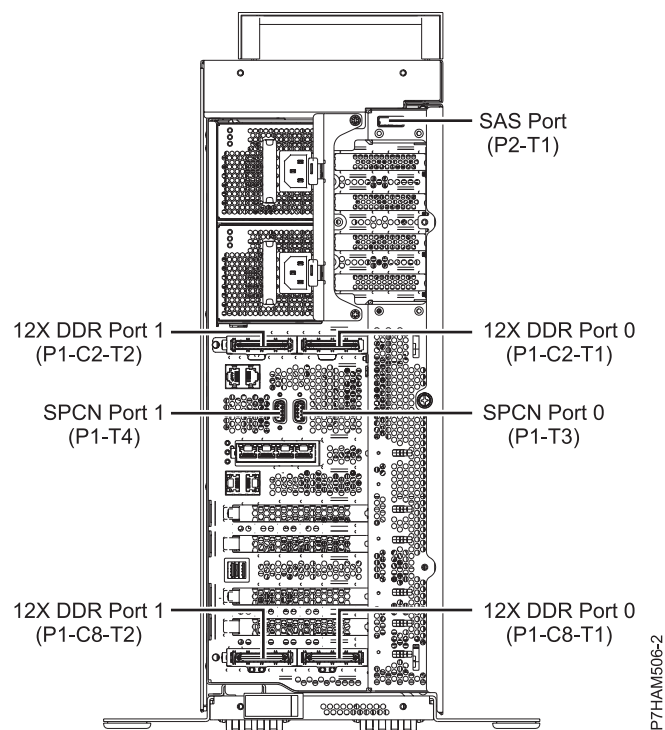


Figure 60. Model 8205-E6B connector locations on a stand-alone model

Model 8205-E6C connector locations

Learn about connector locations on rack-mounted models.

The 8205-E6C server provides cable connector locations for the following enclosures:

- Support for expansion units, as shown in the following figure, is as follows:
 - The card installed in the C1 slot can contain two 12X double data rate (DDR) cable ports. However, the C1 slot cannot provide both 12X DDR and PCIe cable ports.

- The card installed in the C8 slot can contain two 12X DDR cable ports. However, the C8 slot cannot provide both 12X DDR and PCIe cable ports.
- The port card type installed in the C1 slot can differ from the port card type installed in the C8 slot.
- The server contains a serial-attached SCSI (SAS) port.
- Support for disk drive enclosures, as shown in the following figure, is as follows:
 - The server contains a SAS port.
- Support for PCIe storage enclosures, as shown in the following figure, is as follows:
 - The card installed in the C1 slot can contain two PCIe cable ports. However, the C1 slot cannot provide both PCIe and 12X DDR cable ports.
 - The card installed in the C8 slot can contain two PCIe cable ports. However, the C8 slot cannot provide both PCIe and 12X DDR cable ports.
 - The port card type installed in the C1 slot can differ from the port card type installed in the C8 slot.
 - The server contains a SAS port.

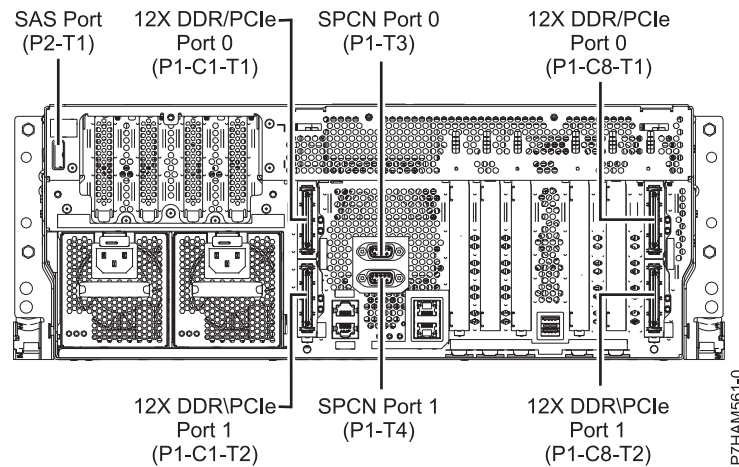


Figure 61. Model 8205-E6C connections for expansion units, disk drive enclosures, and PCIe storage enclosures

Model 8205-E6D connector locations

Learn about connector locations on rack-mounted models.

The 8205-E6D server provides cable connector locations for the following enclosures:

- Support for expansion units, as shown in the following figure, is as follows:
 - The card installed in the C1 slot can contain two 12X double data rate (DDR) cable ports. However, the C1 slot cannot provide both 12X DDR and PCIe cable ports.
 - The card installed in the C8 slot can contain two 12X DDR cable ports. However, the C8 slot cannot provide both 12X DDR and PCIe cable ports.
 - The port card type installed in the C1 slot can differ from the port card type installed in the C8 slot.
 - The server contains a serial-attached SCSI (SAS) port.
- Support for disk drive enclosures, as shown in the following figure, is as follows:
 - The server contains a SAS port.
- Support for PCIe storage enclosures, as shown in the following figure, is as follows:
 - The card installed in the C1 slot can contain two PCIe cable ports. However, the C1 slot cannot provide both PCIe and 12X DDR cable ports.
 - The card installed in the C8 slot can contain two PCIe cable ports. However, the C8 slot cannot provide both PCIe and 12X DDR cable ports.
 - The port card type installed in the C1 slot can differ from the port card type installed in the C8 slot.

- The server contains a SAS port.

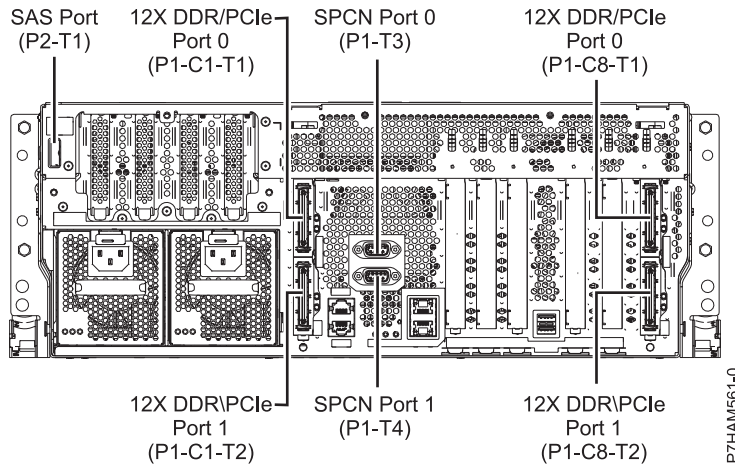


Figure 62. Model 8205-E6D connections for expansion units, disk drive enclosures, and PCIe storage enclosures

Model 8231-E1C connector locations

Learn about connector locations.

The 8231-E1C server provides cable connector locations for the following enclosures:

- Support for disk drive enclosures, as shown in the following figure, is as follows:
 - The server contains a serial-attached SCSI (SAS) port.
- Support for PCIe storage enclosures, as shown in the following figure, is as follows:
 - The card installed in the C1 slot can contain one PCIe cable port.
 - The server contains a SAS port.

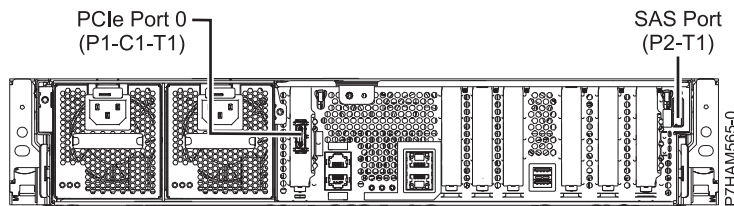


Figure 63. Model 8231-E1C connections for disk drive enclosures and PCIe storage enclosures

Model 8231-E1D or 8268-E1D connector locations

Learn about connector locations.

The 8231-E1D or 8268-E1D servers provides cable connector locations for the following enclosures:

- Support for disk drive enclosures, as shown in the following figure, is as follows:
 - The server contains a serial-attached SCSI (SAS) port.
- Support for PCIe storage enclosures, as shown in the following figure, is as follows:
 - The card installed in the C1 slot can contain one PCIe cable port.
 - The server contains a SAS port.

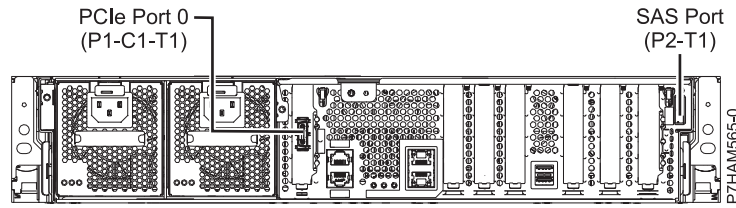


Figure 64. Model 8231-E1D or 8268-E1D connections for disk drive enclosures and PCIe storage enclosures

Model 8231-E2B connector locations

Learn about connector locations on rack-mounted models.

The 8231-E2B server provides cable connector locations for the following enclosures:

- Support for disk drive enclosures, as shown in the following figure, is as follows:
 - The server contains a SAS port.

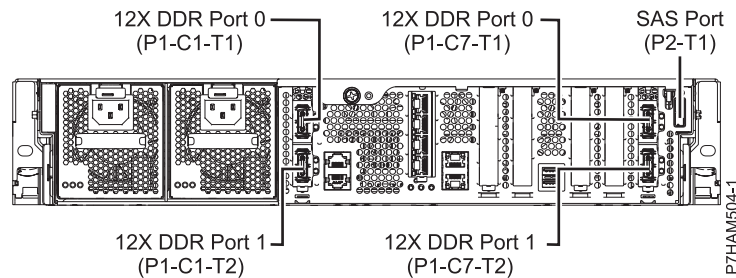


Figure 65. Model 8231-E2B connections for disk drive enclosures

- The 8231-E2B server provides no support for expansion units. The 12X DDR cable ports are for high speed system-to-system interconnection only.

Model 8231-E2C connector locations

Learn about connector locations.

The 8231-E2C server provides cable connector locations for the following enclosures:

- Support for expansion units, as shown in the following figure, is as follows:
 - The C1 slot must contain the system power control network (SPCN) card, and the C8 slot must contain the card with two 12X double data rate (DDR) cable ports.

Note: Installing the 12X DDR cable ports at this location causes both the C8 and C6 slot space to be occupied.

- The server cannot support both 12X DDR cable ports and PCIe cable ports at the same time.
- The server contains a serial-attached SCSI (SAS) port.
- Support for disk drive enclosures, as shown in the following figure, is as follows:
 - The server contains a SAS port.

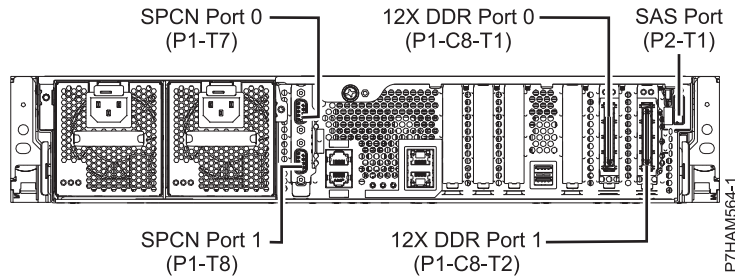


Figure 66. Model 8231-E2C connections for expansion units and disk drive enclosures

- Support for PCIe storage enclosures, as shown in the following figure, is as follows:
 - The card installed in the C1 slot can contain one PCIe cable port, and the card installed in the C8 slot can contain one PCIe cable port.
 - The server cannot support both PCIe cable ports and 12X DDR cable ports at the same time.
 - The server contains a SAS port.

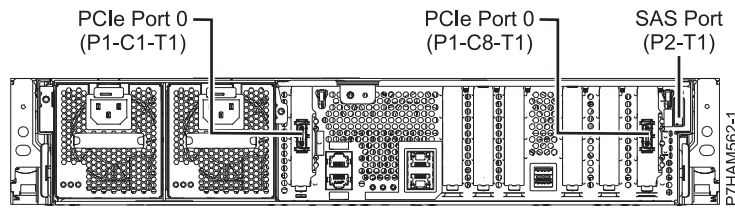


Figure 67. Model 8231-E2C connections for PCIe storage enclosures

Model 8231-E2D connector locations

Learn about connector locations.

The 8231-E2D server provides cable connector locations for the following enclosures:

- Support for expansion units, as shown in the following figure, is as follows:
 - The C1 slot must contain the system power control network (SPCN) card, and the C8 slot must contain the card with two 12X double data rate (DDR) cable ports.

Note: Installing the 12X DDR cable ports at this location causes both the C8 and C6 slot space to be occupied.

- The server cannot support both 12X DDR cable ports and PCIe cable ports at the same time.
- The server contains a serial-attached SCSI (SAS) port.
- Support for disk drive enclosures, as shown in the following figure, is as follows:
 - The server contains a SAS port.

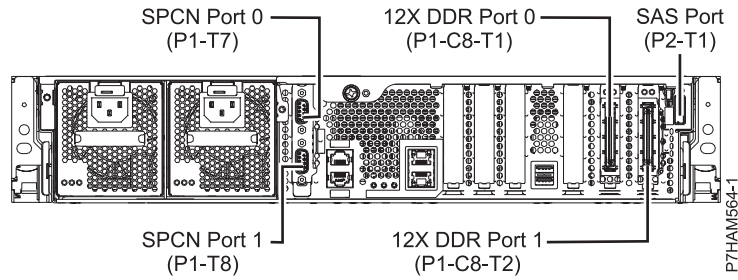


Figure 68. Model 8231-E2D connections for expansion units and disk drive enclosures

- Support for PCIe storage enclosures, as shown in the following figure, is as follows:
 - The card installed in the C1 slot can contain one PCIe cable port, and the card installed in the C8 slot can contain one PCIe cable port.
 - The server cannot support both PCIe cable ports and 12X DDR cable ports at the same time.
 - The server contains a SAS port.

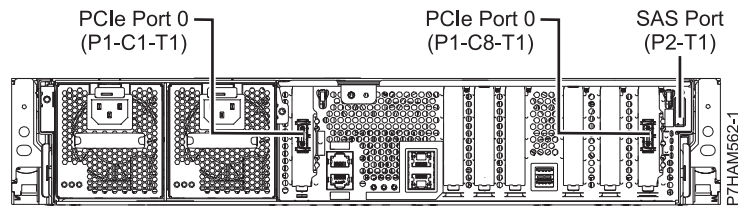


Figure 69. Model 8231-E2D connections for PCIe storage enclosures

Model 8233-E8B connector locations

Learn about connector locations on rack-mounted models.

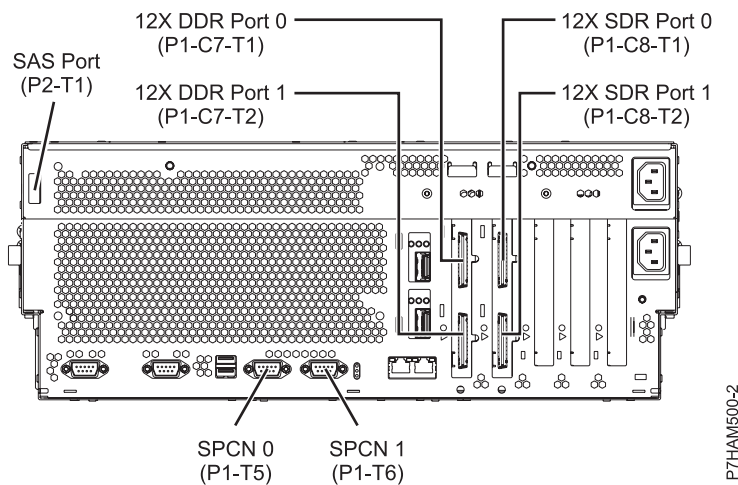


Figure 70. Model 8233-E8B connector locations on a rack-mounted model

Model 8246-L1S connector locations

Learn about connector locations.

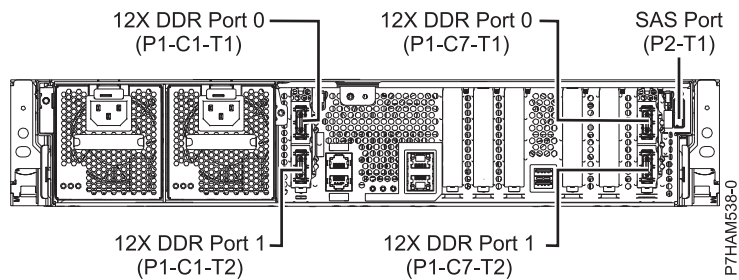


Figure 71. Model 8246-L1S connector locations

Model 8246-L1T connector locations

Learn about connector locations.

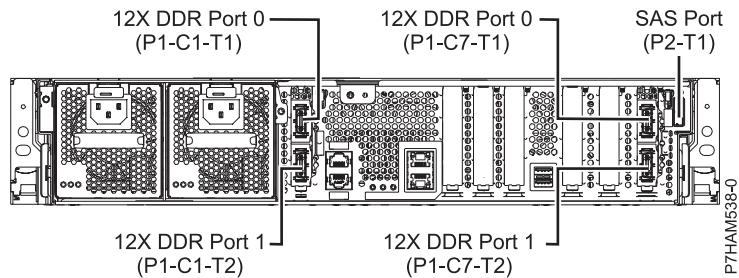


Figure 72. Model 8246-L1T connector locations

Model 8246-L2S connector locations

Learn about connector locations.

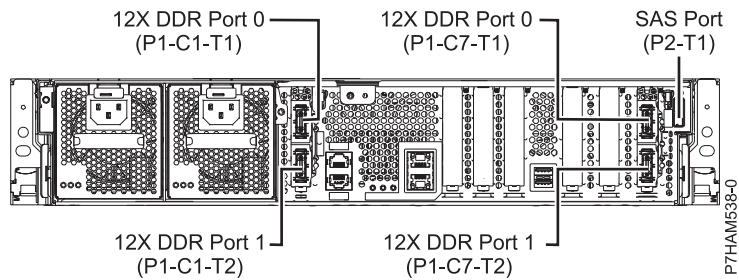


Figure 73. Model 8246-L2S connector locations

Model 8246-L2T connector locations

Learn about connector locations.

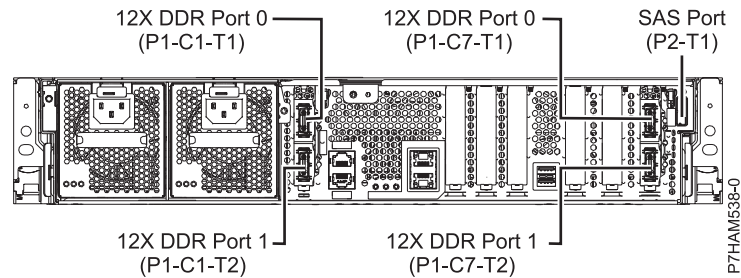


Figure 74. Model 8246-L2T connector locations

Model 8248-L4T, 8408-E8D, or 9109-RMD connector locations

Learn about connector locations.

The 8248-L4T, 8408-E8D, and 9109-RMD servers provide cable connector locations for the following enclosures:

- Support for expansion units, as shown in the following figure, is as follows:
 - The card installed in the C2 slot can contain two 12X double data rate (DDR) cable ports. However, the C2 slot cannot provide both 12X DDR and PCIe cable ports.
 - The card installed in the C3 slot can contain two 12X DDR cable ports. However, the C3 slot cannot provide both 12X DDR and PCIe cable ports.
- Support for disk drive enclosures, as shown in the following figure, is as follows:
 - The server contains a SAS port.
- Support for PCIe storage enclosures, as shown in the following figure, is as follows:
 - The card installed in the C2 slot can contain two PCIe cable ports. However, the C2 slot cannot provide both PCIe and 12X DDR cable ports.
 - The card installed in the C3 slot can contain two PCIe cable ports. However, the C3 slot cannot provide both PCIe and 12X DDR cable ports.

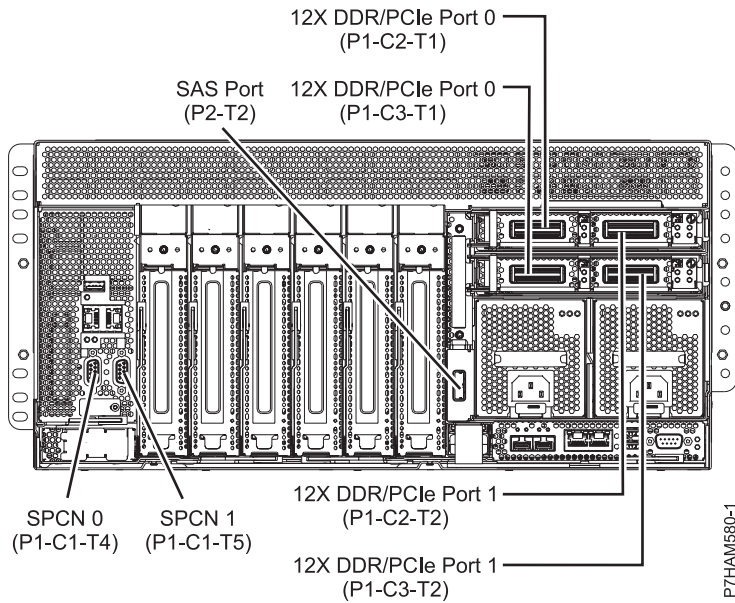


Figure 75. Model 8248-L4T, 8408-E8D, or 9109-RMD connector locations for expansion units, disk drive enclosures, and PCIe storage enclosures

Model 9117-MMB or 9179-MHB connector locations

Learn about connector locations.

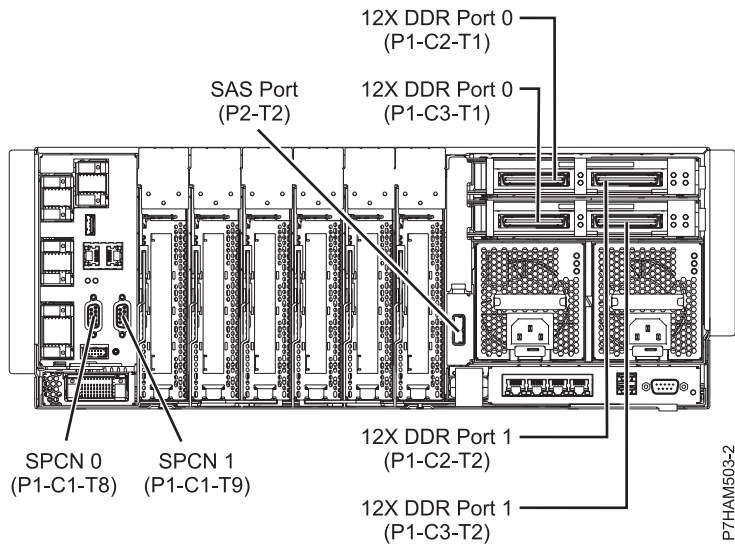


Figure 76. Model 9117-MMB or 9179-MHB connector locations

Model 9117-MMC or 9179-MHC connector locations

Learn about connector locations.

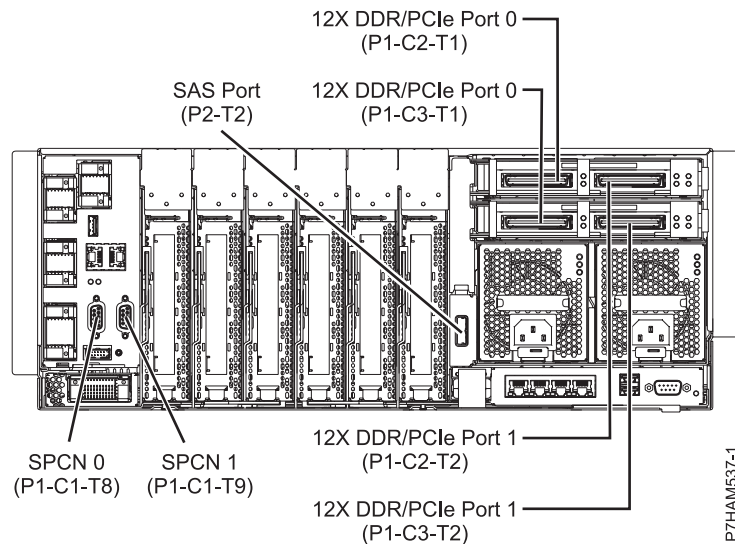


Figure 77. Model 9117-MMC or 9179-MHC connector locations

Model 9117-MMD or 9179-MHD connector locations

Learn about connector locations.

The 9117-MMD and 9179-MHD servers provide cable connector locations for the following enclosures:

- Support for expansion units, as shown in the following figure, is as follows:
 - The card installed in the C2 slot can contain two 12X double data rate (DDR) cable ports. However, the C2 slot cannot provide both 12X DDR and PCIe cable ports.
 - The card installed in the C3 slot can contain two 12X DDR cable ports. However, the C3 slot cannot provide both 12X DDR and PCIe cable ports.
- Support for disk drive enclosures, as shown in the following figure, is as follows:
 - The server contains a SAS port.
- Support for PCIe storage enclosures, as shown in the following figure, is as follows:
 - The card installed in the C2 slot can contain two PCIe cable ports. However, the C2 slot cannot provide both PCIe and 12X DDR cable ports.
 - The card installed in the C3 slot can contain two PCIe cable ports. However, the C3 slot cannot provide both PCIe and 12X DDR cable ports.

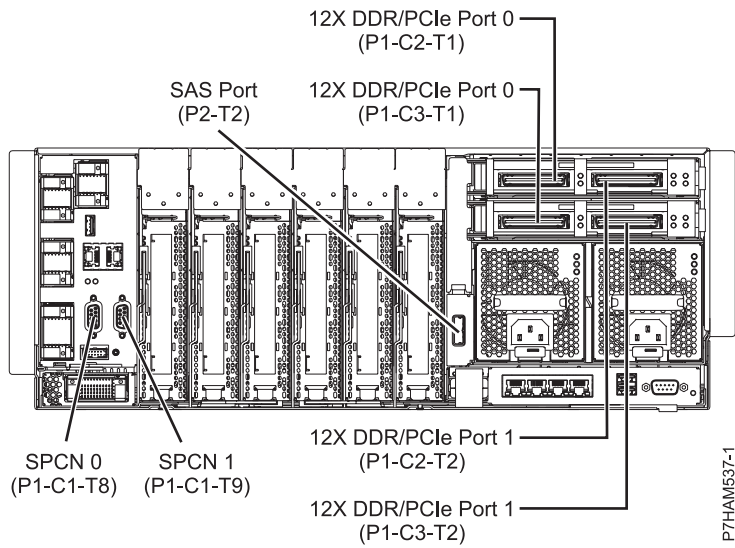


Figure 78. Model 9117-MMD or 9179-MHD connector locations for expansion units, disk drive enclosures, and PCIe storage enclosures

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Linux is a registered trademark of Linus Torvalds in the United States, other countries, or both.

Electronic emission notices

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

Class A Notices

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

Federal Communications Commission (FCC) statement

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

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

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

Industry Canada Compliance Statement

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:
IBM Deutschland GmbH
Technical Regulations, Department M372
IBM-Allee 1, 71139 Ehningen, Germany
Tele: +49 (0) 800 225 5423 or +49 (0) 180 331 3233
email: halloibm@de.ibm.com

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

VCCI Statement - Japan

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

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

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

Japanese Electronics and Information Technology Industries Association (JEITA) Confirmed Harmonics Guideline (products less than or equal to 20 A per phase)

高調波ガイドライン適合品

Japanese Electronics and Information Technology Industries Association (JEITA) Confirmed Harmonics Guideline with Modifications (products greater than 20 A per phase)

高調波ガイドライン準用品

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

声 明

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

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

Electromagnetic Interference (EMI) Statement - Taiwan

警告使用者：

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

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

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

IBM Taiwan Contact Information:

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

Electromagnetic Interference (EMI) Statement - Korea

이 기기는 업무용(A급)으로 전자파적합기기로서 판매자 또는 사용자는 이 점을 주의하시기 바라며, 가정외의 지역에서 사용하는 것을 목적으로 합니다.

Germany Compliance Statement

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

Dieses Produkt entspricht den Schutzanforderungen der EU-Richtlinie 2004/108/EG zur Angleichung der Rechtsvorschriften über die elektromagnetische Verträglichkeit in den EU-Mitgliedsstaaten und hält die Grenzwerte der EN 55022 Klasse A ein.

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

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

Deutschland: Einhaltung des Gesetzes über die elektromagnetische Verträglichkeit von Geräten

Dieses Produkt entspricht dem "Gesetz über die elektromagnetische Verträglichkeit von Geräten (EMVG)". Dies ist die Umsetzung der EU-Richtlinie 2004/108/EG in der Bundesrepublik Deutschland.

Zulassungsbescheinigung laut dem Deutschen Gesetz über die elektromagnetische Verträglichkeit von Geräten (EMVG) (bzw. der EMC EG Richtlinie 2004/108/EG) für Geräte der Klasse A

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

Verantwortlich für die Einhaltung der EMV Vorschriften ist der Hersteller:
International Business Machines Corp.
New Orchard Road
Armonk, New York 10504
Tel: 914-499-1900

Der verantwortliche Ansprechpartner des Herstellers in der EU ist:
IBM Deutschland GmbH
Technical Regulations, Abteilung M372
IBM-Allee 1, 71139 Ehningen, Germany
Tel: +49 (0) 800 225 5423 or +49 (0) 180 331 3233
email: halloibm@de.ibm.com

Generelle Informationen:

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

Electromagnetic Interference (EMI) Statement - Russia

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

Class B Notices

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

Federal Communications Commission (FCC) statement

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

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

If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

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

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

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

Industry Canada Compliance Statement

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

Avis de conformité à la réglementation d'Industrie Canada

Cet appareil numérique de la classe B est conforme à la norme NMB-003 du Canada.

European Community Compliance Statement

This product is in conformity with the protection requirements of EU Council Directive 2004/108/EC on the approximation of the laws of the Member States relating to electromagnetic compatibility. IBM cannot accept responsibility for any failure to satisfy the protection requirements resulting from a non-recommended modification of the product, including the fitting of non-IBM option cards.

This product has been tested and found to comply with the limits for Class B Information Technology Equipment according to European Standard EN 55022. The limits for Class B equipment were derived for typical residential environments to provide reasonable protection against interference with licensed communication equipment.

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取扱説明書に従って正しい取り扱いをして下さい。 VCCI-B

Japanese Electronics and Information Technology Industries Association (JEITA) Confirmed Harmonics Guideline (products less than or equal to 20 A per phase)

高調波ガイドライン適合品

Japanese Electronics and Information Technology Industries Association (JEITA) Confirmed Harmonics Guideline with Modifications (products greater than 20 A per phase)

高調波ガイドライン準用品

IBM Taiwan Contact Information

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台北市松仁路7號3樓
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Electromagnetic Interference (EMI) Statement - Korea

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Germany Compliance Statement

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

Dieses Produkt entspricht den Schutzanforderungen der EU-Richtlinie 2004/108/EG zur Angleichung der Rechtsvorschriften über die elektromagnetische Verträglichkeit in den EU-Mitgliedsstaaten und hält die Grenzwerte der EN 55022 Klasse B ein.

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Deutschland: Einhaltung des Gesetzes über die elektromagnetische Verträglichkeit von Geräten

Dieses Produkt entspricht dem "Gesetz über die elektromagnetische Verträglichkeit von Geräten (EMVG)". Dies ist die Umsetzung der EU-Richtlinie 2004/108/EG in der Bundesrepublik Deutschland.

Zulassungsbescheinigung laut dem Deutschen Gesetz über die elektromagnetische Verträglichkeit von Geräten (EMVG) (bzw. der EMC EG Richtlinie 2004/108/EG) für Geräte der Klasse B

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

Verantwortlich für die Einhaltung der EMV Vorschriften ist der Hersteller:

International Business Machines Corp.

New Orchard Road

Armonk, New York 10504

Tel: 914-499-1900

Der verantwortliche Ansprechpartner des Herstellers in der EU ist:

IBM Deutschland GmbH

Technical Regulations, Abteilung M372

IBM-Allee 1, 71139 Ehningen, Germany

Tel: +49 (0) 800 225 5423 or +49 (0) 180 331 3233

email: halloibm@de.ibm.com

Generelle Informationen:

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

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